Investigating the Barriers to Asphalt Shingle Recycling Within the City of Vancouver

Final Report
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Executive Summary

This report aims to present the barriers and subsequent recommendations as to how the City of Vancouver could increase the diversion of asphalt shingles from landfills to recycling programs. The information included within the report, in addition to the final recommendations, are intended to inform the City of Vancouver on the issue of asphalt shingle recycling, and to develop and create appropriate policies that will increase the diversion of asphalt shingles from landfills to recycling programs.

Organisation and Regulatory
Barrier: The lack of organisation and communication with the different groups of importance within the recycled asphalt shingle (RAS) industry in Vancouver, has resulted in the lack of an appropriate process flow procedure and a great deal of separation within the industry itself. These circumstances mean that it is difficult to be able to prove the presence or absence of asbestos within the captured shingle material.
Recommendation: A process flow procedure should be developed, incorporating input from all involved groups, to ensure that it is both acceptable and feasible.

Perception
Barrier: The perception of RAS as a ‘waste’ product, has prevented engineers and highway paving companies from utilizing RAS within their hot mix asphalt (HMA), as they do not want to work with products that are perceived to be inferior. Without appropriate resources documenting the utilization of RAS within current projects, this perception persists.
Recommendation: The City of Vancouver should reclassify asphalt shingles from ‘waste’ products, to ‘recyclable materials’. Test data from projects currently utilizing RAS should be collected and used, and various test roadways utilizing RAS should be constructed, to prove its performance within the context of Vancouver.

Market
Barrier: Gemaco’s location in Delta coupled with the lack of significant incentives to deposit shingles at a recycling facility rather than at a landfill site, limits the size of the market and therefore the volume of shingles that are deposited at Gemaco’s facility. While at the moment distribution of the recycled shingles is limited, by addressing the barriers of organisation and perception, the future potential barrier of market will become more relevant.
Recommendation: The attractiveness of depositing shingles at Gemaco’s facility rather than at landfill sites should be increased; Gemaco could consider offering pick-up services, bins to dump shingles at landfill sites and develop relations with certain bin companies. The City of Vancouver should offer incentives to recycle shingles, and should increase available information as to how to go about recycling shingles.

This report draws the conclusion that the increased diversion of asphalt shingles from landfills to recycling programs is both important and beneficial, and can be realized by the implementation of these suggested recommendations.
Background Information and Benefits

The asphalt shingles that are suitable for recycling, primarily originate from residential roofs that are often found on single-family dwellings and row house units, of which there is a combined total of 487,535 within Metro Vancouver (KC, 2012). The majority of larger-scale residential dwellings, such as apartment blocks, or commercial developments, such as office towers and warehouses, do not utilize asphalt shingles. Of these 487,535 suitable residential roofs, it is estimated that 67% are composed of asphalt shingles, with around 7% of the roofs being replaced every year (KC, 2012). This estimation provides a number of 22,865 roofs replaced every year, with these roof replacements generating around 35,000 tonnes of waste asphalt shingles (KC, 2012). The primary application for recycled asphalt shingles (RAS) is as a binding agent within hot mix asphalt (HMA) that is utilized within highway paving construction projects (ISUIT, 2013).

Environmental benefits include the reduced consumption of landfill space in addition to the reduced overall energy consumption, when comparing the utilization of RAS to virgin materials. The reduced consumption of landfill space is an important benefit, as it will contribute to the City of Vancouver’s “Greenest City: 2020 Action Plan”, which mandates a reduction of solid waste going to landfills and incinerators by 50%, between 2008 and 2020 (CV, 2011). Within an urban environment such as the City of Vancouver, there is a limited amount of space that can be devoted to landfill sites, and by utilizing increasing amounts of recyclable materials, will help to minimize the area occupied by these land uses. Keeping asphalt shingles from becoming waste materials and reducing the use of virgin materials, contributes to a reduction in overall energy consumption in the asphalt shingle manufacturing process. Every ton of utilized RAS, results in the saving of 2 barrels of bitumen and 60 tonnes of carbon dioxide, that would have otherwise been consumed and produced respectively, within the manufacturing process (Gemaco, 2014).

Economic benefits are focused on the cost savings that will result from the increased use of RAS, which only requires processing in order to be utilized, as opposed to virgin materials, which require the full manufacturing process. The rising cost of petroleum, which is an essential ingredient within the shingle manufacturing process, results in increasing economic savings to utilizing RAS. A statistic that illustrates these potential savings is that by using 5% RAS byproduct in HMA, savings ranging between $1 and $2.80 per ton are realised (Gemaco, 2014). HMA is primarily used in highway construction, and as these projects are often large in scale, these savings can be significant, and beneficial to any company that decides to bid for the project in question and include RAS within their HMA.
Method

This investigation has been informed through two research methods. First, a thorough and comprehensive literature review was undertaken, in order to gain an understanding of the issue of asphalt shingle recycling and to identify some preliminary barriers that exist. Second, the conducting of 4 interviews with key people and organisations that are integral to the asphalt shingle recycling industry within the City of Vancouver.

As the recycling of asphalt shingles is not incredibly widespread, literature pertaining specifically to this form of recycling was not readily available. However, there was relevant literature that provided useful information to two of the barriers to asphalt shingle recycling. The first issue that was explored within Elseifi et al.’s report, “New Approach to Recycling Asphalt Shingles in Hot-Mix Asphalt”, was the technical barrier to the utilization of RAS within real-world applications. The second issue that was identified within Kane Consulting’s “Market Analysis of Used Building Materials in Metro Vancouver” was how the presence or absence of end markets acted as a barrier to the RAS process.

The interviews proved to be an extremely useful form of research and provided the majority of information that will inform the final recommendations of this report. This is a summarization of the 4 interviews that were conducted:

1. Anonymous Informant. This interview was conducted with an industry professional who wishes to remain anonymous.
2. City of Vancouver Environmental Services Division. This phone interview was conducted with Rosalie Budau and Nicole Montgomery, who are part of the City of Vancouver ESD. This division is responsible for the hazardous materials testing process that is required by the City of Vancouver, prior to issuing a demolition permit.
3. City of Vancouver Kent Operations. This phone interview was conducted with Jeff Markovic, who is the key contact at the City of Vancouver Kent Operations, where the City of Vancouver’s asphalt plant is located.
4. Gemaco Sales Ltd.. This interview and site visit was conducted with Terry Charles and Hilary Hannah at Gemaco Sales Ltd., the sole asphalt shingle recycler within the Metro Vancouver region. Their operation is responsible for the physical processing that converts consolidated asphalt roofing shingles into ground asphalt.
Barriers

The barriers that have been identified through both the literature review and the various interviews have been separated and are listed individually below.

Organisation and Regulatory:
The principal barrier, identified in all 4 interviews, was that of organisation, and the fact that there are many different groups of people within the RAS industry in Vancouver, with very little organisation and communication between them. In addition to the 4 groups interviewed, there are many others associated with the RAS industry, ranging from small, independent roofers to much larger companies. Various governmental organisations provide recommendations and guidelines on issues including hazardous waste disposal (provided by Worksafe BC) and generic construction and demolition permits (provided by Worksafe BC and the City of Vancouver). However, there is no document or accredited procedure that relates to asphalt shingle recycling specifically, and the absence of this document is the center of the organisational barrier that exists. It is extremely difficult to coordinate such a large group of stakeholders, especially as there are many different priorities and agendas that exist.

Government agencies such as Worksafe BC and the City of Vancouver Environmental Services Division are responsible for providing guidelines for how to deal with specific issues of construction projects, such as hazardous waste disposal and permit approval. However, as stated earlier, there is no process in place that deals with the RAS industry as a whole, and unifies all government agencies, private companies and homeowners. Within the RAS industry in Vancouver there are 5 main groups of interest: government agencies (Worksafe BC and City of Vancouver), the asphalt shingle recycler (Gemaco Sales Ltd.), roofing, construction and demolition companies that remove the shingles from roofs, bin companies that transport the shingles to the recycler, and companies that utilize the recycled shingle product.

There is a significant amount of separation between the groups of interest, which results in confusion as to the expectations and requirements of certain organisations (Gemaco, 2014). It is the asphalt shingle recycler, Gemaco Sales Ltd., that is primarily responsible for the creation of a process flow system, but they are reliant on regulatory bodies to provide sufficient information for them to do so. However, there appears to be direct conflict between Worksafe BC and the City of Vancouver guidelines dealing with the testing for hazardous materials (specifically asbestos). According to Gemaco Sales Ltd., Worksafe BC stated that they require testing for every 100 tonnes inbound to the recycling facility, in addition to singular instances of airborne testing; the City of Vancouver has stated that they require airborne testing to be conducted for 30 consecutive days. Although the City
of Vancouver would ideally like this level of testing to be conducted, Worksafe BC is responsible for the testing itself, and informed Gemaco that after one day, they would not be returning to conduct more tests – they were satisfied that the asbestos hazard was not present (Gemaco, 2014). In addition to this lack of communication between Worksafe BC, the City of Vancouver and Gemaco, the testing for one day at Gemaco’s facility was reported as having cost $6,000; if the testing was required to be conducted for 30 consecutive days, the cost would escalate to $180,000 – a prohibitive cost for a relatively small-scale private operation (Gemaco, 2014).

This lack of organisation and communication within the RAS industry in Vancouver has resulted in the allowed existence of another extremely important barrier – the potential presence of asbestos within RAS. Asbestos is an extremely hazardous material, with fine fibres that can remain suspended in the air for a long period of time; workers exposed to asbestos-contaminated air can inhale the fibres, which can cause serious health problems and even death (WBC, 2012). Asbestos was included within some shingles in the 1960’s, 1970’s and 1980’s, due to its resistance to heat and fire, but due to its health hazards, it was banned in the 1980’s (Gemaco, 2014). Although it was only used for a relatively short period of time, it is now a potentially large problem, due to the uncertainty with how to deal with it, in the context of asphalt shingles. There are currently regulations as to how it must be dealt with within the construction and demolition industry, but these regulations do not always translate seamlessly between industries (CVKO, 2014).

Insufficient organisation and communication between the various groups within the RAS industry have allowed the existence of this barrier, as has the issue of bin companies. Bin companies are often responsible for transporting waste between construction/demolition sites and the appropriate facility. Without an appropriate system or regulations to track the loads that these companies carry, it is impossible to guarantee exactly what a bin brought to Gemaco’s facility may contain (Gemaco, 2014). Without an appropriate system recognized by all parties to ensure that all asbestos-contaminated material is disposed of correctly and separated from asbestos-free material, it is difficult to mitigate against this barrier (CVESD, 2014; CVKO, 2014; AI, 2014). There are two distinct groups of companies within the ‘upstream’ portion of the recycling process – that are responsible for the removal of shingles from roofs and subsequent transportation to Gemaco’s facility:

1. Small companies. These are usually roofing or construction and demolition companies that are often comprised of only a few employees and are not always the most reliable when it comes to adhering to regulations (Gemaco, 2014; CVKO, 2014). These companies are motivated solely through profit and try to minimize operating costs as much as possible. As many of these small companies are operating as ‘cash in hand’ businesses and are not always correctly licensed or particularly trustworthy, it is hard to gauge the exact size of this part of the
industry within Vancouver. Regardless, their lack of accountability presents a significant barrier to the organisation, communication and implementation of regulations.

2. Large companies. These are usually more general construction companies that have a greater number of employees and are far more reliable in terms of adhering to regulations (Gemaco, 2014; CVESD, 2014; CVKO, 2014). These companies are motivated through maintaining their reputation and providing high quality services. They are far more likely to follow guidelines put in place by organisations such as Worksafe BC and to obtain proper permits before undertaking any work, as they are better known and therefore more accountable to both the City of Vancouver and homeowners.

Perception:
According to Metro Vancouver’s Solid Waste Division, asphalt shingles that are removed from roofs within the Metro Vancouver area, which includes the City of Vancouver, are labeled a ‘waste’ product (MV, 2012). There is therefore a negative perception of the use of RAS, as municipal governments and their engineers do not want to use ‘waste’ products in the construction of roads (Gemaco, 2014). Although RAS has been proven to be a technically equivalent substitute, the perception that it is a waste product means that many people see it to be inferior, and are subsequently unwilling to utilize it.

With asphalt shingles perceived to be a ‘waste’ product, in addition to the fact that no universally accredited documentation process exists, that explicitly specifies how to recycle asphalt shingles within the context of the City of Vancouver, this issue of perception will be hard to directly address. The negative perception of RAS seems to stem chiefly from engineers who are responsible for incorporating the recycled product within their mix designs for HMA (Gemaco, 2014). This is a significant barrier, as without the support of these engineers for the increased use of RAS within road construction, both municipal and private contractors will be unwilling to utilize RAS in projects in which they are involved.

This issue of perception is magnified by the lack of available resources that document the utilization of RAS within highway paving projects (Gemaco, 2014). While RAS is utilized within various US states, including Missouri, California, Colorado, Illinois, Indiana, Iowa, Minnesota, Washington and Wisconsin, there is variation within each of the usage contexts. For example, a different recipe for HMA required for highway paving construction projects, may be present in different states, meaning that it is hard to quantifiably compare the performance of RAS in these different projects (ISUIT, 2013). While the majority of the transport agencies for these different states have commissioned a section of highway to be constructed utilizing RAS for testing purposes, it is hard to
compare the performance of one state’s projects to another, as there are many variables to be considered (ISUIT, 2013). These variables include the percentage of RAS to be included within the HMA itself, the recipe for the HMA (which is usually different for different companies and municipalities) and the climate of the state in question, as the ingredients of HMA often vary depending on the climatic area that the highway paving will be located within (ISUIT, 2013).

**Market:**
This is a relatively small barrier when compared to those above, but is important nonetheless. Currently, Gemaco is the only shingle recycler within the lower mainland, with no recyclers existing within the City of Vancouver itself. As such, a much larger potential market exists for them, than the one they are currently serving. As Gemaco’s facility is located in Delta, which is not central to the City of Vancouver, it is not a particularly attractive proposition for roofers and construction and demolition companies to make the journey to Delta. Its location, in addition to the lack of significant incentives to encourage the deposition of shingles at the facility rather than at the landfill, and the lack of knowledge of the facility’s existence, certainly limit the potential market. Currently, Gemaco charges tipping fees of $45/tonne, whereas at the City of Vancouver landfills, the fees are $108/tonne (Gemaco, 2014). Although this is a relatively large price difference, it is clearly not enough to attract companies and homeowners that are located closer to landfill sites. While at present, the challenge Gemaco is facing is lack of distribution due to the organisation and perception barriers that exist, once these barriers are overcome, they will be able to serve a larger market and accept and process more product than they are currently attracting.
Recommendations

These recommendations are designed to inform the City of Vancouver as to how best to increase the diversion of asphalt shingles from landfills to recycling programs. The three recommendations are designed to address the barriers identified above: organisation and regulatory, perception and market.

Organisation and Regulatory:
To address the organisation and regulatory issues, an all-encompassing process flow procedure should be developed. While the responsibility of this process development currently lies with Gemaco, this recommendation suggests that it is developed with input from all involved groups, ensuring that it is both acceptable and feasible. To create this process flow procedure, more roundtable meetings should occur, similar to the meeting that occurred in the first week of March 2014, that facilitated discussions between paving companies, the City of Vancouver, Metro Vancouver, Gemaco and a representative from King County, Washington’s Solid Waste Division. These additional meetings should include a representative from a small number of roofing and construction and demolition companies, in order to integrate that particular part of the process with all others. These roundtable meetings should be held with three clear goals:

1. The creation of a process flow procedure – who will be responsible
2. The critiquing, verification and acceptance of this procedure
3. Ensuring that the final procedure is acceptable to and feasible for all involved groups

As the roundtable discussion held in March 2014 included a representative from King County, Washington’s Solid Waste Division, it would be possible to use an accredited procedure from the US, to inform this one as a starting point. However, it must be adapted to ensure it is appropriate for the local context of the City of Vancouver. Within the process of designing the procedure, clear communication must be established between all involved groups, ensuring that individual responsibilities are understood. Existing guidelines must also be clarified; for example, Worksafe BC’s definition of a ‘qualified person’ is not stringent enough for the City of Vancouver’s Environmental Services Division, which often finds problems with reports carried out by people that are less qualified than they would like.

Below is a recommended process flow procedure that provides suggestions for all required steps, from what is required before work can start, to what is required in order for Gemaco to accept shingles to their recycling facility. This process incorporates Worksafe BC’s existing asbestos abatement process as well of City of Vancouver guidelines into a more all-encompassing procedure.
• A house/building is to have a new roof
• An accredited roofing company is contacted to come and survey the roof
• If the roof is older than 1990, it must be sampled
• The building owner or the employer retains a qualified person (usually a consultant) to perform a risk assessment and asbestos survey before conducting work where asbestos may be disturbed
• The qualified person inspects the house/building, collects representative bulk samples, and has the samples analyzed by a qualified laboratory – according to Worksafe BC OHS Guidelines, for a roofing surface of around 1000 ft² at least one sample for each layer of material must be taken
  o Copies of the results should be kept on file by the lab, and given to both the testing company and the home owner
  o If the test samples reveal asbestos is present, the testing company must submit a report to Worksafe BC and notify the home owner
• The qualified person prepares a report that identifies all inspection results (including drawings, plans or specifications), risk assessment, and scope of work for the abatement of the asbestos
  o The report containing the inspection results is provided to the owner/employer – the inspection results must be available at the worksite whenever workers are on site
  o The owner or employer retains trained asbestos abatement workers
  o A notice of project (NOP) with written work procedures is submitted to Worksafe BC before commencement of asbestos removal work
  o Safe removal and disposal of identified asbestos occurs
  o After the asbestos removal the owner or employer receives written confirmation that the asbestos specified for removal on the NOP has been removed – a copy of the inspection results is on site
  o The owner authorizes demolition of the house/building or removal of the roof to proceed
  o The demolition employer proceeds to demolish the house or remove the roof using safe work procedures (copy of inspection results and post-abatement reports are on site)
  o If any asbestos is found during demolition, all work is to cease until a new risk assessment in performed, and the asbestos is safely contained or removed
• If the samples reveal no asbestos, it should be recycled
  o Taken to Gemaco’s facility
  o Picked up by a Gemaco pick-up service
  o Taken to the landfill and deposited in a recycling specific bin
• In order to be recycled, Gemaco should require a lab test report, proving and ensuring that no asbestos is present in the shingles and none enters their facility
  o Asbestos testing should be done before shingles arrive at facility – test reports must be submitted before shingles can be accepted
  o Asphalt shingle recycling facilities should be required to document the source of the post-consumer shingles accepted at their facilities
  o Recycling facilities should screen in-coming loads to ensure no hazardous materials are accepted and loads do not exceed ten percent by weight of non-shingle material (ensuring consistent quality)
  o Documentation of the source and tonnages should be required to be kept on file and available for review
  o Recyclers should monitor their intake, as newer post-consumer shingles may contain lower asphalt contents and lower binder viscosities, compared to older post-consumer shingles which may have binder that is stiffer due to more aging and higher asphalt contents
• Regular air testing for airborne asbestos should occur at Gemaco’s facility, in order to satisfy Worksafe BC guidelines
• Regular testing of ground shingle piles at Gemaco – more than once every 100 tonnes to prove that no asbestos is present, possibly once every 25/50 tonnes (whichever is more acceptable)
• As asbestos is now extremely unlikely to be accepted at Gemaco’s facility, and therefore even more unlikely to be included in their product, downstream customers should be confident in the asbestos-free and consistent nature of the product

Perception:
In order to address the barrier of the perception of asphalt shingles, two recommendations are listed below. They are designed to work together and inform one another, but they are distinctly different.

1. The City of Vancouver (as well as Metro Vancouver and its constituent municipalities) should reclassify asphalt shingles that have been removed from roofs, from ‘waste’ products, to ‘recyclable materials’. This would help change the perception, as the shingles will no longer have the connotation of waste associated with them, and will instead be associated with other legitimate recyclable materials

2. To showcase the performance and durability of RAS within highway paving construction projects, test data from US municipalities that have had experience with RAS, should be used. The way in which these municipalities have incorporated RAS into their highway paving should be examined, and used to help inform highway paving construction within the context of Vancouver. In addition
to the utilization of test data, a section of highway, residential roadway and parking lot, using different amounts of RAS incorporated within it should be constructed, in order to both showcase its performance and durability, as well as to test these two variables and their suitability within the climate of Vancouver.

There is an opportunity to examine the types of road standards within areas of similar climatic conditions that accept RAS, in order to ascertain if equivalent road standards exist. For example, would the road standards of a primary road with a 50mph speed limit in one of the US states that already uses RAS within road construction, be equivalent to a primary road with an 80kph speed limit in the Metro Vancouver region. The comparison of road standards could potentially provide some interesting information.

Market:
To address the barrier of limited markets interested in depositing shingles at Gemaco’s facility, a number of recommendations are listed below. These recommendations all aim to increase the attractiveness of depositing shingles at Gemaco’s facility, over deposition at landfill sites.

1. Gemaco should offer pick-up services. These should be offered for a fee and only to projects that are large enough to economically justify the service. Gemaco should require copies of relevant documents such as lab reports, before pick-up of the shingles, so there is no wasted time or money by either party.
2. Gemaco should offer bins to dump shingles at Vancouver landfill sites. These bins should be offered at a cost that is lower than the generic tipping fee, but accounts for the fact that Gemaco will have to collect these shingles at some point.
3. The City of Vancouver should offer incentives to people/companies that recycle shingles. These incentives could include credit towards new shingles at certain home improvement stores for homeowners, and certain tax breaks for companies that deposit shingles at recycling facilities rather than landfills.
4. Gemaco should develop relations with certain bin companies. This would ensure that the companies are legitimate and follow proper protocols. Partnerships could be formed, where perhaps Gemaco would give more business to bin companies that only work with roofing and construction and demolition companies that provide proper documentation.
5. The City of Vancouver should provide a list of locations that accept shingles for recycling. This list should include information on how to go about recycling shingles, and should be available on the City of Vancouver website.
Conclusions

This report draws the conclusion that the increased diversion of asphalt shingles from landfills to recycling programs is both important and beneficial, and can be realized by the implementation of the suggested recommendations. The report and supporting research is not designed to explore barriers and suggest recommendations in a generic sense, but rather within the specific context of the City of Vancouver. The research presented here is designed to act as a starting point for the City of Vancouver, if further research is conducted on this matter.

Suggestions for further research are twofold. Firstly, the conducting of two interviews with highway paving companies – one that either uses or has used RAS within their HMA in the past, and one that has not. These interviews would provide useful information and would help to inform the process flow procedure more completely. Secondly, the quantitative analysis of the performance of RAS within HMA in all available US states – a good starting point for this analysis could be the report produced by ISUIT in 2013, as well as using information from additional municipalities such as King County, in Washington. This analysis would be extremely useful for engineers, as it may help them better understand how to effectively incorporate RAS into their HMA designs.
Works Cited


CVESD (City of Vancouver Environmental Services Division), 2014. Information from interview conducted with Rosalie Budau and Nicole Montgomery from the City of Vancouver’s Environmental Services Division.

CVKO (City of Vancouver Kent Operations), 2014. Information from interview conducted with Jeff Markovic from the Kent Operations asphalt plant.


Gemaco, 2014. Information from interview conducted with Terry Charles and Hilary Hanna from Gemaco Sales Ltd..


Works Consulted


Appendix

Images taken from a site visit to Gemaco in February 2014, showcasing the different stages in asphalt shingle recycling.
Unedited interview conducted with Anonymous Informant, 2014.

1. Does all roofing have to be checked for asbestos, or just roofing that is suspected of being older than 1983?
A date was set for around 1990 – all roofs constructed earlier than this time have to be tested. There is a Worksafe BC guideline that talks about asbestos in general – complete survey o be conducted for buildings older than 1990. 1990 date makes sense – residential roofs rarely last that long. Mid 80’s phasing out asbestos. More than one layer: when you do a survey, you look at how many layers. Older layers – you sample. Roofers refuse to shingle on top of old roofs – warranty.

2. How significant of a problem do you see asbestos in asphalt shingles to be?
Not much.

3. How many companies follow correct testing protocols?
WBC regulations exist preventing lying: 20.112. Any building to be tested must be looked at for asbestos. There has been difficulty dealing with surveyors and demolition contractors – not following testing protocols.

4. How much would it cost to test roofing? How many samples are necessary?
On www.worksafebc.com – G20.112 OHS guideline. Table tells you how many samples you need to take. Roofing materials, one samples for a roof of less than 1000 ft².

5. Are there regulatory barriers in place that limit the use of recycled asphalt in Metro Vancouver due to potential asbestos contamination? How significant do you believe the health and safety issue is, for either workers recycling asphalt shingles or working with materials that contain recycled asphalt shingles?
Don’t know – it would be a bylaw or environmental regulation. Considered a hazardous material/waste. Depends – the shingles are non-fryable. Have to be ground up before asbestos could get out. Air samples done to test asbestos – has been done/can be done. Suspicion that stuff going in – very unlikely. Still have obligation to test if there is any doubt.

6. How long does the laboratory analysis process to determine the presence of asbestos take and is there any way to speed it up? How much does it cost? Are mobile test units a viable option?
Half an hour at the most. Dissolve the asphalt with solution and look for asbestos. Reason that there is a turnover – busy lab or not. Sending samples down to the USA – cheaper. Depends on how fast the surveyor works. Cost – depends on location. $8 per piece in USA. $25/30 in Canada. As high as $50. Volume and care dependent – lab dependent.
Cheaper labs run samples quickly. Lots of labs that do sampling in town. Not necessary – can get samples rushed. Can get them set up – has been done – ventilation, microscope set up. Mobile labs set up at facility (eg. Chevron and Burnaby) to get the samples analysed immediately.

7. Is there any kind of mandatory testing or education that all roofers must complete before they are allowed to work in environments where asbestos may be present? In guidelines. Before any work is done, asbestos has to be tested for. Homeowners who are going to do work, if house is older than 1990. Survey to be done.

8. From talking to another group associated with this problem, the issue of bin companies has been raised – when a bin company removes waste from a construction site it mixes a lot of different kinds of waste together – roofing waste with non-roofing waste, as well as waste from different sites. Is there any way that regulations could be put in place that make bin companies track their waste more carefully, and therefore keep asbestos contaminated waste away from waste that has not been contaminated by asbestos.
According to Worksafe BC, asbestos material has to be contained in double bags. Shouldn’t be any asbestos there in the first place.

9. Is a chain of custody type process a viable option for keeping track of asbestos within shingles in Metro Vancouver? What barriers would such a process face? Honest people will fill them out properly. Lying people won’t tell the truth. Won’t be any left in 20 years in shingles.

10. At present there seems to be a disconnect between shingle recycling companies and Worksafe BC. Is there any possibility of Worksafe BC being able to work more closely with these companies to implement a policy/set of regulations that clearly lay out what must be done by a shingle recycling company in order to ensure potential customers that they are following a set form of guidelines/procedures and therefore instill a sense of confidence in the customers of these recyclers that they are purchasing a high quality, regulation-approved product?
Honesty. Look at drywall – same problems. Honesty, honesty, honesty. Don’t take precautions. Dump stuff to save money. Recycling is a great idea, have to deal with stuff. Can’t just dump stuff. Trying with shingles and drywall. Depends on honesty of people doing work. People don’t care. Doesn’t always work in the real world. Payment break/tax break – anything better than nothing? Right now – no incentive to do it right and lots of incentive to do it wrong. Benefit – health to do it right. Con – putting people’s health at risk. Drywall recyclers ask to see proof in form of lab result. Make lab results mandatory? Maybe if you send stuff to recyclers, you get a disposal ticket to drop off other stuff free.
of charge. Main obstacle: people. Not in the commercial building area – they are bigger employers – they have lots of people to deal with asbestos properly – long track record. Unregistered companies are the worst kind. Enough law – not perception problem.

Unedited interview conducted with Rosalie Budau and Nicole Montgomery from City of Vancouver Environmental Services Division, 2014.

1. Describe your role with the City of Vancouver and how it relates to hazardous materials testing and worker protection.

We do a review of the demolition permit application. Those applications have a declaration of inventory of HM of building to be demolished. Also intake the hazardous materials survey required by WBC – intake report and review prior to review of permit.

2. How significant of a problem do you see asbestos in asphalt shingles to be? Have seen asphalt shingles come back twice in all reports reviewed (1000s).

3. Could you explain the hazardous materials testing process that the City of Vancouver requires prior to issuing a demolition permit?

WBC has guidelines – guideline indicates that all possible asbestos containing materials in a building have to be tested. 1-3 samples depending on size of building. Analyzed at lab and compiled into report. City doesn’t have specific requirements of its own. WBC requires a report – hazardous materials. City requires that WBC compliant report be submitted to city. Construction guideline 20.

4. Do you see any shortcomings with the current hazardous materials testing process?

Biggest problem – WBC has – definition of a qualified person. Assessments/sampling of materials have to be done by ‘qualified’ person. WBC defines ‘qualified’ as very broad. Challenging to eliminate people that are not properly qualified. Dishonesty in industry. Fraudulent work done – report written, but forged lab results. That’s why City started taking reports – to review them. Vancouver does more reviewing than anywhere else in BC.

5. Would you say that the majority of individuals and companies within construction and demolition industry in Vancouver follow correct testing protocols, as outlined by the City of Vancouver?

Review done to stop any glaring errors/suspicious reports/new consultant – reports referred off to WBC for investigation and compliance sampling. Hopefully bad reports get stopped before there is a further issue. Deconstruction is a special case – number of
contractors is fairly limited. Not necessarily a cost effective approach. Work that is done properly – more so than traditional demolition.

6. Is there a specific reason that the City of Vancouver does not require a permit for re-roofing, especially considering the issues of asbestos contained within asphalt roofing shingles?

City of Vancouver doesn’t require a permit for removal. City side – in order require a permit, there has to be something in a bylaw (doesn’t have a bylaw). Recladding/re-roofing – cosmetic as opposed to structural – don’t require a City permit. Roofing company should have suspect material tested, and if it does contain asbestos, it would have to be removed following proper procedures. Any asbestos abatement project – WBC requires a notice of project to be filed a minimum of 24 hours before work commences. City doesn’t deal with roofing in isolation – doesn’t know how often that happens.

7. Are there barriers that the City of Vancouver faces when implementing regulations for the construction and demolition industry?

New or existing – difference. Hazardous materials report – requirement to provide surveys. City policy – invoked as City’s regulatory responsibilities. Require submission of surveys. Can invoke clauses of building code. Building code is more general/not specific to what materials are beyond main definition of hazardous. To add a specific piece of regulation – more challenging. To change a regulation/add something to bylaw – has to be written, brought to council. Building bylaws only change every 2-4 years. Not a piece of the City’s bylaws that is updated regularly – try and do large scale (packaged) reviews – not on a regular basis. Because it does have to get council approval – adds a challenge to getting changes in.

8. What are the general attitudes relating to regulations within the construction and demolition industry?

Starts to be segment specific – larger/commercial projects are far more on board with any sorts of programs. Challenges often lie with single family speculation builders (eg. to flip house) – resistant to anything that increases construction cost – impacts bottom line. Nature of the spec. building industry – competitive and narrow margins. Everything is time press to them – to have to do a large scale abatement can slow down timeline – add costs. Every time you add a layer of regulation – adds cost. Reputable people will increase cost to consumer of job. Non-reputable people won’t increase costs – try to cut costs and quality. Reputable people lose jobs because of low costs of for non-reputable people.

9. What barriers are currently in place that limit the use of recycled construction or demolition materials in Metro Vancouver? Do you believe there is a health and safety issue, for workers working with recycled construction materials?
Depends if you’re talking actual recycling and remanufacturing or up-cycling. Don’t know that there is anything specific. Specifically roofing materials – imagine that any facility to take in shingles could use same protocol that gypsum uses. Requiring testing materials. Not-fryable – monitoring material coming in. Asbestos hasn’t been used in roofing for a long time – number of homes that have it would be smaller.

10. How is the use of recycled material viewed within the construction and demolition industry?
Not that she’s aware of. Deal with demolition end – less stuff on other end. Depending on homes, there is a market segment that is interested in green construction. Projects are marketed on that aspect – could be segment interested in that kind of thing. Larger scale project – LEED certification.

11. What would be required to address these issues/concern/barriers?
A lot of single family constructions – spec. building or people building custom for them selves. Custom segment – difficult to know individuals requests. Spec. segment looking for cost benefits.

Unedited interview conducted with Jeff Markovic from City of Vancouver Kent Operations, 2014.

1. How significant of a problem do you see asbestos in asphalt shingles to be?
Very significant. Without a system to deal with it, it is a liability. All about elimination of the liability. Regardless of the requirement (0.5%) by WBC, even below that, the perception that any type exists, is viewed negatively. Probably biggest factor in being able to use product. Environmental and health and safety issues. Even half a percent that is allowed, mixed into more asphalt, diluted, but still a problem perception.

2. Does the asphalt shingle recycler operating in the Metro region follow correct testing protocols?
Not sure. Asked them if they are following same procedures as asphalt producers as America – laid out by organisation. Various US based ones that have similar steps that you need to take, but in saying that, correct criteria for local market I shard to establish. Part of the construction materials recycling association – their criteria acceptable within lower mainland. Who is putting down regulations.

3. What barriers are currently in place that limit the use of recycled asphalt shingles in asphalt production in Metro Vancouver? Do you believe there is a health and safety issue,
for either workers at asphalt plants or working with materials that contain recycled asphalt shingles such as paving?

Health and safety issue – yes there is. When dealing with post consumer shingles and range being shingles from last 100 years theoretically, do you have a set procedure that protect the employees when sorting out materials that could potentially contain asbestos. Trained and equipped for asbestos materials? Identifying asbestos how? Once he receives shingles, he expects that he should have no concerns about materials like asbestos. At this point, he can’t say yes – no planned out system/process to capture asbestos 100% of the time. We could test for airborne asbestos for a day – is that ticked off by hygienist. He hasn’t seen anything conducted at that level, to satisfy his concerns about worker safety. Needs to be a recognized process, that product is at a stage that is able to be used company – doesn’t exist yet. If there is any kind of material that is new/recycled – who is signing off on process – Worksafe BC? Lots of will to go in that direction, but when it comes to process flow, there is currently no recognized body. Quality control – no real set limit or recognition in any governing municipal documentation. No one agency that is saying there is a certain amount of RAS in mixes. There are some barriers to producers – they are taking on a lot of liability without having any real quantifiable benefit to it. No governing bodies/customer doesn’t have any requirement to use it – not mandatory to use. Producers are bidding on job – end spec work – where the owner may ask for a 12.5mm surface – why would producer take on risk for new material that is not proven? No one else sharing risk with them. Quality side – no ‘you will use this’ – shall or may.

4. What are the major barriers that the City of Vancouver sees in utilizing recycled asphalt shingles? Would the asphalt plant prefer to use virgin asphalt or recycled asphalt? If asbestos issues could be addressed and dealt with, which would the City prefer to use? Not an established system that brings on those barriers. City has tried some practical applications and due diligence. Overall, quality of RAS is risky – Jeff isn’t sure if he has maximized use of RAP – if RAP is fairly clean material (only oil and aggregate) and ability to reuse material without issues (no polymers/other additives) – considered an asset and not a reliability. RAP – asset to be recycled and reused, with simple manipulation of materials. RAS – post consumer is liability issue. Not all wood/metal out of RAS. Consistency of RAS needs to be fairly consistent (2-3% RAS use) – not a huge amount to impact mix designs. Discussion – use of RAS – local governments/municipalities have different requirements – haven’t maximized reuse of RAP. Without maximizing RAP, how are you going to use RAS? RAP that is fairly pavement (asphalt and aggregate) is simple and basic, but you know you can recycle and reuse it. Minimize risk by using any kind of impurities. RAS not considered an asset.

5. What would be required to address these issues/concern/barriers?
More standardized/recognized process. Use of cutoffs – 10x lower risks – clean new material that hasn’t been put on roof. Without wood/nails – not a quality control issue or environmental or health/safety. Post consumer (50 year window) of various types of shingles – consistency issue/type of RAS. If there are controls to deal with wood/nails/asbestos/identification of other types of materials – ok. Without a proper process, it can’t be used.

6. Does the City of Vancouver have any contact with other municipalities in either Canada or the USA that have utilized asphalt with recycled asphalt content? If so, what has their experience been, working with this product? Would the City be interested in establishing contact with municipalities that have utilized recycled asphalt successfully in projects?
Primary contact has been through Metro Vancouver – MV is looking at an avenue of limiting reusable materials going to landfills. Discussing other local (eg. Alberta and Washington) – look at trials and to see where they are at with products. Unless Burnaby was using a huge amount of RAS for example – see how process is working and direction its going. Municipal not really – just MV. 30,000 tonnes of shingles that are brought to landfills per year. A lot of municipalities could increase RAP use before they start to consider RAS use unless they have done review on their own. City of Vancouver has its own asphalt plant – own streets and generate product and are willing to go further with trials. Increased use of RAP. Municipalities without facility have to go to contractors – based on best price. If RAS gave competitive advantages (such as recycling oil) then it would be beneficial. Producer and municipality realizing a price advantage, considering risk?

7. How is the use of recycled asphalt and asphalt with recycled shingle content viewed within the construction industry?
Quality control issue. Producers will use product if they realize a return benefit. If RAP or RAS results in efficiency, with a good price point, they will be used. Quality control and engineers who are responsible, how much risk are they willing to take? Producer might want to use 20% RAP and 3% RAS, but engineer might not want to use a trustable product. Not enough history with product. If there was a 10 year study showing a good road with a certain mix giving a certain performance – more likely to be accepted by engineers. Who is willing to take the first risk? Municipalities aren’t willing to take a calculated risk with shrinking budgets – mitigate risk by limiting untested materials. Go with what they know first.

8. Is the quality of recycled asphalt comparable with the quality of virgin asphalt? For example, has there been testing of its performance when compared with virgin asphalt?
It can be, but back to quality control issue. City of Vancouver – quality control is the mantra. Checks after implementation are conducted, but testing while product is being designed is more important. Continual testing within Vancouver – sampling of lots of different uses of RAS. Recycled products need to meet design specifications. Roadway → residential roads → collector roads → highways. Can’t perform at the same quality as virgin materials. Some kind of oil rejuvenation to give it extended life – maybe can. Quality checks needed to ensure that. Volumes of quality control data. Not every single roadway is going to have ability to do these checks. Not going to be focused on one project long enough to put process in place. What are you willing to spend on quality control and quality assurance. Virgin materials are always better – oil will be oxidized if ground up/used/UV light/wear and tear. Unless you can rejuvenate oil, it won’t be at highest standard. Maybe use RAS for residential roads rather than highways.

9. Are the any processes in addition to existing regulations that are a potentially viable option for keeping track of asbestos within shingles in Metro Vancouver? What barriers would such a process face?

No – back to process that has been accepted somewhere else as a high standard for recycling shingles. Process flow needs to be the best – government agencies and other people need to ok a certain process. Governing agencies want a process to be in place – relying on private sector to put it in place. City of Vancouver is interested and can give some guidance, but not telling exactly what to do. Have to prove to MV, WBC and City of Vancouver that such a process is good. Chicken and egg phenomenon. Private sector in charge.

10. At present there seems to be a disconnect between shingle recycling companies and the rest of the industry. Is there any possibility of the City of Vancouver being able to work more closely with these companies and regulatory bodies such as Worksafe BC to implement a policy/set of regulations that clearly lay out what must be done by a shingle recycling company in order to ensure potential customers that they are following a set form of guidelines/procedures and therefore instill a sense of confidence in the customers of these recyclers that they are purchasing a high quality, regulation-approved product? Would standardized regulations increase the likelihood of the City of Vancouver using recycled asphalt?

Definitely would be ok – everyone being comfortable with whole process flow analysis. Accept? Grade? Sort? Staff training? Find? Quality control? How often quality control? Consistency? Training? Environmental review? Worksafe BC? Complete process in place that can be studied, reviewed and ok-ed. Fractionalized. MV is currently trying to facilitate that direction, but one thing is facilitation, discussions, but to make it happen. Can’t make a company go a certain direction. What process is acceptable? Had a roundtable last week. Come up with positives and negatives before full scale use of
product. If you’re not going to maximize on asset (RAP) back into making asphalt again, how are you going to stipulate that you need to use RAS. One process flow that is not maximized, how are you going to maximize another one? Kick start needed. Different municipalities have different criteria/mix designs. Not even unified in quality control/mixes/criteria. Asphalt production in region: 1.2M tonnes. If you were to put RAS into every ton of asphalt – equivalent to 36,000 tonnes. Between 2-3% of RAS put in roadway – this would nullify all shingles put into landfill. Whole region would have make it work to get region to minimize shingles into landfill. Can’t work if everyone has different opinions on quality control etc.

11. What sort of relationship does the City of Vancouver’s asphalt plant currently have with the following groups of people?
   a. Worksafe BC
      Non existent when it comes to RAS – new process. No working group set up to process review. MV has some, but he doesn’t think so. Gemaco has had some relationship with WBC to review. Gemaco has asked WBC to look at process and evaluate it, but for full process flow review, not enough data to sample. Not in-depth of a study. Spot checks have been done, but there is not enough data – or hygienist/data. WBC would have an interest if they decided to use it – concern about asbestos if they started to use it.
   b. Asphalt recycling companies?
      Trying to build up relationship with all parties – trying to facilitate through MV and by themselves, relationships with paving companies.
   c. Asphalt paving companies, and other potential downstream markets for recycled asphalt shingles?
      Speak routinely with other producers. MV and Gemaco met with City of Vancouver last week – most asphalt producers were there for discussion on where things are at. Vancouver – industry needs to be competitive when it comes to price, but there is also a responsibility to meet government expectations for increased use of recycled products/diversion from landfill, fulfill public interest, etc. More simple the better. Sometimes there are private entities that can supply recycled materials. Process to come up with recycled materials is sometimes more complicated – more engineering needed. Polymer: polymer can work but base material could be a suspected carcinogen. Can’t use material if rejuvenator for product is bad. Time of production issues, and they recycling recycled product – want material to be benign. Roadways that were paved 30 years ago with an asbestos element – now have to grind and now there’s a problem. Additives are often the problem. Now they might be great, but in the future the specifications for health and safety and environment might change. How many times can you use reusable materials.
Unedited interview conducted with Hilary Hanna and Terry Charles from Gemaco Sales Ltd., 2014.

1. What is the business case for shingle recycling – how good is the market? Is there a range, either monetary or a percentage, that you would be comfortable to share, that represents Gemaco’s profits?
Market could be bigger – more profit accepted by road owners – no reason not to accept – biggest hurdle. Municipalities and mix design. 1.3-1.5 million tonnes of shingles produced per year – 30,000 tonnes accepted (3%). Last year 7000 tonnes went from Gemaco to Metro Vancouver. 2-3 years before they take any more. MMCD: people that write specs for roads. Job thinking – longevity in jobs → engineers don’t want to go with a new product. Lots of roads already constructed with recycled asphalt. Lefarge and other construction companies are happy, City of Vancouver isn’t happy. Worker safety – zero tolerance to be exposed to asbestos: WBC. Asbestos issue becoming less important though – problem for City of Vancouver – target for being sued. Once its been ground as a binder it is fryable. More asbestos on corner of a road than in product. Cold patch at Gemaco. Hot mix gets them more money for other companies – can’t be used for spec roads. 12,000 tonnes into to Gemaco, 2000 tonnes out. Market in Vancouver is around 30,000 tonnes.

2. In your experience, how is the issue of recycling viewed by the majority of individuals and companies within the construction and roofing industry?
Recycling is a popular idea, but people wouldn’t be willing to spend more money – most important thing. Some companies want to, but only if it becomes cheaper. Few home owners would drive further to recycle. Component of roofing removal so small – not a big deal. Government properties have to have shingles recycled. Roofing side – all about money. HMA companies – doesn’t matter if its recycled or not: savings for them but challenges as well, comfortable with it but can’t get owners to want to use it, no issue for HMA companies using a recycled product. In order to use recycled material properly, patch plants need to be changed a bit.

3. How long has Gemaco operated as the largest asphalt shingle recycler in the Metro Vancouver area?
February 2010 – started – quick start up time, Metro Vancouver supportive. Only recycler in Metro Vancouver.
   i. How much material does Gemaco process?
Takes grinding equipment to other locations (eg. Alberta) where they collect but don’t process the shingles. RGI, screener, loader, support unit.
   ii. Who deposits material there – mostly roofers or demolition contractors?
Bin companies – dirtiest because of homeowners using bin for entire house cleaning. Some roofers independent to bin companies. Few private residents. Gemaco recycled 97/98% of incoming material.

iii. Does the material come from both commercial and residential jobs?
Commercial recycling has to be tested – but not a lot comes in by volume.

4. What are the largest current ‘downstream’ markets for recycled shingles? Are there any potential future markets that are as yet unexplored? Who does Gemaco sell to?
HMA/WMA – largest. Some places use it for dust suppression on dirt roads, but nowhere in Vancouver does this. Companies/producers – small number. Larger paving companies have their own HMA plants. City of Vancouver has its own asphalt plant – problem selling to them in the past. Gemaco identified a protocol (King County, WA) to satisfy the city.

5. Are there any economic barriers to the recycling of asphalt shingles?
Acceptance of RAS into roads by owners (eg. in municipalities). Everything else makes sense. People who lay the roads are responsible for the quality more than Gemaco. Roads exist that have recycled asphalt – around 20 years old. Quality not an issue. Getting into business is expensive – initial investment.

6. Is the asphalt recycling market particularly competitive within Metro Vancouver/BC/Western Canada? If so, does Gemaco have any contact with other such facilities either in Canada or the US?
Only recycling company in Metro Vancouver. Western Canada – Okanagan, Alberta – people contact them to go and grind their recycled product (not a competitor). Almost every recycler has same problem as Gemaco – acceptance, both in the Canada and the US. 11 million tonnes in north America is collected, but very small amounts are recycled. Some places shingles wear out faster – have to be replaced quicker.

7. Are there any regulatory barriers to the recycling of asphalt shingles?
Metro Vancouver solid waste – licensing of facility, costs, increasing yearly, report to Metro Vancouver quarterly. Road owners main barrier. Procedures to follow from Metro Vancouver. Cycle – busiest in summer, least busy in winter.

8. What sort of relationship does Gemaco have with the following groups of people:
   i. City of Vancouver and Metro Vancouver solid waste management staff?
Metro Vancouver – best. Supportive, based on recycling initiative. 4-5% of waste is from shingles. City of Vancouver – keen to recycle, not quite as cost conscious. Issue of asbestos, not laying in January.
   ii. Provincial regulators responsible for establishing standards for recycled asphalt or those responsible for Worksafe legislation and Hazmat protocols?
Wet method is good. Busy ministry of transportation doing other things. Local market (100km) can’t take it a long ways.

iii. Asphalt paving companies, and other ‘downstream’ markets?
Barrier of owners removed – wouldn’t be an issue. Owners are the barrier. Change takes time.

9. What are the range of technical barriers that exist to the recycling of asphalt shingles? Is there a ranking within them – which is the most significant?
Clumping – occurs if the shingles have been ground and sitting for a long time. Take product right after grinding sorts out this issue. Screen it 1-2 days before. Products available to declump, but there is added cost. PEF – calibration has to be precise. Inclusion of RAS into mix design. Asbestos – concern but not a major one. Look of roads 0 visual concerns – colour.

10. What are the largest barriers both upstream and downstream in the recycling process that Gemaco faces?
Recycled asphalt better for roads – less cracking and rutting → need education.

11. Is it easy to identify the presence of asbestos within the shingles?

12. Is a chain of custody type process a viable option for keeping track of asbestos within shingles in Metro Vancouver? What barriers would such a process face?
Long process – can’t enforce type of information. Bin companies don’t know date of roof. Until there’s mandatory recycling – not a process able to be enforced. Have to pay for inspection if before 1983 – bin companies can lie to get around having to conform. Dealing with asbestos has to be done properly - double bagged. Honest answers would help out – reduce tests → cost.