

APPENDIX V

MSDS FOR RECYCLED ASPHALT PAVEMENT



SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Recycled Asphalt Pavement
SYNONYMS: Reclaimed Asphalt Pavement (RAP), Crusted Asphalt Base Course, Reclaimed Paving Material, Reclaimed Blacktop, Reclaimed Asphalt Concrete, Recycled Asphalt Pavement and Millings.

**MANUFACTURER/
SUPPLIER:** City of Calgary - Roads
ADDRESS: P.O. Box 2100, Stn M, Calgary AB, T2P 2M5

EMERGENCY PHONE: 1-403-268-4066 (24 hours)
OTHER CALLS: 1-403-268-2899
FAX: 1-403-268-5566

PRODUCT USE: Product is generated through municipal road maintenance processes of mechanically milling existing asphalt roadways. The product can be re-introduced into new asphalt mixes in specified ratios/percentages and re-applied to roadways. See the City of Calgary product specification and use sheet for recommended ratios/percentages.

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 (403) 299-5600, November 24, 2008.

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Number	% by Weight	LD ₅₀	LC ₅₀
Aggregate (crushed stone, sand, gravel, slag)	various	60% – 100%	Not Available	Not Available
Asphalt	8052-42-4	5% – 10%	>5000 mg/kg Rat (Oral)	Not Available
Crystalline Silica (quartz)	14808-60-7	1% – 5%	>22,500 mg/kg Rat (Oral)	Not Available
Asbestos Fibres - Chrysotile	12001-29-5	1% – 5%	Not Available	Not Available
Limestone (CaCO ₃)	1317-65-3	1% – 5%	6450 mg/kg Rat (Oral)	Not Available

Asphalt pavement is a mixture of gravel or rock, sand, filler (e.g., limestone or hydrated lime) and asphalt cement. It may also contain fly ash, slag, fibres (synthetic or organic), color pigment and other recycled material (e.g., ceramics, plastic, glass, etc.). Properties and composition of this material can vary depending on the original properties and composition of the recovered asphalt pavement.

SECTION 3: HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE: Eye contact, skin contact, inhalation and ingestion.



POTENTIAL HEALTH EFFECTS:

EYES: Airborne dust may cause immediate or delayed irritation or inflammation. Symptoms include redness, burning, and swelling of eyes. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye. When this product is subject to high heat RAP will cause severe burns. Mechanical action, such as rubbing of the eyes or eye lid, could increase irritation. Eye protection is advisable.

SKIN: May cause skin irritation such as dry skin, dermatitis, redness, burning, itching, rash, scaling, cracking and swelling of the skin. This material is unlikely to pass into the body through the skin. Irritation is caused by the physical properties of RAP dust such as abrasion. When this product is subject to high heat it will cause severe burns.

INGESTION: This material is not likely to be swallowed however do not ingest. Although ingestion of small quantities is not known to be harmful, large quantities can cause distress to the digestive tract. Chewing and swallowing asphalt may cause gastrointestinal effects.

INHALATION: Removal of hardened asphalt concrete, or other types of asphalt recycling work can produce dust. Dust may irritate the nose, throat, and airways, and may cause coughing, sneezing, choking, difficult breathing with physical activity and shortness of breath depending on the degree of exposure. The risk of injury depends on the duration and level of exposure. Symptoms usually occur at air concentrations higher than the recommended exposure limits. It is generally accepted that longer duration and larger levels of exposure creates a greater risk for long term health hazards such as:

Silicosis: This product contains crystalline silica. Cutting, crushing or grinding hardened asphalt or other crystalline silica-bearing materials will release respirable crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease.



Asbestosis: This product may contain asbestos fibres. Cutting, crushing or grinding hardened asphalt may release respirable dust containing asbestos fibres. Chronic inhalation of asbestos fibres can create permanent scarring of lung tissue resulting in difficulties breathing and lung disease.

Carcinogenicity: RAP is not considered a carcinogen; however, it contains crystalline silica and asbestos which are classified as known carcinogens.

Heated asphalt may release irritating fumes or vapours such as toxic hydrogen sulphide, smoke, carbon dioxide, carbon monoxide and unburned hydrocarbons. Hydrogen sulphide and other sulphur-containing gases can evolve from this product at elevated temperatures. Exposure to fumes or vapours may cause irritation of the nose and throat, and symptoms such as headache, dizziness, loss of coordination, and drowsiness.

AGGRAVATED EXPOSURE: Exposure may aggravate conditions such as lung disease (e.g., bronchitis, emphysema, pulmonary disease). Studies show that smokers may have an elevated risk of susceptibility to exposure.

SECTION 4: FIRST AID MEASURES

EYES: If symptoms develop, immediately move individual away from exposure and into fresh air. Rinse eyes thoroughly with water for at least 15 minutes, including under eye lids, to remove all particles. Seek immediate medical attention.

SKIN: Immediately remove contaminated clothing. Wash exposed area with cool water and a pH neutral soap or a mild skin detergent for at least 15 minutes. Seek medical attention for rash, irritation and dermatitis. Do not attempt to remove solidified product, since removal may cause further tissue injury. Launder clothing before reuse.

INGESTION: Do not induce vomiting. First aid is not normally required unless discomfort, coughing or other symptoms persist. If swallowed, seek medical attention.

INHALATION: If symptoms develop, move individual away from exposure and into fresh air. If symptoms persist, seek medical attention.

NOTES TO PHYSICIANS OR FIRST AID PROVIDERS: Pre-existing disorders of the following organs may be aggravated by exposure to this material: respiratory tract, skin, lung (example: asthma-like conditions) and kidneys.

SECTION 5: FIREFIGHTING MEASURES

FLASH POINT (METHOD): >100 °C (>212F), Closed Cup Method

RANGE OF FAMBABILITY: Not flammable.

EXPLOSION DATA SENSITIVITY TO MECHANICAL IMPACT: Not explosive

EXLOSION DATA SENSITIVITY TO STATIC DISCHARGE: Not explosive

UPPPER FLAMMABLE LIMIT: Not flammable.

LOWER FLAMMABLE LIMIT: Not flammable.

AUTOIGNITION TEMPERATURE: >485 °C (>905F) as asphalt. This is a combustible solid. Keep away from ignition sources. Avoid breathing fumes and dust.

EXTINGUISHING MEDIA: Agents approved for Class B hazards (regular foam, carbon dioxide, dry chemical, halogenated agents, steam) and water fog. Use extinguishing media appropriate for surrounding fire. Do not apply direct water stream.

SPECIAL FIREFIGHTING PROCEDURES: Self Contained Breathing Apparatus (SCBA) with a full facepiece is recommended to limit exposures to combustion products when fighting any fire. Chemical resistant personal protective equipment should also be worn.

HAZARDOUS COMBUSTION PRODUCTS: Other combustion products produced in the fire could include a friable form of asbestos due to the reduction of oil/encapsulation material, carbon monoxide, carbon dioxide, hydrogen sulphide, amines, ammonia, nitrogen dioxide, sulphur oxides, ozone, and various hydrocarbons. Hazardous vapours may collect in areas that not properly ventilated.



SECTION 6: ACCIDENTAL RELEASE MEASURES

PRECAUTIONS: Avoid inhalation of dust and avoid contact with heated product. Always wear appropriate protective equipment.

CLEAN-UP: Use a shovel to scrape up product and place product in suitable containers for recovery or disposal.

LARGE SPILLS: This material is solid or semi-solid, and is not likely to spill or flow.

SECTION 7: HANDLING AND STORAGE

General: Minimize dust exposure. Handle with care and use appropriate control measures. Do not stand on stockpiles of RAP as they might be unstable. Use engineering controls (e.g., wetting stockpiles) to prevent windblown dust from stockpiles.

Usage: Cutting, crushing or grinding hardened asphalt or other crystalline silica-bearing materials will release respirable crystalline silica. Use appropriate measures of dust control or suppression, and personal protective equipment (PPE).

Housekeeping: Avoid actions such as dry sweeping or using compressed air that can cause dust to become airborne during clean up. To clean-up dust, use HEPA vacuum or thoroughly wet with water

Storage Temperature: Store away from heat, open flames, strong oxidizers or other ignition sources.

Clothing: Promptly remove and launder dusty clothing. Thoroughly wash skin after exposure to dust.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: To maintain levels below exposure limits, use local exhaust or general dilution ventilation when using RAP at elevated temperatures or during activities that generate dust or fumes.

EXPOSURE CONTROLS/PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear approved glasses or safety goggles when handling product and when involved with activities that generate dust to prevent contact with eyes. Wearing contact lenses under dusty conditions is not recommended.

Skin Protection: Wear normal work clothing covering arms and legs. If manual handling of material occurs, wear leather or cloth gloves to prevent skin contact and insulated gloves when handling hot product. Thoroughly wash hands and other exposed skin after exposure. Remove clothing and protective equipment that becomes dusty and launder before reuse.

Respiratory Protection: When exposed to dust or fumes above exposure limits, during routine paving activities, wear a NIOSH-approved respirator with a cartridge appropriate for the contaminant(s) (e.g., P100, organic vapour). Make sure the respirator is properly fitted and is in good condition.

Foot Protection: Wear CSA Standard CAN/CSA-Z195-M92 (R2000) or CSA Standard Z195-02 approved footwear.

Engineering Controls: Provide sufficient mechanical (general and/or local exhaust ventilation to maintain exposure below TLV(s).

EXPOSURE GUIDELINES:

COMPONENT	ACGIH (2008 TLV)	OSHA PEL-TWA	Alberta 8-hour TWA
Particulate, not otherwise classified Total; Respirable	10 mg/m ³ ; 3 mg/m ³	15 mg/m ³ ; 5 mg/m ³	10 mg/m ³ ; 3 mg/m ³
Asphalt (fume)	0.5 mg/m ³	None	5 mg/m ³
Crystalline Silica (quartz – respirable)	0.025 mg/m ³	10mg/m ³ (%SiO ₂ +2)	0.1 mg/m ³
Asbestos Fibres	0.1 f/cc	0.1 f/cc	0.1 f/cc
Limestone (CaCO ₃) Total; Respirable	None	15 mg/m ³ ; 5 mg/m ³	10 mg/m ³ ; None



SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Dark brown, grey or black solid
ODOUR: Petroleum-like
ODOUR THRESHOLD: Not available
SPECIFIC GRAVITY: >1
PHYSICAL STATE: Solid
VAPOUR PRESSURE: Not applicable
VAPOUR DENSITY (AIR = 1): >1
EVAPORATIVE RATE: Will not evaporate
BOILING POINT: Typically >400°C (>752F) as asphalt
FREEZING POINT: Typically >200°C (>400F) as asphalt
pH: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable. Avoid contact with incompatible materials, excessive heat, sources of ignition and open flame.

INCOMPATIBILITY (MATERIAL TO AVOID):

Incompatible with strong acids or bases, and oxidizing agents such as nitrates, chlorates, fluorine and peroxides.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:

Heat may liberate hydrogen sulphide, carbon monoxide, carbon dioxide, amines, ammonia, nitrogen dioxide, hydrogen sulphide, sulphur oxides, ozone and various hydrocarbons.

HAZARDOUS POLYMERIZATION: None

SECTION 11: TOXICOLOGICAL INFORMATION

In its milled state, this product is not expected to pose a significant exposure risk to workers. Storage and handling (added to asphalt mixes) without further mechanical destruction of the material poses no additional exposure risks as the hazardous ingredients are encapsulated in the matrix of the product. Adding the product to new asphalt mixes further increases this encapsulation.

ROUTES OF ENTRY: Inhalation, ingestion, eye contact or skin contact.

ACUTE EFFECTS: Asphalt fumes and silica (quartz) have been shown to cause immunological effects in rodents. Silica (quartz) and asbestos (chrysotile) have been found to cause fibrosis, cough and dyspnea in humans.

CHRONIC EFFECTS: None attributed to asphalt. Silicosis is linked to chronic silica (quartz) exposure. Lung cancer, asbestosis and mesothelioma are linked to chronic asbestos (chrysotile) exposure.

IRRITANCY OF PRODUCT: Respiratory irritant. Further mechanical destruction of the product is not recommended as this could result in airborne particles released from the solid matrix introducing eye, skin, ingestion or inhalation hazards.

SKIN SENSITIZATION: Not available for asphalt. Quartz dust is not expected to be irritating to the skin.

RESPIRATORY SENSITIZATION: reported as human respiratory sensitizer for asphalt, asbestos (chrysotile) or silica (crystalline).

CARCINOGENICITY: Asphalt is not classified as a human carcinogen: IARC (Group 3) and ACGIH (A4). This product contains silica and may contain asbestos (chrysotile) fibres. Silica (quartz) and asbestos (chrysotile) have been shown to be tumorigenic in rodents. Both compounds have been identified as human carcinogens. Silica (quartz) and asbestos (chrysotile) are classified as IARC Group 1 (human carcinogen). ACGIH classifies asbestos (chrysotile) as A1 (confirmed human carcinogen) and silica (quartz) as A2 (suspected human carcinogen).

REPRODUCTIVE TOXICITY: The limited information available does not indicate that asphalt, silica (quartz) or asbestos (chrysotile) are reproductive toxins.

TERATOGENICITY: The limited information available does not indicate that asphalt, silica (quartz) or asbestos (chrysotile) are developmental toxins.

EMBRYOTOXICITY: The limited information available does not indicate that asphalt, silica (quartz) or asbestos (chrysotile) are developmental toxins.

MUTAGENICITY: Asphalt, silica (quartz) and asbestos (chrysotile) have been shown to be mutagenic in rodents; however, the evidence is inadequate to conclude that these components are mutagenic in humans.

SYNERGISTIC PRODUCTS/EFFECTS: Not available for asphalt. Simultaneous exposure to known carcinogens, for example, benzo(a)pyrene, can increase the carcinogenicity of crystalline silica. A synergistic effect between smoking and crystalline silica and/or silicosis on risk of lung cancer is also likely. Asbestos exposure when combined with smoking is also known to produce a synergistic effect toward lung cancer.



SECTION 12: ECOLOGICAL INFORMATION

For questions regarding ecological information refer to contact information in Section 1.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD:

Dispose of waste and containers in compliance with applicable federal, state, provincial and local regulations.

SECTION 14: TRANSPORT INFORMATION

UN number: 1999

PROPER SHIPPING NAME: TARS, LIQUID, including road asphalt and oils, bitumen and cut backs

HAZARD CLASS: 3 and Potential Marine Pollutant

SPECIAL PROVISIONS: TDG 89

SPECIAL SHIPPING INFORMATION: None

SECTION 15: REGULATORY INFORMATION

WHMIS/DSL: Products containing asbestos and crystalline silica are classified as D2A; products that pose a skin, eye and respiratory irritation are classified as D2B; each is subject to WHMIS requirements.

OSHA/MSHA HAZARD COMMUNICATION:

This product is considered by OSHA/MSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND:

This product is not listed as a CERCLA hazardous substance.

EPCRA SARA TITLE III:

This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

EPCRA SARA Section 313:

This product contains none of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

RCRC:

If discarded in its purchased form, this product would not be a hazardous waste either by listing or characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

TSCA:

This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.

CALIFORNIA PROPOSITION 65:

Crystalline silica (airborne particulates of respirable size) and asbestos are substances known by the State of California to cause cancer.

"THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CONTROLLED PRODUCTS REGULATIONS AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CONTROLLED PRODUCTS REGULATIONS"



SECTION 16: OTHER INFORMATION

OTHER INFORMATION: None

ABBREVIATIONS:

<	Less than	NIOSH	National Institute for Occupational Safety and Health (United States)
>	Greater than	MSHA	Mine Safety and Health Administration
ACGIH	American Conference of Governmental Industrial Hygienists	OSHA	Occupational Safety and Health Administration
CAS Number	Chemical Abstract Service Number	PEL	Permissible exposure limit
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	pH	Negative log of hydrogen ion concentration
CFR	Code for Federal Regulations (United States)	RCRA	Resource Conservation and Recovery Act
EPCRA	Emergency Planning and Community Right-to-Know Act	SARA	Superfund Amendments and Reauthorization Act
HEPA	High-Efficiency Particulate Air	TDG	Transportation of Dangerous Goods
IARC	International Agency for Research on Cancer	TLV	Threshold limit value
LC ₅₀	Lethal Concentration, 50% of population	TWA	Time weighted average
LD ₅₀	Lethal Dose, 50% of population	UN	United Nations
mg/m ³	milligrams per cubic metre of air	WHMIS/DSL	Workplace Hazardous Materials Information System/ Domestic Substances List

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APPENDIX VI
CITED DOCUMENTS AND MATERIALS