SAFETY DATA SHEET

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SECTION 1	IDENTIFICATION
Product Name:	Recycled Asphalt Pavement
CAS No.:	8052-42-4 (asphalt)
Synonyms:	RAP
Type of Products:	Recycled asphalt pavement is used as a construction material.

SECTION 2	HAZARD(S) IDENTIFICATION
Classifications:	Carcinogenicity – Category 1
	Specific Target Organ Toxicity, single exposure – Category 2
	Specific Target Organ Toxicity, repeated exposure – Category 2
	Eye Damage/Irritation- Category 1
	Skin Corrosion/Irritation – Category 1B
Pictograms:	
Signal Word:	DANGER
Hazard Statements:	• May cause cancer by inhalation • May cause damage to organs (lungs, liver, kidney, nervous system, skin, spleen, thymus, blood, lymph nodes, bone marrow) through prolonged repeated exposures
Precautionary Statements:	Do not handle until this safety information contained in this SDS has been read and understood. Do not breathe vapors, dusts or mists. Use only outdoors or in a well ventilated area. Do not eat, drink, smoke, apply cosmetics while handling these products. Avoid prolonged contact of the material with skin. Wash skin thoroughly after handling. Wear personal protective equipment (PPE) as required. PPE includes protective gloves, clothing, eye and face protection. Product may produce hydrogen sulfide gas. Assessment of storage tanks, transport vessels and other confined spaces should be made to determine potential exposrues and appropriate controls. Dispose of products in accordance with local, regional, national, and/or international regulations.

SECTION 3	COMPOSITION/INFORMATION ON INGREDIENTS

Recycled Asphalt Pavement contains aggregate, a naturally occurring mineral complex with varying quantities of crystalline (quartz) silica, gravel, sand, and asphalt cement. It may also contain small amount of asphalt modifiers (e.g., anti-stripping agents, hydrated lime), fly ash, slag, fibers (synthetic or organic), color pigment or other recycled materials, (e.g. ceramics, plastics, glass, etc.). Hardened product may be subjected to various natural or mechanical forces that produce small particles/dust which may contain respirable crystalline silica. Mixture may contain vacuum tower bottoms, petroleum distillates, hydrogen sulfide, and diesel oil.

Component	CAS Registry No.	% by Weight (Approximately)
Aggregate (crushed stone, sand, gravel)	Mixture	>90
Asphalt	8052-42-4	<19%
Silica, crystalline – Quartz (content typically greater than 1% and can be higher than 20%)	14808-60-7	>1
Other possible forms of Crystalline silica: • Cristobalite • Tridymite	 14464-46-1 15468-32-3	 Varies Varies
May Contain:		
Vacuum tower bottoms	64741-56-6	>0.1
Heavy naphthalene, Petroleum distillates	64741-53-3	>0.1
Aromatic extract oil	64742-11-6	>0.1
Hydrogen sulfide	7783-06-4	>0.1
Diesel oil	68476-34-6	0.7 – 1.4

< Less than
> Greater than
CAS Chemical Abstract Service

SECTION 4	FIRST AID MEASURES
Inhalation:	If excessive inhalation occurs, remove to fresh air. Get prompt medical attention if breathing remains difficult or if irritation persists. Do not attempt to rescue victim(s) from confined spaces unless trained and so authorized by employer.
Eyes:	Immediately flush eye(s) with plenty of clean potable water for at least 20 minutes while holding eyelids open. Beyond flushing, do not attempt to remove material from the eye(s). Get medical attention if irritation, pain, swelling, lacrimation, or photophobia persist or develop later. Thermal burns require immediate medical attention.
Skin:	Clean exposed skin with a mild soap/detergent and large amounts of water until all material is removed from the skin. Do not use solvents to remove material from skin.
Ingestion:	If swallowed, do not induce vomiting. Drink large volumes of water and get immediate medical attention. Never give anything by mouth to an unconscious person.

SECTION 4	FIRST AID MEASURES
Acute & Delayed Symptoms:	Emissions from heated material may have an unpleasant odor and may cause moderate to severe irritation of the mucous membranes and upper respiratory tract, headaches, nausea and dizziness. Hydrogen sulfide gas may be released. Exposure to hydrogen sulfide gas can cause rapid olfactory fatigue. Breathing silica-containing dust for prolonged periods can cause lung damage and silicosis (See Section 11).

SECTION 5	FIRE-FIGHTING MEASURES
Extinguishing Agent:	For fires involving asphalt, agents approved for Class B hazards should be used.
Unusual Fire and Explosion Hazards:	Avoid use of straight-stream water. Adding water to hot asphalt presents an explosion hazard.
Special Fire Fighting Procedures:	Wear a National Institute for Occupational Safety and Health (NIOSH) approved positive pressure Self-Contained Breathing Apparatus (SCBA) and fully protective clothing (such as turnout gear) as necessary. Withdraw immediately from the area if there is a rising sound from venting safety device or discoloration of vessels, tanks, or pipelines.
Hazardous Combustion Products:	Hydrocarbons. Vapors may form explosive mixture with air. Never weld or use a cutting torch or open flame on a full, partially full or empty bin, hopper, or other container that holds or has held asphaltic material unless precautions are taken to prevent fire and explosion. WARNING: hydrogen gas and other hazardous gases/vapors may be emitted and collect in the headspace of storage vessels whereby an explosive, toxic, or oxygen deficient atmosphere may be created.

SECTION 6	ACCIDENTAL RELEASE MEASURES
Spilled material where dust containing crystalline silica may present an inhalation hazard to cleanup personnel therefore, do not dry sweep spilled material. Collect the material using a method that does not produce dust such as a vacuum cleaner equipped with a High-Efficiency Particulate Air (HEPA) filter or thoroughly wet down the dust before cleaning up. Prevent materials from entering streams, drainages, or sewers. Spills entering surface waters (or any other watercourse or sewers entering/leading to surface waters) that cause a sheen must be reported to the National Response Center 800-424-8802. None of these components in these products are subject to the reporting requirements of SARA Title III.	

SECTION 7	HANDLING AND STORAGE

Do not store near food, beverages, tobacco products, or other personal items. Avoid contact with heated materials because potentially irritating vapors may be released. Respirable dust containing crystalline silica may be generated when hardened asphalt concrete is subjected to mechanical forces, such as in demolition work, surface treatment (sanding, grooving, chiseling, etc.), and recycling of pavement. Tripping accidents have occurred because of asphalt building on bottom of shoes and boots. Materials should be removed regularly to prevent tripping accidents. However, do not use solvents or thinners to clean footwear.

Handle as a combustible material. Do not store near ignition sources including open flames, heat, or sparks. Do not weld, heat, pressurize, cut, or drill the container. Empty container may contain hazardous material which may ignite explosively if heated sufficiently. Therefore do not attempt to clean empty containers. Hydrogen sulfide gas may accumulate in tanks and bulk transport compartments. Avoid vapors when opening hatches and dome covers. Avoid incompatible materials.

SECTION 8	EXPOSURE CONTROLS/PERSONAL PROTECTION	
Component	OSHA PEL	ACGIH TLV-TWA
Asphalt Fumes	None	0.5 mg/m^3 (as benzene-soluble aerosol)
Hydrogen Sulfide	20 ppm C (50 ppm, 10-min. max. peak)	1 ppm (5 ppm STEL)
Respirable Particulates/Dust	5 mg/m^3	5 mg/m^3
Particulates (not otherwise regulated)	15 mg/m^3	15 mg/m^3
Crystalline Silica (Quartz)	10 mg/m^3/% SiO_2 + 2	0.025 mg/m^3
Crystalline Silica (Cristobalite)	Use ½ the value calculated from the count or mass formula for quartz	0.025 mg/m^3
Crystalline Silica (Tridymite)	Use ½ the value calculated from the count or mass formula for quartz	None Established

mg/m^3	milligrams per cubic meter of air volume.
ACGIH	American Conference of Governmental Industrial Hygienists
C	Ceiling
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
TLV	Threshold Limit Value
TWA	Time Weighted Average

Engineering Controls:	It is recommended to determine and monitor employee's potential exposure to asphalt fumes (as benzene-soluble aerosols) and respirable dust and crystalline quartz silica.
Ventilation:	Use only in well ventilated areas. Natural ventilation generally is adequate to maintain exposures below appropriate exposure limits under anticipated use conditions. If dust is generated indoors and exceeds its PEL, use local exhaust ventilation.

SECTION 8	EXPOSURE CONTROLS/PERSONAL PROTECTION
Respiratory Protection:	It is good practice to conduct personal monitoring to determine a worker's potential exposure airborne concentrations of respirable and/or total dust, respirable crystalline silica, and asphalt vapors during handling and use of this product, including activities which generate dust from hardened asphalt concrete. If concentrations are below applicable exposure limits, respiratory protection is not required. If concentrations exceed the applicable exposure limits and while engineering controls are being implemented, use a NIOSH approved air-purifying respirator equipped with the appropriate filter in accordance with an employer/company-specific Respiratory Protection Program. Do not use air-purifying respiratory protection when considering elevated hydrogen sulfide gas concentrations. Supplied air respiratory protection may be necessary especially if hydrogen sulfide is present when entering a confined space or enclosed space.
Eye & Face Protection:	Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessively (visible) dusty conditions are present or anticipated. There is a potential for severe eye irritation if exposed to excessive concentrations of dust for those using contact lenses. It is recommended that contact lenses should not be worn when eye contact with product is possible. An eye wash station should be immediately available at the work area.
Skin & Foot Protection:	Use gloves constructed of chemical resistant materials such as heavy nitrile rubber if frequent or prolonged contact is expected. Boots with tops at least 6 inches high and laced without opening are recommended. Pants without cuffs which extend over the tops of the boots are also recommended.
Personal Hygiene:	Wash dust-exposed hands with soap and water before eating, drinking, use of tobacco products, applying cosmetics, or using toilet facilities. Wash work clothes after each use. Clean skin with soap and water. Do not use solvents or thinners (e.g. gasoline, kerosene) or harsh abrasive skin cleaners to remove material from skin. Avoid breathing dust.
Other Control Measures:	A fresh potable water supply for emergency first aid should be readily available. An oil-dissolving skin cleaner should be available. Workers should station themselves upwind of asphalt emissions when possible.

SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES
Appearance:	Black, viscous, granular
Odor and Odor Threshold:	Mild petroleum or characteristic asphalt odor. Odor threshold – varies.
pH:	Not applicable
Melting Point/Freezing Point:	Not applicable
Boiling Point:	> 400° C (> 752°F) Varies with particular composition
Flash Point:	> 232°C (> 450°F) Varies with particular composition
Flammability/Explosive Limits:	Not flammable However, combustibility varies with type and amounts of solvents.

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Auto-ignition Temperature:	Data not available
Vapor Pressure:	Negligible
Vapor Density	Not applicable
Relative Density (water = 1):	2.3 – 2.7 (@77°F)

SECTION 10	STABILITY
Stability:	Stable under ambient and anticipated storage and handling conditions.
Incompatibility (Materials to Avoid):	Incompatible with strong acids and strong oxidizers. Some components of hot-mixed asphalt may react vigorously with water. May readily ignite when mixed with naphtha and other volatile solvents. Hydrogen sulfide from the product can react with iron in asphalt storage tank to form iron sulfide, a pyrophoric (a material which ignites spontaneously in air below 130°F) material. Silica reacts violently with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, oxygen difluoride, and hydrogen peroxide yielding possible fire and/or explosions. Silica is also incompatible with acetylene and ammonia. Silica dissolves readily in hydrofluoric acid producing a corrosive gas – silicon tetrafluoride.
Conditions to Avoid:	Heat, flames, sparks. Adding water to hot asphalt presents an explosion hazard.
Hazardous Decomposition Products:	Thermal decomposition of the material may release carbon monoxide, carbon dioxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, and other organic and inorganic compounds (e.g. ammonia). Silica-containing dust can be generated. When heated, quartz is slowly transformed into tridymite (above 860°C/1580°F) and cristobalite (above 1470°C/2678°F). Hazardous vapors may collect in enclosed vessels or areas if not properly ventilated.
Hazardous Polymerization:	Not known to polymerize.

SECTION 11	TOXICOLOGICAL INFORMATION
The information contained in this section represents an overview of health effects caused by overexposure to one or more components in Recycled Asphalt Pavement.	
Primary Routes of Exposure:	Inhalation, Ingestion
Eye Contact:	Asphalt fumes may cause eye irritation. Exposure to hydrogen sulfide at sufficient airborne concentrations (e.g., 2-5 parts per million) may cause eye irritation. Hardened material may cause irritation due to mechanical abrasion or corrosive action. Conjunctivitis may occur.
Skin Contact:	Emissions may cause mild irritation. Chronic exposure to petroleum asphalt has caused skin disorders such as dermatitis, folliculitis, or oil acne. There may be increased sensitivity to sunburn when the skin is exposed to petroleum asphalt and asphalt emission. Direct contact may cause irritation by mechanical abrasion. Some

SECTION 11	TOXICOLOGICAL INFORMATION
	components of material are also known to cause corrosive effects to skin and mucous membrane.
Skin Absorption:	Not expected to be a significant route of exposure.
Ingestion:	Petroleum asphalt has a low toxicity when ingested. However, petroleum distillates may be absorbed from the gastrointestinal tract, with possible systemic effects (gastrointestinal irritation, vomiting, diarrhea, and central nervous system depression and possible aspiration into the lungs). Aspiration of petroleum distillates may cause pulmonary edema and chemical pneumonitis. Ingestion of large amounts may cause gastrointestinal irritation and blockage. Direct contact with heated material can produce thermal burns on contacted tissues.
Inhalation:	Petroleum asphalt may produce emissions including dust that irritate the nose, throat, mucous membranes, and upper respiratory tract by mechanical abrasion. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, and flu-like fever may occur following exposures in excess of applicable exposure limits. Chronic exposures to elevated levels of asphalt emissions may result in chronic respiratory irritation and/or other lung diseases. Hydrogen sulfide gas can be harmful or fatal if inhaled in excessive concentrations. Airborne dust or silica is not expected during normal handling and use of this material. If hardened asphalt concrete is subjected to mechanical forces (such as in demolition or asphalt recycling work) which generate dust, exposure to respirable crystalline silica may be possible. Avoid breathing excessive dust. Repeated and prolonged or chronic exposure to respirable dust in excess of allowable exposure limits can result in pneumoconiosis, a lung disease. Repeated and prolonged (chronic) exposure to respirable crystalline silica-containing dust in excess of allowable exposure limits may cause silicosis, a progressive pneumoconiosis, and possibly lung cancer.

SECTION 11	TOXICOLOGICAL INFORMATION
Medical Conditions Aggravated By Exposure:	Prolonged and repeated exposure to asphalt may cause skin disorders such as dermatitis, folliculitis, and acne-like lesions. Chronic inhalation of high concentrations of airborne asphalt vapors may cause chronic bronchitis and pneumonitis. Inhaling respirable dust and/or crystalline silica may aggravate existing respiratory system diseases(s) such as bronchitis, emphysema, chronic obstructive pulmonary disease (COPD). Exposure to dust may aggravate existing skin and/or eye conditions. Smoking and COPD may also exacerbate the effects of excessive exposure to this material.
Carcinogenicity:	Petroleum Asphalt and Respirable Crystalline Silica 1. Petroleum asphalt and asphalt derivatives in this product are not listed on the NTP or OSHA lists of carcinogens. NIOSH has nominated asphalt fumes for toxicological assessment by the NTP. The International Agency for Research on Cancer (IARC) concluded the following: a. <u>Occupational Exposures to Oxidized Bitumens and Their Emissions During Roofing</u>: "The body of available data from cancer studies in humans points to an association between exposures to oxidized bitumens during roofing and lung cancer and tumors in the upper aerodigestive tract. In support of these findings, extracts and fume condensates of oxidized bitumens, which are used primarily in roofing applications, showed sufficient evidence of carcinogenicity in experimental animals. Taking these data together, the Working Group evaluated occupational exposures to oxidized bitumens and their emissions during roofing as "probably carcinogenic to humans" (Group 2A). b. <u>Occupational Exposures to Hard Bitumens and Their Emissions During Mastic Asphalt Work:</u> Based on two positive studies among mastic asphalt workers, the Working Group concluded "that there was limited evidence in humans for the carcinogenicity of occupational exposures during mastic asphalt work. This type of bitumens has not been tested in experimental animals. In consequence, occupational exposures to hard bitumens and their emission during mastic asphalt work were classified as "possibly carcinogenic to humans" (Group 2B). c. <u>Occupational Exposures to Straight-Run Bitumens and Their Emissions During Road Paving</u>: On the basis of an earlier meta-analysis, the IARC multi-center study and several more recent independent studies, the Working Group concluded that there was inadequate evidence in humans for the carcinogenicity of occupational exposures during road paving with straight-run bitumens. Also, there was inadequate evidence in experimental animals for the carcinogenicity of extracts and of fume condensates of this type of bitumens. However, studies of workers exposed to bitumen emissions during paving with straight-run bitumens showed mutagenic and genotoxic/cytogenetic effects in these workers. Similar

SECTION 11	TOXICOLOGICAL INFORMATION
	effects were also observed in experimental systems under controlled conditions. This strong mechanistic evidence led to the classification of occupational exposures to straight-run bitumens and their emissions during road paving as "possibly carcinogenic to humans", (Group 2B). Some possible trace components (e.g. benzene, < 0.1%) may be carcinogenic. (IARC, 10/19/2011). (The following information regarding crystalline silica-containing dust particles applies to the dried product if it is subjected to mechanical forces such as demolition or asphalt recycling work). 2. Crystalline Silica: The IARC concluded that there is "sufficient evidence in humans for the carcinogenicity of crystalline silica in the form of quartz or Cristobalite," there is "sufficient evidence in experimental animals for the carcinogenicity of quartz dust" and there is "limited evidence in experimental animals for the carcinogenicity of Tridymite dust and Cristobalite dust". The overall IARC evaluation is that "crystalline silica inhaled in the form of quartz or Cristobalite dust is carcinogenic to humans (Group I)". The IARC evaluation noted that not all industrial circumstances studied evidenced carcinogenicity. The NTP has listed respirable crystalline silica as a known human carcinogen. The American Conference of Governmental Industrial Hygienists (ACGIH) has listed respirable crystalline silica (quartz) as a suspected human carcinogen (A-2 designation, 2015). The Occupational Safety and Health Administration (OSHA) does not list crystalline silica on the carcinogen list. California Proposition 65 – Crystalline silica was listed in 1996 on the Safe Drinking Water and Toxic Enforcement Act of 1986 as a "chemical known to the state to cause cancer or reproductive toxicity."
Signs & Symptoms of Overexposure:	Symptoms of petroleum asphalt exposure include (but may not be limited to): irritation of the nose, throat, eyes, and skin. Other symptoms associated with nausea and dizziness. The signs and symptoms of acute exposures to dust from hardened asphalt may include irritation of the eyes, skin, and respiratory tract. Symptoms of silicosis include (but may not be limited to): shortness of breath, difficulty breathing upon exertion, coughing, diminished chest expansion, reduction in lung volume, right heart enlargement, or failure.

SECTION 12	ECOLOGICAL INFORMATION
The lack of available information precludes adequate assessment of potential risks to the environment. However recent studies indicate that the very low water solubility and high molecular masses are such that their bioavailability to aquatic organisms is expected to be limited. Expected to be resistant to biodegradation.	

SECTION 13	DISPOSAL CONSIDERATIONS
Dispose of waste materials only in accordance with applicable federal, state, and local regulations. This information only applies to Rieth-Riley Construction Company product as sold. The product may become contaminated during use and it is the responsibility of the user to assess the appropriate disposal method in each situation.	

SECTION 14	TRANSPORT INFORMATION
U.S. Department of Transportation (USDOT):	Not regulated
Transportation of Dangerous Goods (TDG):	Not regulated

SECTION 15	IDENTIFICATION
CERCLA:	Section 103 and SARA Section 304 (Release to the Environment). THE CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA section 103 reporting requirements. However, other federal reporting requirements, including SARA 304, as well as the Clean Water Act may still apply.
TSCA Status:	On TSCA Inventory
DSL Status:	All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards:	Health Hazard
Penn. RTK:	U.S. Pennsylvania Worker and Community Right-to-Know Law (34 PA Code Chap. 301-323)
Mass. RTK:	U.S. Massachusetts Commonwealth's Right-To-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000).
NJ RTK:	U.S. New Jersey Worker and Community Right-To-Know Act (New Jersey Statute Annotated Section 34: 5A-5).
California Prop 65:	Warning! This product contains a chemical known to the State of California to cause cancer.

SECTION 16	OTHER INFORMATION
Label requirements:	Danger! Release of Toxic Hydrogen Sulfide Gas Can Be Emitted From Hot Asphalt. Due to Odor Masking/Fatigue of the Sense of Smell, the Odor of Hydrogen Sulfide (Rotten Eggs) Cannot Be Relied upon as a Means of Detection. Inhalation of a Few Breaths of High Concentrations (700 ppm) Could Be Fatal.
Disclaimer:	The information contained herein is furnished without warranty of any kind. Employers should use this Information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. The data in this SDS was prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information to comply with all laws, standards, and regulations applicable to the safe handling and use of these products and to determine the suitability of the product for its intended use.