Environmental Product Declaration for GM-RSS
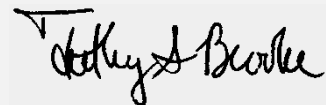
Product Category: Pavement Preservation Products
Produced By: Asphalt Systems Inc.

1.0 General Information

Product Name	GM-RSS
Manufacturer Name	Asphalt Systems Inc.
Program Operation	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2959, USA
EPD Declaration Number	EPD 952
Meets Quality Specification	California technical specification ABC123, ISSI Standards 143 and ARRA standard 987.
Reference PCR	ISO 21930: 2017
Date of Issuance:	April 4, 2025
End of Validity:	April 3, 2030
Product Name	GM-RSS Utilizing Optimal Aggregates
EPD Owner	Asphalt Systems Incorporated
EPD Scope:	Cradle-to-gate with options (A1, A2, A3, A4, A5)
Declared Unit:	Preservation of 1 m^2 of pavement for 1 year using GM-RSS
Verification:	ISO 21930 serves as the core PCR. Independent verification of the declaration according to ISO 14025 and ISO 21930. ☐ internal ☒ external
LCA Reviewer and EPD Verifier:	Timothy S. Brooke ASTM International

2.0 Product Information

GM-RSS is an emulsified, gilsonite-modified rejuvenating sealing solution designed for asphalt pavement repair and preservation. The product penetrates and rebinds the surface aggregate while sealing and rejuvenating the oxidized asphalt binder, delivering a durable and visually enhancing finish. GM-RSS has been extensively utilized for both preventative maintenance in early-stage pavement preservation and reactive applications for severely raveled and deteriorated roads, parking lots, airfield runways, and taxiways. It extends the service life of asphalt pavements by an average of five years, reducing the need for frequent maintenance and reconstruction. The product is applied using asphalt distributor trucks, ensuring a uniform application of liquid and aggregate in a single-pass process, making it efficient and cost-effective. This innovative solution is engineered to enhance pavement durability and sustainability, making it a key component in modern asphalt maintenance strategies.

The analysis shown here was performed in accordance with ISO 21930 as the core PCR, also referencing the Earthsure Environmental Product Declaration Program product category rule for pavement preservation products. The analysis is based on a life cycle assessment of GM-RSS, using data collected from January 2023 to December 2023. Environmental Product Declarations from other sources using different Product Category Rules may not be comparable to this one.

3.0 LCA Calculation Rules

The declared unit is the preservation of 1 m^2 of pavement for 1 year using GSB-78™. The system boundary is a cradle-to-gate with options focus including the following modules:

- **A1: Raw material supply**: extraction, handling, and processing of the iron ore, coke, limestone, and other material inputs.

- **A2: Transportation**: transportation of all input materials and fuels from the suppliers to the gate of the manufacturing facility.

- **A3: Manufacturing**: the specific mixing processes that occur at ASI's Utah facility. Also includes the overhead operations of the manufacturing facility, resource, use, and waste.

- **A4: Transport to Site:** transport from the factory gate to the construction site.

- **A5 Installation:** the application of the product on the road surface

All significant foreground data was gathered from the manufacturer based on measure values.

The cut-off criteria for all activity stage flows considered within the system boundary conform with ISO 21930: 2017 Section 7.1.8. Specifically, the cut-off criteria were applied as follows:

- All inputs and outputs for which data are available are included in the calculated effects and no collected core process data are excluded.

- A one percent cut-off is considered for renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process. The sum of the total neglected flows does not exceed 5% of all energy consumption and mass of inputs.
- All flows known to contribute a significant impact or to uncertainty are included.
- The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the life cycle inventory.

No material or energy input or output was knowingly excluded from the system boundary. Table 1 shows the background data and indications of data quality used in the assessment.

Table 1: Secondary Data Sources and Data Quality Assessment				
A1: Raw Material Inputs				
Inputs	**LCI Data Source**	**Geography**	**Year**	**Data Quality Assessment**
Asphalt Cement	USLCI 2014: Bitumen, at refinery/kg/US	N. America	2014	**Technology:** very good Process models average N. American technology **Time:** very good Data is <5 years old **Geography:** very good Data is specific to N. American conditions.
Gilsonite	USLCI 2014: Limestone, at mine/US (proxy for gilsonite mining process data)	N. America	2014	**Technology:** fair Process approximates average N. American Gilsonite mining technology **Time:** very good Data is <5 years old **Geography:** very good Data is specific to N. American conditions.
Hydrochloric Acid	USLCI 2014: Hydrochloric acid, at plant/kg/RNA	N. America	2014	**Technology:** very good Process models average N. American technology **Time:** very good Data is <5 years old **Geography:** very good Data is specific to N. American conditions.
Surfactant	DataSmart USEI Database: Soap, at plant/RER with US electricity U	N. America	2012	**Technology:** very good Process models average global technology **Time:** good Data is 6 years old **Geography:** good Data is specific to global conditions, customized with US electricity.

Polymer	DataSmart USEI Database: Latex/RER with US electricity U	N. America	2012	**Technology:** very good Process models average global technology **Time:** good Data is 6 years old **Geography:** good Data is specific to global conditions, customized with US electricity.

A2/A4: Transportation

Inputs	LCI Data Source	Geography	Year	Data Quality Assessment
Trucking	USLCI 2014: Transport, combination truck, diesel powered/US	N. America	2014	**Technology:** very good Process models average N. American technology **Time:** very good Data is <5 years old **Geography:** very good Data is specific to N. American conditions.

A3: Manufacturing

Energy	LCI Data Source	Geography	Year	Data Quality Assessment
Electricity	ecoinvent 3.3 Database: Electricity, low voltage {WECC, US only}| market for | Alloc Def, U	Western United States	2016	**Technology**: very good Process models electricity generation technologies specific to the WECC Western United States grid. **Time**: very good Data is less than 5 years old **Geography**: very good Data representative of the Western USA.
Natural Gas	USLCI 2014 Database: Natural gas, combusted in industrial boiler/US	North America	2014	**Technology**: very good Process models average North American technology **Time**: very good Data is less than 5 years old **Geography**: very good Data representative of North America.

Waste	LCI Data Source	Geography	Year	Data Quality Assessment
Non-hazardous Waste Treatment	ecoinvent 3.3 database: Process-specific burden, sanitary landfill	Global	2016	**Technology**: very good Process models average global technology **Time**: very good Data is less than 5 years old

{RoW}| processing | Alloc Def, U		**Geography**: good Data is representative of global conditions.		

A5: Application				
Application	**LCI Data Source**	**Geography**	**Year**	**Data Quality Assessment**
Optimal Aggerate	Primary data from Optimal Aggregate	N. America	2022	**Technology**: very good Process models specific technology **Time**: very good Data is less than 5 years old **Geography**: good Data is representative of global conditions.

The data was gathered for the 2022 production year. The environmental load amount products produced at the production facility were allocated according to mass. For waste that is recycled, the "recycled content approach" was chosen. The recycling of waste generated by the product system is cut off.

4.0 LCIA Information

Life cycle impact assessment (LCIA) is the phase in which the set of results of the inventory analysis – the inventory flow table – is further processed and interpreted in terms of environmental impacts and resource use inventory metrics. Tables 2 and 3 below summarizes the modules considered and indicators reported for the A1-A5 product system.

Table 2: Description of the System Boundary (x: included in LCA; mnd: module not declared; mnr: module not relevant)																			
Product			**Construction Installation**		**Use**								**End-of-life**				**Benefits Beyond the System Boundary**		
Raw Material supply	Transport	Manufacturing	Transport	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-Construction/ Demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
X	x	x	x	x	mnd	mnd	mnr	mnr	mnr	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd

Table 3: Life Cycle Impact Assessment Indicators		
Environmental Indicator	**Abbreviation**	**Unit**
Environmental impacts		
Global Warming Potential	GWP	kg CO2 eq.
Ozone Depletion Potential	ODP	kg CFC-11 eq.
Eutrophication Potential	EP	kg N eq.
Acidification Potential	AP	kg SO2 eq.
Photochemical Oxidation Potential	POCP	kg O3 eq.
Use of primary resources		
Renewable Energy Used as Energy	RPRE	MJ, NCV
Renewable Energy Used as Material	RPRM	MJ, NCV
Non-renewable Energy Used as Energy	NRPRE	MJ, NCV
Non-renewable Energy Used as Material	NRPRM	MJ, NCV
Use of secondary resources		
Secondary Material	SM	kg
Renewable Secondary Fuel	RSF	MJ, NCV
Non-renewable Secondary Fuel	NRSF	MJ, NCV
Recovered Energy	RE	MJ, NCV
Abiotic depletion potential		
Abiotic depletion potential fossil	ADPf	MJ, LHV
Abiotic depletion potential elements	ADPe	kg Sb
Consumption of freshwater resources		
Freshwater consumption	FW	m3
Waste and output flows		
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
High-level Radioactive Waste	HLRW	m3
Intermediate/Low level Radioactive Waste	ILLRW	m3

4.0 LCA Results

Detailed Life Cycle Environmental Impacts of preserving one square meter of pavement for one year using GM-RSS (5-year service life)

Environmental Indicator	Unit	Total	A1	A2	A3	A4	A5
Table 4: Life Cycle Impact Assessment Results for GM-RSS per m2 per year (5-year service life)							
Environmental impacts							
GWP	kg CO2 eq.	8.07E-01	9.25E-02	1.28E-02	6.83E-01	1.89E-02	6.51E-05
ODP	kg CFC-11 eq.	2.34E-09	2.19E-09	4.86E-13	1.37E-10	7.19E-13	7.33E-12
EP	kg N eq.	7.28E-03	1.28E-03	7.63E-05	5.81E-03	1.13E-04	4.16E-07
AP	kg SO2 eq.	1.42E-04	5.73E-05	4.24E-06	7.44E-05	6.27E-06	1.73E-07
POCP	kg O3 eq.	5.91E-02	1.25E-02	2.08E-03	1.64E-02	3.08E-03	2.51E-02
Use of primary resources							
RPRE	MJ, NCV	5.81E-02	4.75E-02	0.00E+00	1.06E-02	0.00E+00	5.77E-05
RPRM	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRE	MJ, NCV	2.10E+01	8.55E+00	1.74E-01	1.20E+01	2.57E-01	9.14E-04
NRPRM	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary resources							
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Abiotic depletion potential							
ADPf	MJ, LHV	1.93E+01	8.05E+00	1.64E-01	1.08E+01	2.43E-01	7.75E-04
ADPe	kg Sb	3.13E-10	1.04E-10	0.00E+00	1.99E-10	0.00E+00	1.11E-11
Consumption of freshwater resources							
FW	m3	7.01E-04	6.55E-04	0.00E+00	1.15E-05	3.51E-05	0.00E+00
Waste and output flows							
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HLRW	m3	4.44E-12	1.20E-12	0.00E+00	3.18E-12	0.00E+00	6.41E-14
ILLRW	m3	3.66E-11	5.78E-12	0.00E+00	2.94E-11	0.00E+00	1.44E-12
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

More information on GM-RSS

GM-RSS contains these hazardous materials	
Cas Number	68476-33-5
Name	Fuel Oil

To the best of our knowledge, GM-RSS contains no endocrine disrupters as defined by the European Commission.

Dates of primary data collection	2023

Product Owner Certification

I have personally examined the conditions and the individuals performing this analysis and to the best of my knowledge, these representations are true and accurate.

Name: David S Walker, Managing Director – Asphalt Systems Inc.

Date: Feb 26, 2025

Signature

Disclaimers

The analyses presented here were performed with all due care, but the user should realize that they represent the average results measured under standardized conditions and the actual environmental performance will vary depending on the particular application, the climate, the traffic type and intensity and other factors beyond the control of Asphalt Systems, Inc.

The results shown here pertain only to the referenced product category rule. They should not be compared directly to results using a different product category rule.

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