



Environmental  
Product  
Declaration



# READY-MIXED CONCRETE



# Environmental Product Declaration



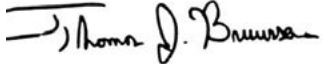

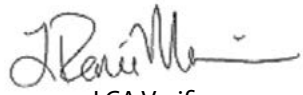


According to ISO 14025

## NRMCA Certified

This environmental product declaration is in accordance with ISO 14025:2006 and describes the environmental characteristics of 150 ready-mixed concrete products. It is a certified declaration and all relevant environmental information is disclosed as per the governing product category rules.

Internal Verification     External Verification

PROGRAM OPERATOR	The National Ready Mixed Concrete Association (NRMCA) 900 Spring Street Silver Spring, MD 20910 <a href="http://www.nrmca.org/sustainability">www.nrmca.org/sustainability</a> 301-587-1400	
DECLARATION HOLDER	Graniterock 350 Technology Drive; PO Box 50001 Watsonville, CA 95077-5001 <a href="http://www.graniterock.com/">http://www.graniterock.com/</a> 831.768.2000	
DECLARATION NUMBER	NRMCAEPD:10006	
DECLARED PRODUCT	This EPD covers 150 ready mixed concrete products on a per cubic meter and cubic yard basis comprising 30 mix designs from five concrete production facilities in the San Francisco and Monterey Bay areas.	
REFERENCE PCR	Product Category Rules (PCR) for ISO 14025 Type III Environmental Product Declarations (EPDs) for Concrete meeting the requirements of one of the following: ASTM C94, ASTM C90, CSA A23.1/A23.2, UNSPSC code 30111500, Version 1.1 dated December 4, 2013, serves as the PCR for this EPD. The Carbon Leadership Forum: <a href="http://www.carbonleadershipforum.org">www.carbonleadershipforum.org</a>	
DATE OF ISSUE	January 9, 2015	
PERIOD OF VALIDITY	Five years (Until January 9, 2020)	
CONTENTS OF THE DECLARATION	Declares a cradle-to-gate (A1 to A3) assessment of 150 ready mixed concrete products-capturing a significant spectrum of the industry's production	
The PCR review was conducted by: Nicholas Santero, PE International; Holly Lahd, EL Analytics and Medgar Marceau, Morrison Hershfield December 4, 2013		
LCA and EPD Developer: Athena Sustainable Materials Institute		
This declaration was independently verified in accordance with ISO 14025 by: Name: Tom Bruursema, NSF International Contact: <a href="mailto:bruursema@nsf.org">bruursema@nsf.org</a>		 EPD Verifier
This life cycle assessment was independently verified to be in conformance with ISO 14044 and the cited PCR by: Name: J. Renee Morin, PRé Sustainability Contact: <a href="mailto:morin@pre-sustainability.com">morin@pre-sustainability.com</a>		 LCA Verifier



## Description of Company

Graniterock has served the needs of the Construction Industry since 1900. Graniterock supplies crushed aggregate, sand and gravel, concrete, building materials, natural stone, and asphaltic concrete to any construction job, large or small. The Company's Construction Division is a significant regional heavy engineering contractor building roadways, airports and private commercial and residential projects. Graniterock was founded on Valentine's Day, February 14, 1900. Graniterock has operations in Watsonville, Santa Cruz, Seaside, Salinas, Hollister, Aromas, Cupertino, Felton, San Jose, Redwood City, Oakland, and South San Francisco.

At Graniterock, we believe that quality products and exemplary service can only be achieved with highly skilled and motivated people who take personal ownership of customer satisfaction. You will notice a difference in Graniterock People. We are proud of our dedication to uncompromising product quality and service.

Graniterock received the 1992 Malcolm Baldrige National Quality Award and the 1994 Governor's Golden State Quality Award. The future of Graniterock will echo the many remarkable achievements of the past. Graniterock has strategic plans to maintain its leadership position in the industry. High-technology solutions are being implemented to enhance the products, service and procedures already in place at the A. R. Wilson Quarry in Aromas.

Graniterock has led the way through for more than 100 years and will continue to be a community and market leader through employee dedication, technological innovation and commitment to excellence.

This EPD is for ready-mixed concrete produced by Graniterock at the following five facilities:

Facility	321 - Santa Cruz	331 - Salinas	341 - Sand City	361 - San Jose	381 - Redwood City
Street Address	303 Coral Street	400 Work Street	1755 Del Monte Boulevard	11711 Berryessa Road	355 Blomquist Street
City	Santa Cruz	Salinas	Seaside	San Jose	Redwood City
State	California	California	California	California	California
Zip	95060-2106	93091	93955	95133-1012	94063-2701
Plant Type	Central Mix	Transit Mix	Transit Mix	Central Mix	Central Mix

## Description of Product

Products covered by this EPD satisfy general purpose concrete as used in residential, commercial and public works applications in the US and Canada. This EPD reports the impacts for a 30 different ready-mixed concrete products (listed in Table 2 on the following page) in accordance with the following:

- ACI 211: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- ACI 318: Building Code Requirements for Structural Concrete
- ASTM C94: Standard Specification for Ready-Mixed Concrete
- CSI MasterFormat Division 03-30-00: Cast-in-Place Concrete
- UNSPSC Code 30111500: Ready Mix Concrete



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**Table 2. Declared Product Range Classification**

Mix #	Product ID	Product Code	Mix Properties				
			28 day CS (PSI)	Water cement	Fly Ash (%)	Slag (%)	Air Entrained
Mix 1	670297	5 Sack, 15% FA, 3/4" crushed, tailgate	3000	0.6	15	0	Y
Mix 2	87296	6 Sack, 25% FA, pea gravel	3000	0.58	25	0	Y
Mix 3	670311	5 Sack, 15% FA, 3/4" crushed, 3" line pump	3000	0.62	15	0	Y
Mix 4	57T500	5 Sack, 35% Slag, 15% FA, boom pump	3000	0.62	15	35	N
Mix 5	67T50P	5 Sack, 35% Slag, 15% FA, 3/4" crushed	3000	0.64	15	35	N
Mix 6	72604	6 Sack, 17% FA, 1/2" crushed pump mix	3000	0.53	17	0	Y
Mix 7	80300	6 Sack, 15% FA, pea gravel	3000	0.58	15	0	Y
Mix 8	72609	6 Sack, 25% FA, 1/2" crushed	3500	0.5	25	0	Y
Mix 9	670363	5.5 Sack, 15% FA, 3/4" crushed, 3" line pump	3500	0.55	15	0	Y
Mix 10	57T550	5.5 Sack, 15% FA, 35% slag, boom pump	3500	0.55	15	35	N
Mix 11	57B590	6 Sack, 30% FA, 0.45 w/cm	3500	0.45	30	0	N
Mix 12	670357	5.5 Sack, 25% FA, 3" line pump	3500	0.55	25	0	Y
Mix 13	578606	6 Sack, 25% FA, tailgate	3500	0.49	25	0	Y
Mix 14	578604	6 Sack, 20% FA, 3/4" crushed tailgate	4000	0.49	20	0	N
Mix 15	83774	8 Sack, 15% FA, shotcrete	4000	0.43	15	0	Y
Mix 16	666713	7 Sack, 15% FA, lightweight 110 lb/ft3	4000	0.48	15	0	Y
Mix 17	83798	8 Sack, 25% FA, shotcrete	4000	0.42	25	0	N
Mix 18	672414	6 Sack, 15% FA, 3/4" crushed, 3" line	4000	0.5	15	0	Y
Mix 19	57T605	6 Sack, 15% FA, 35% Slag, boom pump	4000	0.51	15	35	N
Mix 20	57T600	6 Sack, 30% FA, 40% Slag, tailgate	4000	0.5	30	40	N
Mix 21	572657	7 Sack, 25% FA, 0.45 w/cm	4000	0.45	25	0	Y
Mix 22	572600	6 Sack, 25% FA, Class A/Minor Concrete	4000	0.5	25	0	N
Mix 23	670414	6 Sack, 25% FA, 3" line	4000	0.5	25	0	Y
Mix 24	67G607	6 Sack, 15% FA, 35% Slag, 3" line pump	4000	0.49	15	35	N
Mix 25	57G665	7 Sack, 15% FA, 30% Slag, 0.45 w/cm, tail- gate	4000	0.45	15	30	Y
Mix 26	678657	7 Sack, 25% FA, 3/4" crushed, 0.45 w/cm	4500	0.45	25	0	Y
Mix 27	571650	6.5 Sack, 3000 PSI 7 day strength	4500	0.45	0	0	N
Mix 28	57T750	7.5 Sack, 30% FA, 30% Slag, tailgate	5000	0.44	30	30	N
Mix 29	57T751	7.5 Sack, 15% FA, 30% Slag, tailgate low shrink	5500	0.39	15	30	N
Mix 30	571800	8 Sack, 3000 PSI 3 day strength	6000	0.38	0	0	N

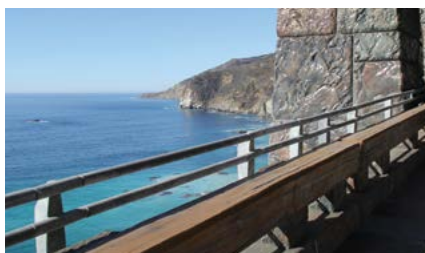
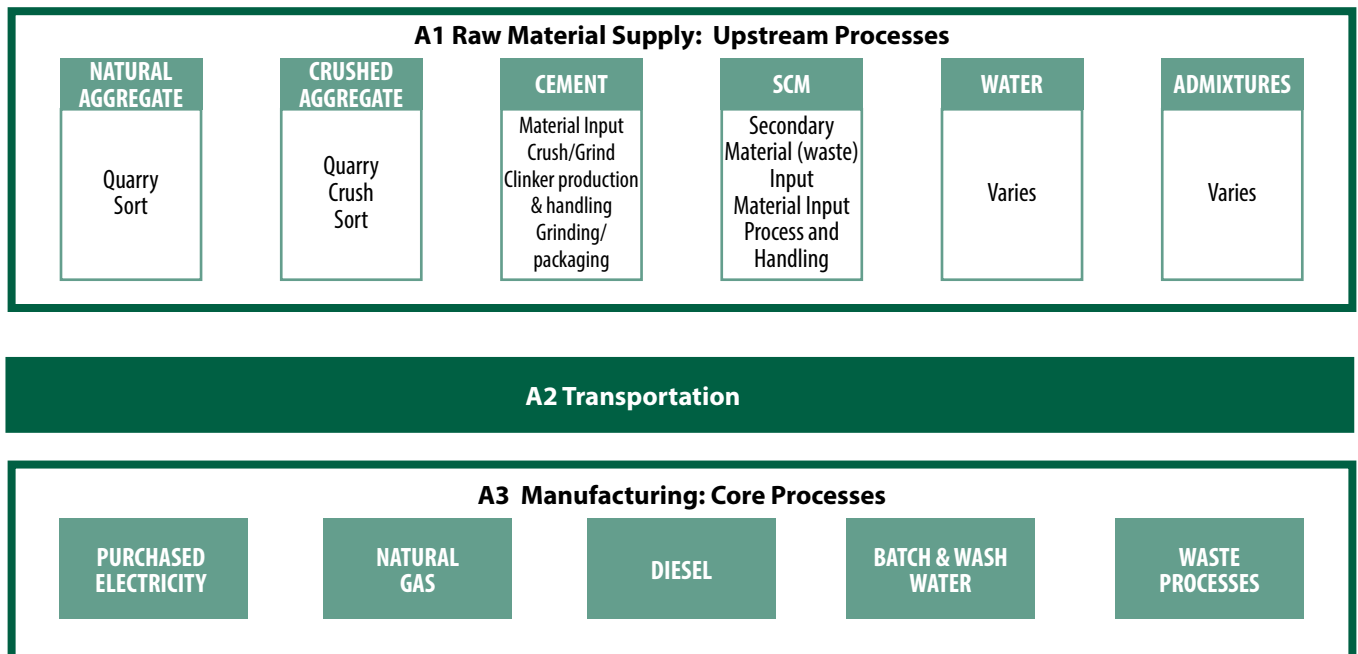
## Cradle-to-Gate Life Cycle of Concrete

### Business-to-Business EPD and Cradle-to-Gate LCA

This EPD is intended for use in Business to Business (B-to-B) communication. The scope of this EPD is cradle-to-gate and considers the following life cycle stages.

- **A1 - Raw Material Supply:** Includes all upstream process related to extraction, handling, and processing of the raw materials and intermediate component products as well as fuels, cement, supplementary cementitious materials, aggregate (coarse and fine), water, admixtures and other materials or chemicals used in concrete mixtures.
- **A2 - Transportation:** Accounts for the transportation of all input materials and fuels from the supplier to the gate of the concrete plant.
- **A3 - Manufacturing - Core Processes:** Includes all core process and the energy and water used to store, move, batch and mix the concrete and operate the concrete plant as well as the transportation and processing of wastes from these core processes.

Figure 1: Cradle-to-gate product system for concrete



## Methodology of Underlying LCA

### Declared Unit

The declared units are 1 cubic meter and 1 cubic yard for 150 ready mixed concrete products comprising of 30 mix designs from five production facilities in the San Francisco and Monterey Bay areas. Key product variables include:

- **28-day Strength:** Seven different specified compressive strengths are represented in the 30 mix designs: 3,000 psi (20.7 MPa); 3,500 psi (24.1 MPa); 4,000 psi (27.6 MPa); 4,500 psi (31.0 MPa); 5,000 psi (34.5 MPa); 5,500 psi (37.9 MPa); and 6,000 psi (41.3 MPa);
- **Water to cementitious materials ratio (w/cm):** as per mix design specification provided by Graniterock in accordance with ACI 211.1;
- **SCM reactivity:** as per mix design specification provided by Graniterock in accordance with ACI 211.1;
- **Admixtures use:** Admixture use was specified for the different mixes that were modeled. These admixtures included an air-entraining admixture, water reducing and accelerating admixtures, and high range water reducer admixtures.

Product (mix design) components include: portland cement, fly ash, slag cement, natural and crushed aggregates, admixtures and batch water.



## Scope of LCA

The life cycle stages included in this EPD are limited to raw materials and component products used in the manufacture of ready-mixed concrete (A1), the transportation of these materials and components to the concrete plant (A2) and the manufacture of ready mixed concrete (A3) ready for shipment at the plant gate.

Life cycle stages excluded from this EPD include:

- Transport to the construction site;
- On-site construction processes and components (reinforcement, forms and form work, placing and curing);
- Building (infrastructure) use and maintenance; and
- End of life effects.

In addition, the following life cycle processes are excluded from this study:

- Production, manufacturer and construction of buildings' capital goods and infrastructure;
- Production and manufacture of concrete production and mobile equipment;
- Personnel-related activities (commuting, furniture, office supplies); and
- Energy and hygiene water use related to facility management activities.

## Cut-off Rules

The cut-off criteria for all activity stage flows considered within the system boundary conform with ISO14044:2006 and section 3.3 of the governing PCR. 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 (e.g., portland cement and admixtures) are included;
- The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the life cycle flow inventory.

**Note:** Two of the five Graniterock concrete plants (331 and 341) are truck-mixing plants where the concrete mixing occurs within mixer trucks after they are loaded and at the project site; for these operations, a portion of the delivery truck's energy use that would typically be captured under "Construction and Process Stage" A4-Transportation (to site) is allocated to the mixing of concrete for truck-mixing plants and is captured in information module A3. This system boundary refinement addresses the difference between truck-mixing and central-mixing concrete plants where the latter plant type fully mixes the concrete prior to loading the concrete into delivery trucks.

## Allocation

The applied allocation procedures conform with ISO14044 clause 4.3.4.

## Limitations

The limitations of this EPD include:

- This EPD does not report all of the environmental impacts due to manufacturing of the product, but rather reports the environmental impacts for those categories with established LCA-based methods to track and report. Unreported environmental impacts include (but are not limited to) factors attributable to human health, land use change, and habitat destruction.
- In order to assess the local impacts of product manufacturing, additional analysis is required.
- This EPD reports the results of an LCA or the 'cradle-to-gate' analysis. Thus, declarations themselves are not comparative assertions, defined as an environmental claim regarding the superiority or equivalence of one product versus a competing product that performs the same function. An EPD does not make any statements that the product covered by the EPD is better or worse than any other product.
- Graniterock may participate in other sustainability or environmental best practice programs. The additional information section details Graniterock's purchase of Renewable Energy Certificates (RECs); however, no such additional environmental claim, declaration or claim in addition to the purchase of RECs is conveyed in this EPD.
- EPDs of concrete mixtures may not be comparable if they do not comply with this standard and data from this EPD. The data cannot be used to compare between concrete mixes, construction products or concrete mixtures used in different concrete products unless the data is integrated into a comprehensive LCA. For example, precast concrete, concrete masonry units and site cast concrete all have different manufacturing processes whose impacts are attributed to different LCA stages. This precludes direct comparison between mixtures used in these different products unless all life cycle phases are included.
- Life cycle impact assessment (LCIA) results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

## Data Sources and Data Quality Assessment

This EPD is based on foreground LCI data collected from five Graniterock production facilities, all located in California. Data was also collected for two of Graniterock's aggregate production facilities and used to model these inputs. All other upstream material, resource and energy carrier inputs have been sourced from various industry-average datasets and literature. The electricity inputs at the Graniterock production facilities was modelled based on the NERC region in which the facilities operate (WECC).

Many of these data sets are defaulted to those specified for use in the CLF PCR. Care was taken to fill known data gaps (dummies) as recorded in the USLCI database profiles. Tables 3 to 5 describe each LCI data source for raw materials (A1), transportation by mode (A2), the RMC core manufacture process (A3 and A4), and descriptions of data quality for each data source. This EPD was created using industry-average data for upstream materials. Variation can result from differences in supplier locations, manufacturing processes, manufacturing efficiency and fuel type used.



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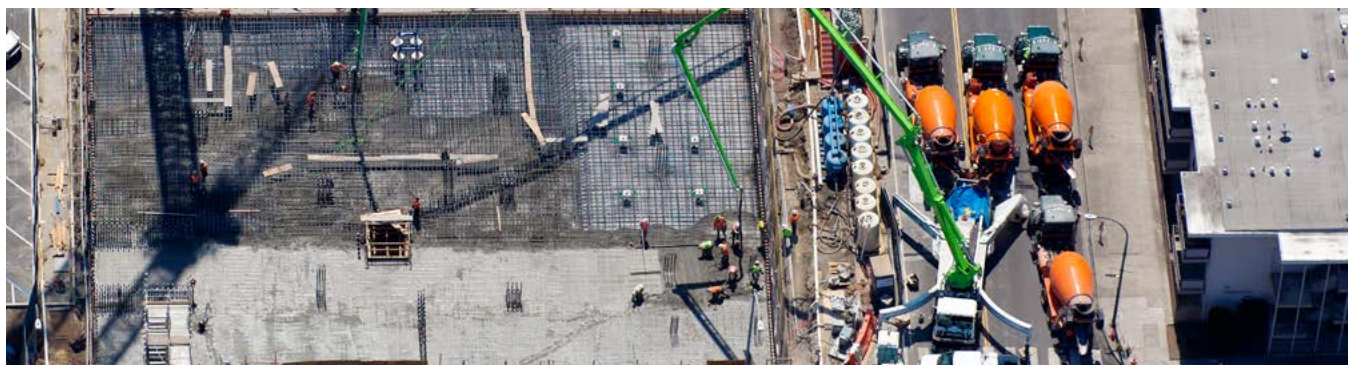
**Table 3: A1 - Raw Material Supply**

Material/Unit	LCI data source [as per CLF PCR: 2013]	Geography	Year	Data Quality Assessment
Cement (lbs)	MIT 2014 paper, Update of portland cement, at plant (USLCI). Modified to include upstream impacts of fuel and energy production. Electricity grid modelled as WECC region to reflect the sourcing of cement from suppliers in California.	USA/California	2010	<ul style="list-style-type: none"> <li>• Technology: good</li> <li>Process represents average cement production in the U.S. and electricity production in California.</li> <li>• Time: good</li> <li>Data is within 4 years</li> <li>• Geography: very good</li> <li>• Completeness: good</li> <li>Data is based on an average of national production</li> <li>• Reliability: very good</li> </ul>
Fly Ash (lbs)	None, no incoming burden, only inbound transport was considered	N/A	N/A	N/A
Slag cement (lbs)	LCI Slag Cement Manufacturing	USA	2003	<ul style="list-style-type: none"> <li>• Technology: good</li> <li>Process models ground granulated blast furnace slag.</li> <li>• Time: fair</li> <li>Data is within eleven years.</li> <li>• Geography: very good</li> <li>• Completeness: good</li> <li>• Reliability: good</li> </ul>
Crushed and Natural Aggregates (lbs) coarse and fine	Primary data gathered at two of Graniterock's aggregate facilities	California	2013	<ul style="list-style-type: none"> <li>• Technology: good</li> <li>Processes represent aggregate production at Graniterock's facilities.</li> <li>• Time: Very good</li> <li>Data is within one year.</li> <li>• Geography: Very good</li> <li>Processes model specific sources.</li> <li>• Completeness: very good</li> <li>• Reliability: very good</li> </ul>

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**Table 3: A1 - Raw Material Supply Con't**

<p>Admixtures (lbs) Accelerator Air Entrainer Retarding Waterproofing Plasticizer Superplasticizer</p>	<p>EFCA EcoProfiles (300, 301, 302, 303, 324 and 325) <a href="http://www.efca.info/publications.html">http://www.efca.info/publications.html</a></p>	<p>EU</p>	<p>2005 -2006</p>	<ul style="list-style-type: none"> <li>• Technology: very good Processes represents admixture production for use in concrete</li> <li>• Time: fair Data is within ten years</li> <li>• Geography: fair</li> <li>• Completeness: good Data from a federation of European admixture producers</li> <li>• Reliability: good Profiles have undergone an independent review process. Compliance with ISO standards (unknown)</li> </ul>
<p>Concrete Batch and Wash Water (gallons)</p>	<p>Primary (Pre-consumer, burden of crushing is reported and included in module A3)</p>	<p>USA</p>	<p>2013</p>	<ul style="list-style-type: none"> <li>• Technology: very good Primary data collected via industry survey</li> <li>• Time: very good Data is within two years</li> <li>• Geography: very good</li> <li>• Completeness: very good Primary data from core processes survey</li> <li>• Reliability: very good</li> <li>• Data based on specified use</li> </ul>
<p>Oil, Lubricants and Greases (lbs)</p>	<p>ecoinvent 3.01, Lubricating oil {US} production   Alloc Def, U</p>	<p>USA</p>	<p>2008</p>	<ul style="list-style-type: none"> <li>• Technology: good Process models the manufacture of lubricants</li> <li>• Time: fair Data is within two years.</li> <li>• Geography: good Processes model US production</li> <li>• Completeness: very good</li> <li>• Reliability: very good Data is verified by ecoinvent.</li> </ul>



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**Table 4: A2 - Transportation**

Process	LCI Data Source	Geography	Year	Data Quality Assessment
Truck, rail, ocean freighter and barge (lbs*miles)	USLCI – single unit truck transport, diesel powered; rail transport, diesel powered; ocean freighter, average fuel mix; barge, average fuel mix	USA	2008	<ul style="list-style-type: none"> <li>• Technology: very good</li> <li>Process represents U.S. average transportation profiles</li> <li>• Time: fair</li> <li>Data is within 10 years</li> <li>• Geography: fair</li> <li>• Completeness good (all data place holders filled)</li> <li>• Reliability: good</li> </ul>

**Table 5: A3 - Manufacturing**

Process	LCI Data Source	Geography	Year	Data Quality Assessment
Electricity (kWh)	ecoinvent 3.01, 2014 LCI datasets for: Electricity, medium voltage {WECC, US only}	USA/California	2008	<ul style="list-style-type: none"> <li>• Technology: very good</li> <li>Process represents production of electricity in the appropriate NERC region.</li> <li>• Time: fair</li> <li>Data is within ten years</li> <li>• Geography: very good</li> <li>• Completeness: good</li> <li>Data is representative of California production.</li> <li>• Reliability: good</li> <li>Data has been verified by ecoinvent.</li> </ul>
Natural Gas (cu. ft.)	USLCI	USA	2008	<ul style="list-style-type: none"> <li>• Technology: very good</li> <li>Process represents combustion of natural gas in an industrial boiler.</li> <li>• Time: fair</li> <li>Data is within ten years</li> <li>• Geography: fair</li> <li>• Completeness: good</li> <li>Data is representative of U.S. conditions</li> <li>• Reliability: good</li> <li>Data is from USLCI database</li> </ul>

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**Table 5: A3 - Manufacturing Con't**

Diesel (gallon)	USLCI	USA	2008	<ul style="list-style-type: none"> <li>• Technology: very good</li> <li>Process represents combustion of diesel in industrial equipment.</li> <li>• Time: fair</li> <li>Data is within ten years</li> <li>• Geography: fair</li> <li>• Completeness: good</li> <li>Data is representative of U.S. conditions</li> <li>• Reliability: good</li> <li>Data is from USLCI database</li> </ul>
Non-Hazardous Solid Waste (lbs)	ecoinvent 3.01; Adjusted for U.S. electricity grid	EU	2008	<ul style="list-style-type: none"> <li>• Technology: good</li> <li>• Time: fair</li> <li>Data is within ten years.</li> <li>• Geography: fair</li> <li>Processes model Swiss production (no U.S. process in USLCI database).</li> <li>• Completeness: very good</li> <li>• Reliability: very good</li> <li>Data is verified by ecoinvent.</li> </ul>

## Data Quality

Data quality/variability requirements, as specified in the CLF PCR: 2013, sections 3.5 and 3.6, are applied. This section describes the achieved data quality relative to the ISO 14044:2006 requirements. Data quality is judged on the basis of its precision (measured, calculated or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied within a study serving as a data source) and representativeness (geographical, temporal, and technological).

**Precision:** Through measurement and calculation, the manufacturer collected and provided primary data on their annual production of aggregate and RMC products. For accuracy, the LCA team validated these plant gate-to-gate input and output data.

**Completeness:** All relevant, specific processes, including inputs (raw materials, energy and ancillary materials) and outputs (emissions and production volume) were considered and modeled to represent the specified and declared RMC products. The relevant background materials and processes were taken from the US LCI Database (adjusted for known data placeholders); US system boundary adjusted ecoinvent v 2.2 and v3.0 LCI databases and modeled in SimaPro software v.8.0.1, 2014.

**Consistency:** To ensure consistency, the LCI modeling of the production weighted input and output LCI data for the declared products used the same modeling structure across the respective product systems, which consisted of input raw and ancillary material, energy flows, water resource inputs, product and co-products outputs, returned and recovered concrete materials, emissions to air, water and soil, and waste recycling and treatment. The same background LCI datasets from the SimaPro LCI database were used across all RMC product systems. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the plant and selected process level to maintain a high level of consistency.

**Reproducibility:** Internal reproducibility is possible since the data and the models are stored and available in a SimaPro database for all background processes, and in Athena's proprietary concrete LCA calculator\* for all production facility and mix-specific calculations. A considerable level of transparency is provided throughout the LCA report as the specifications and material quantity make-up for the declared RMC products are presented and key primary and secondary LCI data sources are summarized. The provision of more detailed data to allow full external reproducibility was not possible due to reasons of confidentiality. *\* Athena has developed a proprietary excel-based tool that allows the calculation of PCR-compliant LCA results for ready-mixed concrete product mix designs. The tool scales results for base-unit technosphere inputs (i.e. 1lb portland cement, 1 kWh electricity, etc.) to replicate the reference flow conversions that take place in SimaPro. The tool was tested against the NRMCA average LCA results (Athena SMI, 2014) that were developed exclusively in SimaPro and generated results within 1-2% in every impact category and inventory metric.*

**Representativeness:** The representativeness of the data is summarized as follows.

- Time related coverage of the manufacturing processes- Primary collected data: 2013 (12 months).
- Upstream (background) LCI data: either the PCR specified default or more appropriate LCI datasets were used as found in the US LCI (adjusted) Database, US adjusted ecoinvent v.2.2 and v.3.0 database, 2014.
- Geographical coverage: the cement, aggregate production, and RMC plant operations take place in California; other upstream and background processes are based on North American average data.
- Technological coverage: typical or average – specific to Graniterock facilities for all primary data.

## Life Cycle Assessment Results

### Environmental indicators and inventory metrics

Per the governing PCR, this EPD supports 15 life cycle impact assessment indicators and inventory metrics as listed in Table 6. Tables 7a through 11b then report the LCA results for each product. The number reference (7-11) refers to the 5 facilities (321, 331, 341, 361, and 381) and the letter reference is as follows: a)cubic meter results; b)cubic yard results.

Table 6. Life Cycle Category Indicators and Inventory Metrics			
#	LCIA Indicators	Abbreviations	Units
1	Global Warming Potential (climate change)	<b>GWP</b>	kg CO2-eq
2	Ozone Depletion Potential	<b>ODP</b>	kg CFC-11-eq
3	Acidification Potential	<b>AP</b>	kg SO2-eq
4	Eutrophication Potential	<b>EP</b>	kg N-eq
5	Photochemical Ozone Creation/Smog Potential	<b>POCP</b>	kg O3-eq
Inventory Metrics			
6	Total primary energy consumption	<b>PEC</b>	MJ (HHV)
7	Depletion of non-renewable energy resources	<b>NRE</b>	MJ (HHV)
8	Use of renewable primary energy	<b>RE</b>	MJ (HHV)
9	Depletion of non-renewable material resources	<b>NRM</b>	kg
10	Use of renewable material resources	<b>RM</b>	kg
11	Concrete batching water consumption	<b>CBW</b>	m3
12	Concrete washing water consumption	<b>CWW</b>	m3
13	Total water consumption	<b>TW</b>	m3
14	Concrete hazardous waste	<b>CHW</b>	kg
15	Concrete non-hazardous waste	<b>CNHW</b>	kg

\*HHV, higher heating value (also called gross calorific value), is the heat of combustion of a given amount of fuel that includes the calorific value of condensing the water content of the fuel (the heat of vaporization). The lower heating value (LHV) excludes the heat of vaporization of the water content and thus the HHV is equal to the LHV plus the heat of vaporization.

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## Impact Assessment Results

Table 7a. Summary Results (A1-A3): Graniterock 321-Santa Cruz Plant, per cubic m<sup>3</sup>

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO <sub>2</sub>	kg CFC-11	kg SO <sub>2</sub>	kg N	kg O <sub>3</sub>	MJ	MJ	MJ	kg	kg	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>	kg	kg
MIX 1	285.51	4.25E-6	1.16	0.13	13.30	2,345.66	2,285.55	38.78	2,312.50	0.51	0.18	0.15	0.33	0.00	0.06
MIX 2	291.80	4.31E-6	1.18	0.13	13.52	2,371.97	2,312.72	39.77	2,161.83	0.50	0.20	0.15	0.35	0.00	0.06
MIX 3	292.25	4.35E-6	1.19	0.13	13.51	2,385.35	2,324.76	39.77	2,279.08	0.51	0.19	0.15	0.34	0.00	0.06
MIX 4	184.82	2.73E-6	0.94	0.10	11.87	1,734.89	1,688.61	24.33	2,211.19	0.39	0.18	0.15	0.33	0.00	0.06
MIX 5	183.93	2.71E-6	0.93	0.10	11.82	1,725.88	1,679.93	24.25	2,190.36	0.39	0.18	0.15	0.33	0.00	0.06
MIX 6	320.75	4.75E-6	1.30	0.14	14.56	2,578.83	2,514.78	43.63	2,288.95	0.54	0.18	0.15	0.33	0.00	0.06
MIX 7	324.83	4.81E-6	1.31	0.14	14.52	2,585.60	2,521.94	44.45	2,185.46	0.54	0.20	0.15	0.35	0.00	0.06
MIX 8	294.58	4.36E-6	1.20	0.13	13.76	2,408.32	2,347.80	39.93	2,263.94	0.51	0.17	0.15	0.33	0.00	0.06
MIX 9	301.93	4.49E-6	1.23	0.14	13.91	2,457.79	2,395.62	41.00	2,324.48	0.52	0.17	0.15	0.32	0.00	0.06
MIX 10	199.71	2.93E-6	1.00	0.11	12.60	1,840.97	1,792.95	26.30	2,211.44	0.41	0.17	0.15	0.33	0.00	0.06
MIX 11	289.18	4.28E-6	1.18	0.13	13.76	2,388.90	2,328.40	38.94	2,333.62	0.51	0.16	0.15	0.31	0.00	0.06
MIX 12	271.80	4.04E-6	1.11	0.13	12.94	2,256.16	2,198.29	36.81	2,268.74	0.49	0.17	0.15	0.32	0.00	0.06
MIX 13	293.72	4.35E-6	1.20	0.13	13.75	2,406.26	2,345.53	39.77	2,289.35	0.51	0.17	0.15	0.32	0.00	0.06
MIX 14	311.70	4.62E-6	1.27	0.14	14.41	2,535.98	2,472.19	42.15	2,376.85	0.54	0.17	0.15	0.32	0.00	0.06
MIX 15	407.54	5.99E-6	1.62	0.17	17.62	3,158.87	3,084.09	55.56	2,313.08	0.63	0.19	0.15	0.34	0.00	0.06
MIX 16	368.65	5.42E-6	1.46	0.15	15.68	2,833.05	2,766.46	51.03	1,922.58	0.56	0.19	0.15	0.34	0.00	0.06
MIX 17	377.90	5.54E-6	1.51	0.16	16.74	2,963.72	2,893.22	51.36	2,259.15	0.59	0.19	0.15	0.34	0.00	0.06
MIX 18	327.14	4.85E-6	1.32	0.14	14.80	2,626.96	2,561.60	44.45	2,336.55	0.55	0.17	0.15	0.32	0.00	0.06
MIX 19	214.18	3.13E-6	1.07	0.11	13.34	1,946.45	1,896.66	28.20	2,219.86	0.42	0.18	0.15	0.33	0.00	0.06
MIX 20	147.83	2.13E-6	0.85	0.09	11.51	1,511.76	1,471.59	18.91	2,090.11	0.34	0.17	0.15	0.32	0.00	0.06
MIX 21	315.96	4.67E-6	1.28	0.14	14.55	2,555.14	2,491.69	42.81	2,292.13	0.53	0.17	0.15	0.32	0.00	0.06
MIX 22	294.38	4.36E-6	1.20	0.13	13.84	2,417.98	2,356.79	39.77	2,331.66	0.52	0.17	0.15	0.32	0.00	0.06
MIX 23	293.50	4.34E-6	1.20	0.13	13.73	2,402.19	2,341.66	39.77	2,273.04	0.51	0.17	0.15	0.32	0.00	0.06
MIX 24	214.18	3.13E-6	1.08	0.11	13.37	1,946.51	1,896.84	28.20	2,212.61	0.42	0.17	0.15	0.32	0.00	0.06
MIX 25	245.55	3.58E-6	1.18	0.12	14.25	2,144.47	2,091.11	32.64	2,188.84	0.45	0.17	0.15	0.32	0.00	0.06
MIX 26	314.73	4.65E-6	1.28	0.14	14.51	2,546.50	2,483.22	42.64	2,291.55	0.53	0.17	0.15	0.32	0.00	0.06
MIX 27	406.00	6.01E-6	1.62	0.17	17.52	3,166.78	3,089.95	55.23	2,515.60	0.65	0.17	0.15	0.32	0.00	0.06
MIX 28	214.18	3.08E-6	1.09	0.11	13.68	1,943.53	1,895.52	28.12	2,065.47	0.41	0.19	0.15	0.34	0.00	0.06
MIX 29	278.49	4.04E-6	1.33	0.13	15.83	2,386.44	2,328.78	36.92	2,238.23	0.49	0.17	0.15	0.32	0.00	0.06
MIX 30	491.28	7.24E-6	1.94	0.19	20.52	3,741.15	3,653.44	66.91	2,569.08	0.74	0.17	0.15	0.32	0.00	0.06

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Table 7b. Summary Results (A1-A3): Graniterock 321-Santa Cruz Plant, per cubic yard

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	218.57	3.26E-6	0.89	0.10	10.19	1,795.71	1,749.70	29.69	1,770.33	0.39	0.13	0.12	0.25	0.00	0.05
MIX 2	223.39	3.30E-6	0.91	0.10	10.35	1,815.86	1,770.50	30.44	1,654.99	0.38	0.15	0.12	0.27	0.00	0.05
MIX 3	223.73	3.33E-6	0.91	0.10	10.34	1,826.10	1,779.72	30.44	1,744.75	0.39	0.14	0.12	0.26	0.00	0.05
MIX 4	141.49	2.09E-6	0.72	0.08	9.09	1,328.14	1,292.72	18.62	1,692.78	0.30	0.13	0.12	0.25	0.00	0.05
MIX 5	140.81	2.08E-6	0.71	0.08	9.05	1,321.24	1,286.07	18.56	1,676.83	0.30	0.14	0.12	0.26	0.00	0.05
MIX 6	245.55	3.63E-6	0.99	0.11	11.15	1,974.22	1,925.19	33.40	1,752.31	0.41	0.14	0.12	0.26	0.00	0.05
MIX 7	248.67	3.68E-6	1.00	0.11	11.12	1,979.41	1,930.67	34.03	1,673.08	0.41	0.15	0.12	0.27	0.00	0.05
MIX 8	225.52	3.34E-6	0.92	0.10	10.54	1,843.68	1,797.35	30.57	1,733.16	0.39	0.13	0.12	0.25	0.00	0.05
MIX 9	231.14	3.43E-6	0.94	0.10	10.65	1,881.56	1,833.96	31.39	1,779.51	0.40	0.13	0.12	0.25	0.00	0.05
MIX 10	152.89	2.25E-6	0.77	0.08	9.64	1,409.36	1,372.59	20.14	1,692.97	0.31	0.13	0.12	0.25	0.00	0.05
MIX 11	221.38	3.27E-6	0.91	0.10	10.53	1,828.82	1,782.51	29.81	1,786.50	0.39	0.12	0.12	0.24	0.00	0.05
MIX 12	208.07	3.09E-6	0.85	0.10	9.91	1,727.20	1,682.90	28.18	1,736.83	0.37	0.13	0.12	0.25	0.00	0.05
MIX 13	224.86	3.33E-6	0.92	0.10	10.53	1,842.11	1,795.62	30.44	1,752.61	0.39	0.13	0.12	0.24	0.00	0.05
MIX 14	238.63	3.54E-6	0.97	0.11	11.03	1,941.42	1,892.58	32.27	1,819.60	0.41	0.13	0.12	0.24	0.00	0.05
MIX 15	311.99	4.59E-6	1.24	0.13	13.49	2,418.27	2,361.02	42.53	1,770.78	0.48	0.14	0.12	0.26	0.00	0.05
MIX 16	282.22	4.15E-6	1.12	0.11	12.00	2,168.84	2,117.86	39.07	1,471.83	0.43	0.15	0.12	0.26	0.00	0.05
MIX 17	289.30	4.24E-6	1.16	0.12	12.82	2,268.87	2,214.90	39.32	1,729.49	0.45	0.15	0.12	0.26	0.00	0.05
MIX 18	250.44	3.71E-6	1.01	0.11	11.33	2,011.07	1,961.03	34.03	1,788.74	0.42	0.13	0.12	0.25	0.00	0.05
MIX 19	163.97	2.40E-6	0.82	0.09	10.22	1,490.10	1,451.99	21.59	1,699.41	0.32	0.13	0.12	0.25	0.00	0.05
MIX 20	113.17	1.63E-6	0.65	0.07	8.81	1,157.32	1,126.57	14.48	1,600.08	0.26	0.13	0.12	0.25	0.00	0.05
MIX 21	241.88	3.57E-6	0.98	0.11	11.14	1,956.08	1,907.51	32.77	1,754.73	0.41	0.13	0.12	0.25	0.00	0.05
MIX 22	225.37	3.34E-6	0.92	0.10	10.59	1,851.08	1,804.24	30.44	1,785.00	0.40	0.13	0.12	0.25	0.00	0.05
MIX 23	224.69	3.33E-6	0.92	0.10	10.51	1,838.99	1,792.66	30.44	1,740.12	0.39	0.13	0.12	0.25	0.00	0.05
MIX 24	163.96	2.40E-6	0.82	0.09	10.23	1,490.15	1,452.13	21.59	1,693.86	0.32	0.13	0.12	0.25	0.00	0.05
MIX 25	187.98	2.74E-6	0.90	0.09	10.91	1,641.70	1,600.85	24.99	1,675.66	0.35	0.13	0.12	0.24	0.00	0.05
MIX 26	240.94	3.56E-6	0.98	0.11	11.11	1,949.47	1,901.03	32.65	1,754.29	0.41	0.13	0.12	0.24	0.00	0.05
MIX 27	310.81	4.60E-6	1.24	0.13	13.41	2,424.32	2,365.51	42.28	1,925.82	0.50	0.13	0.12	0.24	0.00	0.05
MIX 28	163.96	2.36E-6	0.83	0.08	10.47	1,487.87	1,451.11	21.53	1,581.22	0.31	0.14	0.12	0.26	0.00	0.05
MIX 29	213.20	3.09E-6	1.02	0.10	12.12	1,826.94	1,782.79	28.26	1,713.47	0.37	0.13	0.12	0.24	0.00	0.05
MIX 30	376.10	5.54E-6	1.48	0.15	15.71	2,864.04	2,796.89	51.22	1,966.76	0.56	0.13	0.12	0.25	0.00	0.05



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Table 8a. Summary Results (A1-A3): Graniterock 331-Salinas Plant, per cubic meter

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	289.09	4.21E-6	1.24	0.13	15.94	2,423.02	2,366.32	38.47	2,312.51	0.47	0.18	0.16	0.33	0.00	0.10
MIX 2	295.87	4.24E-6	1.27	0.13	16.31	2,460.88	2,405.83	39.45	2,161.84	0.45	0.20	0.16	0.36	0.00	0.10
MIX 3	295.90	4.29E-6	1.27	0.13	16.18	2,465.36	2,408.46	39.45	2,279.09	0.47	0.19	0.16	0.34	0.00	0.10
MIX 4	189.50	2.68E-6	1.02	0.10	14.69	1,827.12	1,784.21	24.02	2,211.20	0.35	0.18	0.16	0.33	0.00	0.10
MIX 5	188.42	2.65E-6	1.02	0.10	14.64	1,818.25	1,776.14	23.94	2,190.37	0.34	0.18	0.16	0.34	0.00	0.10
MIX 6	324.53	4.67E-6	1.38	0.14	17.31	2,664.48	2,604.76	43.32	2,288.96	0.49	0.18	0.16	0.34	0.00	0.10
MIX 7	329.08	4.74E-6	1.39	0.14	17.32	2,675.49	2,615.80	44.14	2,185.47	0.49	0.20	0.16	0.36	0.00	0.10
MIX 8	298.31	4.28E-6	1.28	0.13	16.50	2,493.62	2,437.49	39.62	2,263.95	0.46	0.17	0.16	0.33	0.00	0.10
MIX 9	305.57	4.43E-6	1.31	0.13	16.58	2,538.00	2,479.59	40.69	2,324.49	0.48	0.17	0.16	0.33	0.00	0.10
MIX 10	204.84	2.89E-6	1.09	0.11	15.50	1,939.18	1,894.49	25.99	2,211.45	0.37	0.17	0.16	0.33	0.00	0.10
MIX 11	293.39	4.23E-6	1.27	0.13	16.50	2,474.45	2,417.27	38.63	2,333.63	0.47	0.16	0.16	0.32	0.00	0.10
MIX 12	275.54	3.98E-6	1.19	0.12	15.62	2,337.05	2,282.79	36.49	2,268.75	0.44	0.17	0.16	0.33	0.00	0.10
MIX 13	297.90	4.30E-6	1.28	0.13	16.49	2,491.51	2,434.15	39.45	2,289.36	0.47	0.17	0.16	0.33	0.00	0.10
MIX 14	315.66	4.57E-6	1.35	0.14	17.12	2,618.87	2,558.55	41.84	2,376.86	0.50	0.17	0.16	0.33	0.00	0.10
MIX 15	412.25	5.90E-6	1.71	0.16	20.56	3,259.98	3,189.97	55.24	2,313.09	0.57	0.19	0.16	0.35	0.00	0.10
MIX 16	374.70	5.38E-6	1.55	0.15	18.73	2,942.60	2,879.13	50.72	1,922.59	0.52	0.19	0.16	0.35	0.00	0.10
MIX 17	382.80	5.45E-6	1.60	0.15	19.71	3,067.45	3,001.71	51.05	2,259.16	0.53	0.19	0.16	0.35	0.00	0.10
MIX 18	331.18	4.79E-6	1.40	0.14	17.53	2,711.81	2,650.06	44.14	2,336.56	0.51	0.17	0.16	0.33	0.00	0.10
MIX 19	219.76	3.09E-6	1.17	0.11	16.32	2,050.52	2,004.03	27.89	2,219.87	0.38	0.18	0.16	0.33	0.00	0.10
MIX 20	153.70	2.09E-6	0.95	0.09	14.54	1,620.20	1,583.36	18.60	2,090.11	0.30	0.17	0.16	0.33	0.00	0.10
MIX 21	320.59	4.63E-6	1.37	0.14	17.35	2,645.48	2,585.21	42.50	2,292.14	0.50	0.17	0.16	0.33	0.00	0.10
MIX 22	298.42	4.31E-6	1.28	0.13	16.55	2,501.76	2,444.01	39.45	2,331.67	0.47	0.17	0.16	0.33	0.00	0.10
MIX 23	297.61	4.29E-6	1.28	0.13	16.47	2,487.87	2,430.92	39.45	2,273.05	0.47	0.17	0.16	0.33	0.00	0.10
MIX 24	219.53	3.07E-6	1.17	0.11	16.35	2,050.68	2,004.82	27.89	2,212.62	0.37	0.17	0.16	0.33	0.00	0.10
MIX 25	251.57	3.54E-6	1.28	0.12	17.29	2,254.06	2,203.92	32.33	2,188.85	0.41	0.17	0.16	0.33	0.00	0.10
MIX 26	319.17	4.60E-6	1.36	0.14	17.30	2,636.30	2,576.54	42.33	2,291.56	0.49	0.17	0.16	0.33	0.00	0.10
MIX 27	410.18	5.96E-6	1.70	0.17	20.26	3,252.93	3,179.60	54.92	2,515.61	0.60	0.17	0.16	0.33	0.00	0.10
MIX 28	221.11	3.04E-6	1.19	0.11	16.88	2,065.73	2,020.93	27.81	2,065.48	0.37	0.19	0.16	0.35	0.00	0.10
MIX 29	285.22	4.00E-6	1.43	0.13	19.00	2,505.78	2,451.33	36.61	2,238.24	0.45	0.17	0.16	0.33	0.00	0.10
MIX 30	496.59	7.20E-6	2.03	0.20	23.44	3,840.90	3,756.38	66.59	2,569.09	0.70	0.17	0.16	0.33	0.00	0.10

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Table 8b. Summary Results (A1-A3): Graniterock 331-Salinas Plant, per cubic yard

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	221.31	3.22E-6	0.95	0.10	12.20	1,854.94	1,811.54	29.45	1,770.34	0.36	0.13	0.12	0.26	0.00	0.08
MIX 2	226.51	3.25E-6	0.97	0.10	12.48	1,883.93	1,841.78	30.20	1,655.00	0.34	0.15	0.12	0.27	0.00	0.08
MIX 3	226.53	3.28E-6	0.97	0.10	12.38	1,887.35	1,843.79	30.20	1,744.75	0.36	0.14	0.12	0.26	0.00	0.08
MIX 4	145.07	2.05E-6	0.78	0.08	11.25	1,398.75	1,365.90	18.39	1,692.78	0.27	0.13	0.12	0.26	0.00	0.08
MIX 5	144.25	2.03E-6	0.78	0.08	11.21	1,391.96	1,359.72	18.32	1,676.83	0.26	0.14	0.12	0.26	0.00	0.08
MIX 6	248.44	3.58E-6	1.05	0.11	13.25	2,039.79	1,994.07	33.16	1,752.31	0.37	0.14	0.12	0.26	0.00	0.08
MIX 7	251.93	3.63E-6	1.06	0.11	13.26	2,048.22	2,002.52	33.79	1,673.08	0.37	0.15	0.12	0.27	0.00	0.08
MIX 8	228.37	3.28E-6	0.98	0.10	12.63	1,908.99	1,866.02	30.33	1,733.16	0.35	0.13	0.12	0.25	0.00	0.08
MIX 9	233.93	3.39E-6	1.00	0.10	12.70	1,942.97	1,898.25	31.15	1,779.51	0.37	0.13	0.12	0.25	0.00	0.08
MIX 10	156.82	2.21E-6	0.84	0.08	11.86	1,484.54	1,450.32	19.90	1,692.97	0.28	0.13	0.12	0.25	0.00	0.08
MIX 11	224.61	3.24E-6	0.97	0.10	12.63	1,894.32	1,850.54	29.57	1,786.51	0.36	0.12	0.12	0.24	0.00	0.08
MIX 12	210.94	3.05E-6	0.91	0.10	11.96	1,789.13	1,747.59	27.94	1,736.84	0.34	0.13	0.12	0.25	0.00	0.08
MIX 13	228.05	3.29E-6	0.98	0.10	12.62	1,907.38	1,863.46	30.20	1,752.62	0.36	0.13	0.12	0.25	0.00	0.08
MIX 14	241.66	3.50E-6	1.03	0.11	13.10	2,004.88	1,958.70	32.03	1,819.61	0.38	0.13	0.12	0.25	0.00	0.08
MIX 15	315.60	4.52E-6	1.31	0.13	15.74	2,495.68	2,442.08	42.29	1,770.78	0.44	0.14	0.12	0.27	0.00	0.08
MIX 16	286.85	4.12E-6	1.19	0.11	14.34	2,252.70	2,204.12	38.83	1,471.84	0.40	0.15	0.12	0.27	0.00	0.08
MIX 17	293.06	4.17E-6	1.23	0.12	15.09	2,348.28	2,297.96	39.08	1,729.50	0.41	0.15	0.12	0.27	0.00	0.08
MIX 18	253.53	3.67E-6	1.07	0.11	13.42	2,076.02	2,028.75	33.79	1,788.75	0.39	0.13	0.12	0.25	0.00	0.08
MIX 19	168.24	2.36E-6	0.89	0.09	12.49	1,569.78	1,534.18	21.35	1,699.42	0.29	0.13	0.12	0.26	0.00	0.08
MIX 20	117.67	1.60E-6	0.73	0.07	11.13	1,240.34	1,212.14	14.24	1,600.09	0.23	0.13	0.12	0.25	0.00	0.08
MIX 21	245.43	3.54E-6	1.05	0.11	13.28	2,025.24	1,979.11	32.53	1,754.74	0.38	0.13	0.12	0.25	0.00	0.08
MIX 22	228.45	3.30E-6	0.98	0.10	12.67	1,915.22	1,871.01	30.20	1,785.01	0.36	0.13	0.12	0.25	0.00	0.08
MIX 23	227.84	3.29E-6	0.98	0.10	12.61	1,904.59	1,860.99	30.20	1,740.13	0.36	0.13	0.12	0.25	0.00	0.08
MIX 24	168.06	2.35E-6	0.89	0.08	12.51	1,569.90	1,534.79	21.35	1,693.87	0.29	0.13	0.12	0.25	0.00	0.08
MIX 25	192.59	2.71E-6	0.98	0.09	13.24	1,725.60	1,687.21	24.75	1,675.67	0.32	0.13	0.12	0.25	0.00	0.08
MIX 26	244.34	3.52E-6	1.04	0.11	13.25	2,018.21	1,972.47	32.41	1,754.30	0.38	0.13	0.12	0.25	0.00	0.08
MIX 27	314.01	4.57E-6	1.30	0.13	15.51	2,490.28	2,434.14	42.04	1,925.82	0.46	0.13	0.12	0.25	0.00	0.08
MIX 28	169.27	2.33E-6	0.91	0.08	12.93	1,581.42	1,547.12	21.29	1,581.22	0.28	0.14	0.12	0.26	0.00	0.08
MIX 29	218.35	3.06E-6	1.09	0.10	14.55	1,918.30	1,876.61	28.02	1,713.48	0.34	0.13	0.12	0.25	0.00	0.08
MIX 30	380.16	5.51E-6	1.55	0.15	17.94	2,940.40	2,875.69	50.98	1,966.77	0.53	0.13	0.12	0.25	0.00	0.08



# Environmental Product Declaration

Table 9a. Summary Results (A1-A3): Graniterock 341-Sand City Plant, per cubic meter

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	293.99	4.27E-6	1.25	0.14	15.97	2,470.07	2,408.35	40.31	2,312.51	0.52	0.18	0.19	0.36	0.00	0.05
MIX 2	300.88	4.33E-6	1.28	0.14	16.29	2,504.51	2,443.63	41.30	2,161.84	0.51	0.20	0.19	0.38	0.00	0.05
MIX 3	300.84	4.36E-6	1.28	0.14	16.19	2,511.23	2,449.03	41.30	2,279.09	0.52	0.19	0.19	0.37	0.00	0.05
MIX 4	194.52	2.75E-6	1.03	0.11	14.75	1,876.10	1,828.22	25.86	2,211.20	0.41	0.18	0.19	0.36	0.00	0.05
MIX 5	193.63	2.73E-6	1.03	0.11	14.69	1,866.94	1,819.38	25.78	2,190.37	0.40	0.18	0.19	0.37	0.00	0.05
MIX 6	329.75	4.77E-6	1.39	0.15	17.32	2,710.22	2,644.54	45.17	2,288.96	0.55	0.18	0.19	0.37	0.00	0.05
MIX 7	333.80	4.82E-6	1.40	0.15	17.27	2,716.74	2,651.46	45.99	2,185.47	0.55	0.20	0.19	0.38	0.00	0.05
MIX 8	303.67	4.38E-6	1.29	0.14	16.53	2,540.92	2,478.77	41.47	2,263.95	0.52	0.17	0.19	0.36	0.00	0.05
MIX 9	310.63	4.50E-6	1.31	0.14	16.61	2,585.12	2,521.34	42.54	2,324.49	0.54	0.17	0.19	0.36	0.00	0.05
MIX 10	209.80	2.95E-6	1.10	0.12	15.54	1,987.56	1,937.93	27.84	2,211.45	0.42	0.17	0.19	0.36	0.00	0.05
MIX 11	298.46	4.29E-6	1.28	0.14	16.56	2,524.39	2,462.29	40.48	2,333.63	0.52	0.16	0.19	0.35	0.00	0.05
MIX 12	280.58	4.05E-6	1.20	0.13	15.66	2,384.77	2,325.28	38.34	2,268.75	0.50	0.17	0.19	0.36	0.00	0.05
MIX 13	302.80	4.37E-6	1.29	0.14	16.52	2,538.86	2,476.53	41.30	2,289.36	0.52	0.17	0.19	0.35	0.00	0.05
MIX 14	320.73	4.64E-6	1.36	0.15	17.17	2,667.86	2,602.47	43.69	2,376.86	0.55	0.17	0.19	0.35	0.00	0.05
MIX 15	417.45	6.01E-6	1.72	0.17	20.53	3,302.74	3,226.32	57.09	2,313.09	0.64	0.19	0.19	0.38	0.00	0.05
MIX 16	378.16	5.44E-6	1.55	0.16	18.53	2,971.66	2,903.47	52.57	1,922.59	0.57	0.19	0.19	0.38	0.00	0.05
MIX 17	388.10	5.56E-6	1.61	0.17	19.70	3,111.54	3,039.41	52.90	2,259.16	0.61	0.19	0.19	0.38	0.00	0.05
MIX 18	336.10	4.87E-6	1.41	0.15	17.55	2,758.01	2,691.04	45.99	2,336.56	0.56	0.17	0.19	0.36	0.00	0.05
MIX 19	224.68	3.15E-6	1.18	0.12	16.36	2,098.59	2,047.20	29.73	2,219.87	0.43	0.18	0.19	0.36	0.00	0.05
MIX 20	158.70	2.15E-6	0.96	0.10	14.59	1,669.08	1,627.31	20.45	2,090.11	0.35	0.17	0.19	0.36	0.00	0.05
MIX 21	325.34	4.68E-6	1.37	0.15	17.37	2,691.88	2,626.83	44.34	2,292.13	0.55	0.17	0.19	0.36	0.00	0.05
MIX 22	303.47	4.38E-6	1.29	0.14	16.61	2,550.68	2,487.88	41.30	2,331.67	0.53	0.17	0.19	0.36	0.00	0.05
MIX 23	302.58	4.36E-6	1.29	0.14	16.50	2,534.86	2,472.72	41.30	2,273.04	0.52	0.17	0.19	0.36	0.00	0.05
MIX 24	224.70	3.15E-6	1.18	0.12	16.39	2,098.95	2,047.67	29.73	2,212.62	0.43	0.17	0.19	0.36	0.00	0.05
MIX 25	256.25	3.60E-6	1.28	0.13	17.30	2,299.43	2,244.47	34.17	2,188.85	0.46	0.17	0.19	0.35	0.00	0.05
MIX 26	324.09	4.67E-6	1.37	0.15	17.33	2,683.03	2,618.15	44.18	2,291.56	0.55	0.17	0.19	0.35	0.00	0.05
MIX 27	415.08	6.03E-6	1.71	0.18	20.29	3,299.46	3,221.02	56.76	2,515.61	0.66	0.17	0.19	0.35	0.00	0.05
MIX 28	225.79	3.10E-6	1.20	0.12	16.89	2,111.02	2,061.41	29.65	2,065.48	0.42	0.19	0.19	0.37	0.00	0.05
MIX 29	289.94	4.06E-6	1.44	0.14	19.01	2,551.58	2,492.31	38.45	2,238.24	0.50	0.17	0.19	0.35	0.00	0.05
MIX 30	501.15	7.26E-6	2.03	0.20	23.42	3,884.61	3,795.29	68.44	2,569.09	0.75	0.17	0.19	0.36	0.00	0.05



# Environmental Product Declaration

Table 9b. Summary Results (A1-A3): Graniterock 341-Sand City Plant, per cubic yard

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	225.06	3.27E-6	0.96	0.11	12.22	1,890.96	1,843.71	30.86	1,770.34	0.40	0.13	0.14	0.28	0.00	0.04
MIX 2	230.34	3.32E-6	0.98	0.11	12.47	1,917.32	1,870.72	31.62	1,655.00	0.39	0.15	0.14	0.29	0.00	0.04
MIX 3	230.31	3.34E-6	0.98	0.11	12.39	1,922.47	1,874.85	31.62	1,744.75	0.40	0.14	0.14	0.29	0.00	0.04
MIX 4	148.91	2.10E-6	0.79	0.08	11.29	1,436.25	1,399.59	19.80	1,692.78	0.31	0.13	0.14	0.28	0.00	0.04
MIX 5	148.23	2.09E-6	0.79	0.08	11.25	1,429.23	1,392.83	19.74	1,676.83	0.31	0.14	0.14	0.28	0.00	0.04
MIX 6	252.44	3.65E-6	1.06	0.11	13.26	2,074.81	2,024.52	34.58	1,752.31	0.42	0.14	0.14	0.28	0.00	0.04
MIX 7	255.54	3.69E-6	1.07	0.11	13.22	2,079.80	2,029.82	35.21	1,673.08	0.42	0.15	0.14	0.29	0.00	0.04
MIX 8	232.47	3.35E-6	0.99	0.11	12.66	1,945.20	1,897.62	31.74	1,733.16	0.40	0.13	0.14	0.28	0.00	0.04
MIX 9	237.80	3.45E-6	1.01	0.11	12.72	1,979.04	1,930.21	32.56	1,779.51	0.41	0.13	0.14	0.27	0.00	0.04
MIX 10	160.62	2.26E-6	0.84	0.09	11.90	1,521.57	1,483.58	21.31	1,692.97	0.32	0.13	0.14	0.28	0.00	0.04
MIX 11	228.49	3.29E-6	0.98	0.11	12.68	1,932.55	1,885.01	30.99	1,786.51	0.40	0.12	0.14	0.27	0.00	0.04
MIX 12	214.80	3.10E-6	0.92	0.10	11.99	1,825.66	1,780.12	29.35	1,736.84	0.38	0.13	0.14	0.28	0.00	0.04
MIX 13	231.81	3.34E-6	0.99	0.11	12.65	1,943.62	1,895.91	31.62	1,752.62	0.40	0.13	0.14	0.27	0.00	0.04
MIX 14	245.53	3.55E-6	1.04	0.11	13.14	2,042.38	1,992.32	33.44	1,819.60	0.42	0.13	0.14	0.27	0.00	0.04
MIX 15	319.58	4.60E-6	1.31	0.13	15.72	2,528.41	2,469.91	43.71	1,770.78	0.49	0.14	0.14	0.29	0.00	0.04
MIX 16	289.50	4.16E-6	1.19	0.12	14.18	2,274.95	2,222.75	40.24	1,471.84	0.44	0.15	0.14	0.29	0.00	0.04
MIX 17	297.11	4.26E-6	1.23	0.13	15.08	2,382.04	2,326.81	40.50	1,729.49	0.46	0.15	0.14	0.29	0.00	0.04
MIX 18	257.30	3.73E-6	1.08	0.12	13.44	2,111.39	2,060.13	35.21	1,788.75	0.43	0.13	0.14	0.27	0.00	0.04
MIX 19	172.01	2.41E-6	0.90	0.09	12.53	1,606.57	1,567.23	22.76	1,699.42	0.33	0.13	0.14	0.28	0.00	0.04
MIX 20	121.49	1.65E-6	0.73	0.08	11.17	1,277.77	1,245.78	15.65	1,600.08	0.27	0.13	0.14	0.28	0.00	0.04
MIX 21	249.06	3.59E-6	1.05	0.11	13.30	2,060.77	2,010.97	33.95	1,754.74	0.42	0.13	0.14	0.27	0.00	0.04
MIX 22	232.32	3.35E-6	0.99	0.11	12.71	1,952.67	1,904.60	31.62	1,785.00	0.40	0.13	0.14	0.28	0.00	0.04
MIX 23	231.64	3.34E-6	0.99	0.11	12.63	1,940.56	1,892.99	31.62	1,740.13	0.40	0.13	0.14	0.28	0.00	0.04
MIX 24	172.02	2.41E-6	0.90	0.09	12.55	1,606.85	1,567.59	22.76	1,693.87	0.33	0.13	0.14	0.27	0.00	0.04
MIX 25	196.17	2.76E-6	0.98	0.10	13.25	1,760.32	1,718.25	26.16	1,675.67	0.36	0.13	0.14	0.27	0.00	0.04
MIX 26	248.11	3.57E-6	1.05	0.11	13.27	2,053.99	2,004.32	33.82	1,754.30	0.42	0.13	0.14	0.27	0.00	0.04
MIX 27	317.76	4.62E-6	1.31	0.14	15.53	2,525.89	2,465.85	43.45	1,925.82	0.50	0.13	0.14	0.27	0.00	0.04
MIX 28	172.85	2.37E-6	0.92	0.09	12.93	1,616.09	1,578.11	22.70	1,581.22	0.32	0.14	0.14	0.29	0.00	0.04
MIX 29	221.96	3.11E-6	1.10	0.11	14.56	1,953.36	1,907.99	29.44	1,713.48	0.38	0.13	0.14	0.27	0.00	0.04
MIX 30	383.65	5.56E-6	1.56	0.16	17.93	2,973.86	2,905.48	52.40	1,966.76	0.57	0.13	0.14	0.28	0.00	0.04

# Environmental Product Declaration



According to ISO 14025

Table 10a. Summary Results (A1-A3): Graniterock 361-San Jose Plant, per cubic meter

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	269.92	4.23E-6	1.11	0.13	12.00	2,132.16	2,072.06	38.89	2,312.50	0.51	0.18	0.19	0.36	0.00	0.04
MIX 2	276.92	4.29E-6	1.13	0.13	12.23	2,168.38	2,109.16	39.88	2,161.83	0.50	0.20	0.19	0.38	0.00	0.04
MIX 3	276.90	4.32E-6	1.13	0.13	12.22	2,175.32	2,114.75	39.88	2,279.08	0.51	0.19	0.19	0.37	0.00	0.04
MIX 4	170.11	2.71E-6	0.88	0.10	10.76	1,533.67	1,487.39	24.44	2,211.19	0.39	0.18	0.19	0.36	0.00	0.04
MIX 5	169.43	2.69E-6	0.88	0.10	10.73	1,527.40	1,481.48	24.36	2,190.36	0.39	0.18	0.19	0.37	0.00	0.04
MIX 6	305.37	4.73E-6	1.24	0.14	13.25	2,368.51	2,304.50	43.75	2,288.95	0.54	0.18	0.19	0.37	0.00	0.04
MIX 7	310.21	4.79E-6	1.25	0.14	13.26	2,385.65	2,322.02	44.57	2,185.46	0.53	0.20	0.19	0.38	0.00	0.04
MIX 8	279.01	4.34E-6	1.14	0.13	12.43	2,195.43	2,134.96	40.04	2,263.94	0.51	0.17	0.19	0.36	0.00	0.04
MIX 9	286.29	4.46E-6	1.17	0.13	12.59	2,243.69	2,181.53	41.11	2,324.48	0.52	0.17	0.19	0.36	0.00	0.04
MIX 10	185.05	2.91E-6	0.95	0.10	11.48	1,640.31	1,592.29	26.42	2,211.44	0.41	0.17	0.19	0.36	0.00	0.04
MIX 11	272.77	4.26E-6	1.12	0.13	12.33	2,164.23	2,103.74	39.06	2,333.62	0.51	0.16	0.19	0.35	0.00	0.04
MIX 12	256.11	4.01E-6	1.05	0.12	11.61	2,041.53	1,983.67	36.92	2,268.74	0.49	0.17	0.19	0.36	0.00	0.04
MIX 13	277.86	4.33E-6	1.14	0.13	12.38	2,189.17	2,128.45	39.88	2,289.35	0.51	0.17	0.19	0.35	0.00	0.04
MIX 14	295.48	4.60E-6	1.20	0.14	13.02	2,313.92	2,250.14	42.27	2,376.85	0.54	0.17	0.19	0.35	0.00	0.04
MIX 15	392.23	5.97E-6	1.56	0.16	16.24	2,949.54	2,874.81	55.67	2,313.08	0.63	0.19	0.19	0.38	0.00	0.04
MIX 16	355.84	5.40E-6	1.41	0.15	14.49	2,657.73	2,591.13	51.15	1,922.58	0.56	0.19	0.19	0.38	0.00	0.04
MIX 17	362.39	5.52E-6	1.45	0.15	15.32	2,751.67	2,681.23	51.48	2,259.15	0.59	0.19	0.19	0.38	0.00	0.04
MIX 18	311.44	4.83E-6	1.26	0.14	13.46	2,412.14	2,346.79	44.57	2,336.55	0.55	0.17	0.19	0.36	0.00	0.04
MIX 19	199.52	3.11E-6	1.02	0.11	12.22	1,745.69	1,695.91	28.31	2,219.86	0.42	0.18	0.19	0.36	0.00	0.04
MIX 20	133.43	2.11E-6	0.80	0.09	10.41	1,314.70	1,274.53	19.02	2,090.10	0.34	0.17	0.19	0.36	0.00	0.04
MIX 21	300.06	4.65E-6	1.22	0.14	13.15	2,337.37	2,273.92	42.92	2,292.12	0.53	0.17	0.19	0.36	0.00	0.04
MIX 22	278.24	4.34E-6	1.14	0.13	12.45	2,196.91	2,135.73	39.88	2,331.66	0.52	0.17	0.19	0.36	0.00	0.04
MIX 23	277.77	4.32E-6	1.14	0.13	12.37	2,186.93	2,126.41	39.88	2,273.03	0.51	0.17	0.19	0.36	0.00	0.04
MIX 24	199.62	3.11E-6	1.03	0.11	12.26	1,747.40	1,697.75	28.31	2,212.61	0.42	0.17	0.19	0.36	0.00	0.04
MIX 25	231.11	3.56E-6	1.13	0.12	13.11	1,946.86	1,893.51	32.75	2,188.84	0.45	0.17	0.19	0.35	0.00	0.04
MIX 26	298.87	4.63E-6	1.21	0.14	13.12	2,329.31	2,266.05	42.76	2,291.55	0.53	0.17	0.19	0.35	0.00	0.04
MIX 27	389.81	5.99E-6	1.55	0.17	16.13	2,945.11	2,868.29	55.34	2,515.60	0.65	0.17	0.19	0.35	0.00	0.04
MIX 28	199.85	3.06E-6	1.04	0.11	12.50	1,747.45	1,699.44	28.23	2,065.47	0.41	0.19	0.19	0.37	0.00	0.04
MIX 29	263.81	4.02E-6	1.28	0.13	14.65	2,185.43	2,127.77	37.03	2,238.23	0.49	0.17	0.19	0.35	0.00	0.04
MIX 30	474.96	7.22E-6	1.87	0.19	19.05	3,517.65	3,429.93	67.02	2,569.08	0.74	0.17	0.19	0.36	0.00	0.04



# Environmental Product Declaration

**Table 10b. Summary Results (A1-A3): Graniterock 361-San Jose Plant, per cubic yard**

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	206.63	3.24E-6	0.85	0.10	9.19	1,632.28	1,586.26	29.77	1,770.33	0.39	0.13	0.14	0.28	0.00	0.03
MIX 2	211.99	3.29E-6	0.86	0.10	9.36	1,660.00	1,614.67	30.53	1,654.99	0.38	0.15	0.14	0.29	0.00	0.03
MIX 3	211.98	3.31E-6	0.87	0.10	9.35	1,665.32	1,618.95	30.53	1,744.75	0.39	0.14	0.14	0.29	0.00	0.03
MIX 4	130.23	2.07E-6	0.68	0.08	8.24	1,174.10	1,138.67	18.71	1,692.78	0.30	0.13	0.14	0.28	0.00	0.03
MIX 5	129.70	2.06E-6	0.67	0.08	8.22	1,169.30	1,134.14	18.65	1,676.83	0.30	0.14	0.14	0.28	0.00	0.03
MIX 6	233.78	3.62E-6	0.95	0.10	10.14	1,813.21	1,764.21	33.49	1,752.31	0.41	0.14	0.14	0.28	0.00	0.03
MIX 7	237.48	3.66E-6	0.96	0.10	10.15	1,826.33	1,777.62	34.12	1,673.08	0.41	0.15	0.14	0.29	0.00	0.03
MIX 8	213.60	3.32E-6	0.87	0.10	9.51	1,680.71	1,634.41	30.66	1,733.16	0.39	0.13	0.14	0.28	0.00	0.03
MIX 9	219.17	3.42E-6	0.89	0.10	9.64	1,717.65	1,670.07	31.47	1,779.51	0.40	0.13	0.14	0.27	0.00	0.03
MIX 10	141.66	2.23E-6	0.73	0.08	8.79	1,255.73	1,218.97	20.22	1,692.97	0.31	0.13	0.14	0.28	0.00	0.03
MIX 11	208.82	3.26E-6	0.86	0.10	9.44	1,656.83	1,610.52	29.90	1,786.50	0.39	0.12	0.14	0.27	0.00	0.03
MIX 12	196.07	3.07E-6	0.81	0.09	8.89	1,562.89	1,518.59	28.26	1,736.83	0.37	0.13	0.14	0.27	0.00	0.03
MIX 13	212.72	3.31E-6	0.87	0.10	9.48	1,675.92	1,629.43	30.53	1,752.61	0.39	0.13	0.14	0.27	0.00	0.03
MIX 14	226.21	3.52E-6	0.92	0.10	9.97	1,771.42	1,722.59	32.36	1,819.60	0.41	0.13	0.14	0.27	0.00	0.03
MIX 15	300.27	4.57E-6	1.19	0.12	12.43	2,258.02	2,200.81	42.62	1,770.78	0.48	0.14	0.14	0.29	0.00	0.03
MIX 16	272.42	4.13E-6	1.08	0.11	11.09	2,034.63	1,983.64	39.16	1,471.83	0.43	0.15	0.14	0.29	0.00	0.03
MIX 17	277.43	4.23E-6	1.11	0.12	11.73	2,106.54	2,052.62	39.41	1,729.49	0.45	0.15	0.14	0.29	0.00	0.03
MIX 18	238.43	3.70E-6	0.96	0.11	10.30	1,846.61	1,796.58	34.12	1,788.74	0.42	0.13	0.14	0.27	0.00	0.03
MIX 19	152.74	2.38E-6	0.78	0.08	9.36	1,336.41	1,298.30	21.67	1,699.41	0.32	0.13	0.14	0.28	0.00	0.03
MIX 20	102.15	1.62E-6	0.61	0.07	7.97	1,006.46	975.71	14.56	1,600.08	0.26	0.13	0.14	0.27	0.00	0.03
MIX 21	229.71	3.56E-6	0.93	0.10	10.06	1,789.37	1,740.80	32.86	1,754.73	0.41	0.13	0.14	0.27	0.00	0.03
MIX 22	213.00	3.32E-6	0.87	0.10	9.53	1,681.84	1,635.00	30.53	1,785.00	0.39	0.13	0.14	0.27	0.00	0.03
MIX 23	212.65	3.31E-6	0.87	0.10	9.47	1,674.20	1,627.87	30.53	1,740.12	0.39	0.13	0.14	0.27	0.00	0.03
MIX 24	152.82	2.38E-6	0.78	0.08	9.39	1,337.72	1,299.71	21.68	1,693.86	0.32	0.13	0.14	0.27	0.00	0.03
MIX 25	176.93	2.73E-6	0.86	0.09	10.04	1,490.42	1,449.57	25.07	1,675.66	0.35	0.13	0.14	0.27	0.00	0.03
MIX 26	228.80	3.54E-6	0.93	0.10	10.04	1,783.20	1,734.77	32.73	1,754.29	0.41	0.13	0.14	0.27	0.00	0.03
MIX 27	298.42	4.59E-6	1.19	0.13	12.35	2,254.63	2,195.82	42.37	1,925.81	0.49	0.13	0.14	0.27	0.00	0.03
MIX 28	153.00	2.34E-6	0.79	0.08	9.57	1,337.76	1,301.01	21.61	1,581.22	0.31	0.14	0.14	0.29	0.00	0.03
MIX 29	201.96	3.08E-6	0.98	0.10	11.21	1,673.06	1,628.91	28.35	1,713.47	0.37	0.13	0.14	0.27	0.00	0.03
MIX 30	363.61	5.53E-6	1.43	0.15	14.58	2,692.93	2,625.78	51.31	1,966.76	0.56	0.13	0.14	0.27	0.00	0.03



# Environmental Product Declaration

**Table 11a. Summary Results (A1-A3): Graniterock 381-Redwood City Plant, per cubic meter**

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	270.56	4.21E-6	1.13	0.13	12.76	2,137.67	2,078.55	37.79	2,312.49	0.50	0.18	0.17	0.35	0.00	0.02
MIX 2	277.58	4.27E-6	1.15	0.13	12.95	2,173.91	2,115.64	38.78	2,161.83	0.49	0.20	0.17	0.37	0.00	0.02
MIX 3	277.52	4.31E-6	1.15	0.13	12.96	2,180.33	2,120.73	38.78	2,279.07	0.50	0.19	0.17	0.36	0.00	0.02
MIX 4	170.83	2.69E-6	0.91	0.10	11.56	1,540.23	1,494.94	23.34	2,211.19	0.39	0.18	0.17	0.35	0.00	0.02
MIX 5	170.11	2.67E-6	0.90	0.10	11.51	1,533.29	1,488.33	23.26	2,190.35	0.38	0.18	0.17	0.35	0.00	0.02
MIX 6	305.98	4.71E-6	1.26	0.14	13.98	2,373.21	2,310.15	42.64	2,288.95	0.53	0.18	0.17	0.35	0.00	0.02
MIX 7	310.73	4.77E-6	1.27	0.14	13.94	2,389.32	2,326.65	43.46	2,185.46	0.53	0.20	0.17	0.37	0.00	0.02
MIX 8	279.73	4.32E-6	1.16	0.13	13.18	2,201.70	2,142.17	38.94	2,263.94	0.50	0.17	0.17	0.34	0.00	0.02
MIX 9	286.92	4.45E-6	1.19	0.13	13.35	2,249.03	2,187.85	40.01	2,324.48	0.52	0.17	0.17	0.34	0.00	0.02
MIX 10	185.78	2.89E-6	0.97	0.10	12.27	1,647.01	1,599.97	25.32	2,211.44	0.40	0.17	0.17	0.34	0.00	0.02
MIX 11	273.69	4.24E-6	1.14	0.13	13.14	2,173.53	2,114.03	37.95	2,333.62	0.50	0.16	0.17	0.33	0.00	0.02
MIX 12	256.87	4.00E-6	1.08	0.12	12.39	2,048.55	1,991.67	35.82	2,268.73	0.48	0.17	0.17	0.34	0.00	0.02
MIX 13	278.66	4.31E-6	1.16	0.13	13.16	2,196.75	2,137.01	38.78	2,289.35	0.50	0.17	0.17	0.34	0.00	0.02
MIX 14	296.25	4.58E-6	1.23	0.14	13.81	2,321.05	2,258.25	41.16	2,376.85	0.53	0.17	0.17	0.34	0.00	0.02
MIX 15	392.77	5.95E-6	1.58	0.16	16.92	2,953.31	2,879.52	54.57	2,313.08	0.62	0.19	0.17	0.36	0.00	0.02
MIX 16	356.21	5.38E-6	1.42	0.14	15.06	2,659.49	2,593.89	50.04	1,922.58	0.55	0.19	0.17	0.36	0.00	0.02
MIX 17	363.11	5.50E-6	1.47	0.15	16.04	2,757.88	2,688.37	50.37	2,259.14	0.59	0.19	0.17	0.36	0.00	0.02
MIX 18	312.09	4.81E-6	1.28	0.14	14.21	2,417.57	2,353.20	43.46	2,336.54	0.54	0.17	0.17	0.34	0.00	0.02
MIX 19	200.26	3.09E-6	1.04	0.11	13.01	1,752.60	1,703.80	27.21	2,219.86	0.42	0.18	0.17	0.35	0.00	0.02
MIX 20	134.35	2.09E-6	0.83	0.09	11.22	1,324.07	1,284.88	17.92	2,090.10	0.33	0.17	0.17	0.34	0.00	0.02
MIX 21	300.87	4.63E-6	1.24	0.14	13.92	2,345.27	2,282.82	41.82	2,292.12	0.53	0.17	0.17	0.34	0.00	0.02
MIX 22	279.06	4.32E-6	1.16	0.13	13.24	2,204.85	2,144.65	38.78	2,331.65	0.51	0.17	0.17	0.34	0.00	0.02
MIX 23	278.54	4.30E-6	1.16	0.13	13.14	2,194.17	2,134.63	38.78	2,273.03	0.50	0.17	0.17	0.34	0.00	0.02
MIX 24	200.33	3.09E-6	1.05	0.11	13.04	1,753.72	1,705.04	27.21	2,212.61	0.41	0.17	0.17	0.34	0.00	0.02
MIX 25	231.82	3.55E-6	1.15	0.12	13.87	1,953.31	1,900.94	31.65	2,188.83	0.44	0.17	0.17	0.34	0.00	0.02
MIX 26	299.66	4.61E-6	1.24	0.14	13.89	2,336.88	2,274.60	41.66	2,291.55	0.53	0.17	0.17	0.34	0.00	0.02
MIX 27	390.30	5.97E-6	1.57	0.17	16.87	2,948.60	2,872.76	54.24	2,515.60	0.64	0.17	0.17	0.34	0.00	0.02
MIX 28	200.80	3.04E-6	1.06	0.11	13.28	1,757.15	1,710.13	27.13	2,065.46	0.40	0.19	0.17	0.36	0.00	0.02
MIX 29	264.56	4.00E-6	1.30	0.13	15.41	2,192.47	2,135.79	35.93	2,238.22	0.48	0.17	0.17	0.34	0.00	0.02
MIX 30	475.43	7.20E-6	1.89	0.19	19.77	3,520.83	3,434.10	65.92	2,569.08	0.73	0.17	0.17	0.34	0.00	0.02

# Environmental Product Declaration



According to ISO 14025

**Table 11b. Summary Results (A1-A3): Graniterock 381-Redwood City Plant, per cubic yard**

Indicator/LCI Metric	GWP	ODP	AP	EP	POCP	PEC	NRE	RE	NRM	RM	CBW	CWW	TW	CHW	CNHW
Unit (equivalent)	kg CO2	kg CFC-11	kg SO2	kg N	kg O3	MJ	MJ	MJ	kg	kg	m3	m3	m3	kg	kg
MIX 1	207.13	3.23E-6	0.86	0.10	9.77	1,636.49	1,591.23	28.93	1,770.33	0.38	0.13	0.13	0.27	0.00	0.01
MIX 2	212.50	3.27E-6	0.88	0.10	9.91	1,664.23	1,619.63	29.69	1,654.99	0.38	0.15	0.13	0.28	0.00	0.01
MIX 3	212.45	3.30E-6	0.88	0.10	9.92	1,669.15	1,623.52	29.69	1,744.74	0.39	0.14	0.13	0.27	0.00	0.01
MIX 4	130.78	2.06E-6	0.69	0.08	8.85	1,179.12	1,144.45	17.87	1,692.77	0.30	0.13	0.13	0.27	0.00	0.01
MIX 5	130.22	2.05E-6	0.69	0.08	8.81	1,173.81	1,139.39	17.80	1,676.82	0.29	0.14	0.13	0.27	0.00	0.01
MIX 6	234.24	3.60E-6	0.96	0.10	10.70	1,816.81	1,768.53	32.64	1,752.30	0.41	0.14	0.13	0.27	0.00	0.01
MIX 7	237.88	3.65E-6	0.97	0.10	10.67	1,829.14	1,781.16	33.27	1,673.07	0.40	0.15	0.13	0.28	0.00	0.01
MIX 8	214.15	3.31E-6	0.89	0.10	10.09	1,685.51	1,639.94	29.81	1,733.15	0.38	0.13	0.13	0.26	0.00	0.01
MIX 9	219.65	3.40E-6	0.91	0.10	10.22	1,721.75	1,674.91	30.63	1,779.50	0.40	0.13	0.13	0.26	0.00	0.01
MIX 10	142.22	2.22E-6	0.75	0.08	9.39	1,260.86	1,224.86	19.38	1,692.96	0.31	0.13	0.13	0.26	0.00	0.01
MIX 11	209.52	3.24E-6	0.87	0.10	10.06	1,663.95	1,618.39	29.06	1,786.50	0.39	0.12	0.13	0.25	0.00	0.01
MIX 12	196.65	3.06E-6	0.82	0.09	9.48	1,568.27	1,524.72	27.42	1,736.83	0.37	0.13	0.13	0.26	0.00	0.01
MIX 13	213.33	3.30E-6	0.89	0.10	10.07	1,681.72	1,635.99	29.69	1,752.61	0.39	0.13	0.13	0.26	0.00	0.01
MIX 14	226.79	3.51E-6	0.94	0.10	10.57	1,776.88	1,728.80	31.51	1,819.60	0.41	0.13	0.13	0.26	0.00	0.01
MIX 15	300.69	4.56E-6	1.21	0.12	12.96	2,260.91	2,204.41	41.77	1,770.77	0.48	0.14	0.13	0.28	0.00	0.01
MIX 16	272.70	4.12E-6	1.09	0.11	11.53	2,035.97	1,985.75	38.31	1,471.83	0.42	0.15	0.13	0.28	0.00	0.01
MIX 17	277.98	4.21E-6	1.12	0.12	12.28	2,111.29	2,058.08	38.56	1,729.48	0.45	0.15	0.13	0.28	0.00	0.01
MIX 18	238.92	3.68E-6	0.98	0.11	10.88	1,850.77	1,801.49	33.27	1,788.74	0.42	0.13	0.13	0.26	0.00	0.01
MIX 19	153.31	2.37E-6	0.80	0.08	9.96	1,341.70	1,304.34	20.83	1,699.41	0.32	0.13	0.13	0.27	0.00	0.01
MIX 20	102.85	1.60E-6	0.63	0.07	8.59	1,013.64	983.64	13.72	1,600.07	0.26	0.13	0.13	0.26	0.00	0.01
MIX 21	230.33	3.54E-6	0.95	0.10	10.66	1,795.42	1,747.61	32.02	1,754.73	0.40	0.13	0.13	0.26	0.00	0.01
MIX 22	213.63	3.31E-6	0.89	0.10	10.14	1,687.92	1,641.83	29.69	1,785.00	0.39	0.13	0.13	0.26	0.00	0.01
MIX 23	213.24	3.30E-6	0.89	0.10	10.06	1,679.74	1,634.16	29.69	1,740.12	0.39	0.13	0.13	0.26	0.00	0.01
MIX 24	153.37	2.37E-6	0.80	0.08	9.98	1,342.56	1,305.29	20.83	1,693.86	0.32	0.13	0.13	0.26	0.00	0.01
MIX 25	177.47	2.71E-6	0.88	0.09	10.62	1,495.35	1,455.26	24.23	1,675.66	0.34	0.13	0.13	0.26	0.00	0.01
MIX 26	229.41	3.53E-6	0.95	0.10	10.63	1,789.00	1,741.32	31.89	1,754.29	0.40	0.13	0.13	0.26	0.00	0.01
MIX 27	298.80	4.57E-6	1.21	0.13	12.92	2,257.29	2,199.24	41.52	1,925.81	0.49	0.13	0.13	0.26	0.00	0.01
MIX 28	153.72	2.33E-6	0.81	0.08	10.17	1,345.19	1,309.19	20.77	1,581.21	0.31	0.14	0.13	0.27	0.00	0.01
MIX 29	202.54	3.06E-6	0.99	0.10	11.80	1,678.44	1,635.05	27.51	1,713.47	0.37	0.13	0.13	0.26	0.00	0.01
MIX 30	363.97	5.51E-6	1.45	0.15	15.13	2,695.37	2,628.97	50.46	1,966.76	0.56	0.13	0.13	0.26	0.00	0.01





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