Environmental Product Declaration

NRMCA
NATIONAL READY MIXED CONCRETE ASSOCIATION

NRMCA MEMBER INDUSTRY AVERAGE EPD FOR

READY MIXED CONCRETE

Environmental Product Declaration

NSF Certified Environmental Product Declaration

Declared Product:	This industry average EPD covers 72 ready mixed concrete products on a cubic meter (cubic yard) basis	
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Period of Validity:	5 Years	
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Product Category Rule:	**ISO 21930:2017 Sustainability in Building Construction — Environmental Declaration of Building Products** serves as the core PCR. **NSF International Product Category Rule (PCR) for Concrete Version 1 (February 22, 2019)** serves as the sub-category PCR	
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Independent LCA Reviewer and EPD Verifier:	Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025:2006 ☐ internal ☒ external Third party verifier: Jack Geibig, Ecoform jgeibig@ecoform.com	

Description of Industry and Product

Description of Industry

There are approximately 7,000 plants across the ready mixed concrete industry in the U.S. and Canada. NRMCA estimates that their membership represents 30% of all companies and 50% of all plants operating in 2017. A survey of NRMCA members as participating in this project revealed that the majority (>85%) of ready mixed concrete plants are of the truck-mixed type (sometimes called transit-mix) where concrete is batched at a fixed plant location and mixed in truck mixers. Over 95% of plants use supplementary cementitious materials (SCM) to Portland cement in their ready mixed concrete products sometimes called mix designs, mixes, mixture compositions or mixture.

Each NRMCA member produces hundreds if not thousands of possible ready mixed concrete (RMC) products (mix designs), which ultimately balance the cost and performance of concrete for a wide variety of applications. For purposes of this NRMCA member Industry average EPD, a conservative approach was taken to arrive at a workable list of 72 RMC products (mix designs) that could pragmatically capture a high proportion of the RMC produced by NRMCA members identified in this EPD.

Description of Product

The typical process for developing mix designs is 1) a design professional or purchaser of concrete states a specified compressive strength and other performance criteria for the concrete in contract documents, and 2) the concrete producer develops a mix design, or proportions, to meet the specified compressive strength and other performance criteria using an accepted mixture proportioning methodology such as the ACI recommended practice 211.1 and 211.2, the most common method used in North America. For this LCA, NRMCA provided the mix designs using the ACI 211 process. For normal weight concrete, six different commonly specified compressive strengths were selected, and 8 different mixture compositions were developed for each specified compressive strength. Further, 8 different mixture compositions were developed for three different compressive strengths of lightweight concrete mixes. The total number of products is thus 72.

The ready mixed concrete products represented in this EPD are comprised of (in order of greatest mass per mix): natural and crushed aggregates, Portland cement, slag cement, batch water, and admixtures.

Declared Product Range Classification

Table 1 lists the 72 ready mixed products considered in the LCA and EPD. They have been purposely enumerated as having a range of mixture components and properties to cover a significant range of possible products and to conservatively estimate life cycle impact indicators; i.e., all product cradle-to-gate life cycle impact indicators and resource use metrics are calculated at the upper bound of the strength class range and lower bound of the indicated SCM percentage and thus, provide a conservative estimate of the life cycle impacts associated with each product. The product name is represented by the specified compressive strength and the quantity (%) of Portland cement and SCMs (either fly ash or slag cement or both) used to estimate the life cycle impact indicators and resource use metrics. Of the 72 ready mixed products, 24 are lightweight mixes in which the aggregate input was assumed to be a lightweight manufactured product. These mixes are denoted by the “LW” prefix in the product name.

Table 1: Declared Product Range Classification		
Specified Compressive Strength Range	**SCM Range (%)**	**Product Name**
0-2500 psi (0-17.24 MPa)	0-19% Fly Ash and/or Slag	2500-00-FA/SL
	20-29% Fly Ash	2500-20-FA
	30-39% Fly Ash	2500-30-FA
	40-49% Fly Ash	2500-40-FA
	30-49% Slag	2500-30-SL
	40-39% Slag	2500-40-SL
	≥ 50% Slag	2500-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	2500-50-FA/SL
2501-3000 psi (17.25-20.68 MPa)	0-19% Fly Ash and/or Slag	3000-00-FA/SL
	20-29% Fly Ash	3000-20-FA
	30-39% Fly Ash	3000-30-FA
	40-49% Fly Ash	3000-40-FA
	30-39% Slag	3000-30-SL
	40-49% Slag	3000-40-SL
	≥ 50% Slag	3000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	3000-50-FA/SL
3001-4000 psi (20.69-27.58 MPa)	0-19% Fly Ash and/or Slag	4000-00-FA/SL
	20-29% Fly Ash	4000-20-FA
	30-39% Fly Ash	4000-30-FA
	40-49% Fly Ash	4000-40-FA
	30-39% Slag	4000-30-SL
	40-49% Slag	4000-40-SL
	≥ 50% Slag	4000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	4000-50-FA/SL
4001-5000 psi (27.59-34.47 MPa)	0-19% Fly Ash and/or Slag	5000-00-FA/SL
	20-29% Fly Ash	5000-20-FA
	30-39% Fly Ash	5000-30-FA
	40-49% Fly Ash	5000-40-FA
	30-39% Slag	5000-30-SL
	40-49% Slag	5000-40-SL
	≥ 50% Slag	5000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	5000-50-FA/SL
5001-6000 psi (34.48-41.37 MPa)	0-19% Fly Ash and/or Slag	6000-00-FA/SL
	20-29% Fly Ash	6000-20-FA
	30-39% Fly Ash	6000-30-FA
	40-49% Fly Ash	6000-40-FA
	30-39% Slag	6000-30-SL
	40-49% Slag	6000-40-SL
	≥ 50% Slag	6000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	6000-50-FA/SL
6001-8000 psi (41.38-55.16 MPa)	0-19% Fly Ash and/or Slag	8000-00-FA/SL
	20-29% Fly Ash	8000-20-FA
	30-39% Fly Ash	8000-30-FA
	40-49% Fly Ash	8000-40-FA
	30-39% Slag	8000-30-SL
	40-49% Slag	8000-40-SL
	≥ 50% Slag	8000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	8000-50-FA/SL

How to Use This Table

NRMCA members participating in this project may use Table 1 to claim compliance with this EPD. Most products proposed for a project will likely not have the precise specified compressive strength and proportions listed in this EPD. One can use Table 1 to classify a proposed product to match one of the products listed in the EPD as follows:

Step 1: Identify the 28-day specified compressive strength of the proposed product and the percentage of fly ash and/or slag cement (e.g. 100 x fly ash quantity / total cementitious materials quantity)

Step 2: In Table 1 identify the specified compressive strength range that captures the specified compressive strength of the proposed product (Column 1).

Step 3: Within that specified compressive strength range row, identify the SCM percentage range that matches the SCM percentage of the proposed product (Column 2). For ternary mixes (mixes containing Portland cement, fly ash and slag cement) between 20% and 49% SCM (fly ash plus slag percentage) take the largest percentage of either fly ash or slag cement and use that value to select the SCM range to use. For example, if the proposed mix has 15% fly ash and 40% slag cement, use the 40-49% slag range.

Step 4: In that row, move to Column 3 to identify the product name that can be used to look up the life cycle impacts listed in Tables 6 through 11a for either 1 cubic meter or 1 cubic yard of product. Reference this EPD and the "Product Name" listed in column 3 in any compliance statement/ literature (e.g., weigh bill) accompanying the product.

Table 1: Declared Product Range Classification (Continued)		
Lightweight 2501-3000 psi (17.25-20.68 MPa)	0-19% Fly Ash and/or Slag	LW-3000-00-FA/SL
	20-29% Fly Ash	LW-3000-20-FA
	30-39% Fly Ash	LW-3000-30-FA
	40-49% Fly Ash	LW-3000-40-FA
	30-39% Slag	LW-3000-30-SL
	40-49% Slag	LW-3000-40-SL
	≥ 50% Slag	LW-3000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	LW-3000-50-FA/SL
Lightweight 3001-4000 psi (20.69-27.58 MPa)	0-19% Fly Ash and/or Slag	LW-4000-00-FA/SL
	20-29% Fly Ash	LW-4000-20-FA
	30-39% Fly Ash	LW-4000-30-FA
	40-49% Fly Ash	LW-4000-40-FA
	30-39% Slag	LW-4000-30-SL
	40-49% Slag	LW-4000-40-SL
	≥ 50% Slag	LW-4000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	LW-4000-50-FA/SL
Lightweight 4001-5000 psi (27.59-34.47 MPa)	0-19% Fly Ash and/or Slag	LW-5000-00-FA/SL
	20-29% Fly Ash	LW-5000-20-FA
	30-39% Fly Ash	LW-5000-30-FA
	40-49% Fly Ash	LW-5000-40-FA
	30-39% Slag	LW-5000-30-SL
	40-49% Slag	LW-5000-40-SL
	≥ 50% Slag	LW-5000-50-SL
	≥ 20% Fly Ash and ≥ 30% Slag	LW-5000-50-FA/SL

Product Standard

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 range of ready mixed concrete products in accordance with the following:

- **ACI 211.1**: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- **ACI 211.2**: Standard Practice for Selecting Proportions for Structural Lightweight Concrete
- **ACI 318**: Building Code Requirements for Structural Concrete
- **ASTM C94**: Standard Specification for Ready Mixed Concrete
- **CSA A23.1-09/A23.2-09 (R2014)**: Concrete materials and methods of concrete construction/test methods and standard practices for concrete
- **CSI MasterFormat Division 03-30-00**: Cast-in-Place Concrete
- **UNSPSC Code 30111500**: Ready Mix Concrete

Methodology of Underlying LCA

Declared Unit

The declared units are 1 cubic meter and 1 cubic yard for 72 ready mixed concrete products. Key product variables include:

- **28-day Strength:** Six different specified compressive strengths are considered, 2,500 psi (17.3 MPa), 3,000 psi (20.7 MPa), 4,000 psi (27.6 MPa), 5,000 psi (34.5 MPa), 6,000 psi (41.3 MPa) and 8,000 psi (55.1 MPa);
- **Water to cementitious materials ratio (w/cm):** Varies, but lower for higher strength concrete mixtures in accordance with ACI 211.1;
- **SCM reactivity:** Assumes 75% reactivity for fly ash (FA) as compared to Portland cement and 100% reactivity of slag cement (SL) as compared to Portland cement based on NRMCA member feedback;
- **Admixtures use:** Products (mix designs) with specified compressive strengths less than or equal to 5,000 psi (34.5 MPa) included an air entraining admixture since many of these concretes would be exposed to freezing and thawing. Products with specified compressive strengths above 5,000 psi (34.5 MPa) did not include air entraining admixture since these higher strength concretes are rarely exposed to freezing and thawing; water reducing and accelerating admixtures were used across all mixes; high range water reducer admixtures were used in high strength mix designs (5,000psi (34.5 MPa) and above).
- **Aggregate use**: The normal weight concrete mixes contain natural and crushed coarse and fine aggregates that are of typical weight and composition. The lightweight concrete mixes substitute typical coarse aggregate with an expanded clay product that reduces the mass of aggregate for a given mix, and thus the overall mass of the lightweight mix concrete products.

Product (mix design) components: Portland cement, fly ash, slag cement, natural and crushed aggregates, manufactured lightweight aggregate, admixtures and batch water.

Note: The comparability of EPDs is limited to those applying a functional unit.

System boundary

The scope of this EPD is cradle-to-gate and considers the following life cycle stages:

- **A1 - Raw Material Supply:** Includes all upstream processes related to extraction, handling, and processing of the raw materials and intermediate component products as well as fuels used in the production of concrete. Component products include 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 processes 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 shows the cradle-to-gate product system for concrete. A schematic figure of life cycle stages included in the EPD as per NSF PCR is shown in Figure 2.

A summary of activities excluded from the EPD is as follows:

- Production, manufacture, and construction of manufacturing capital goods and infrastructure;
- Production and manufacture of production equipment, delivery vehicles, and laboratory equipment;
- Personnel-related activities (travel, furniture, and office supplies); and
- Energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

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

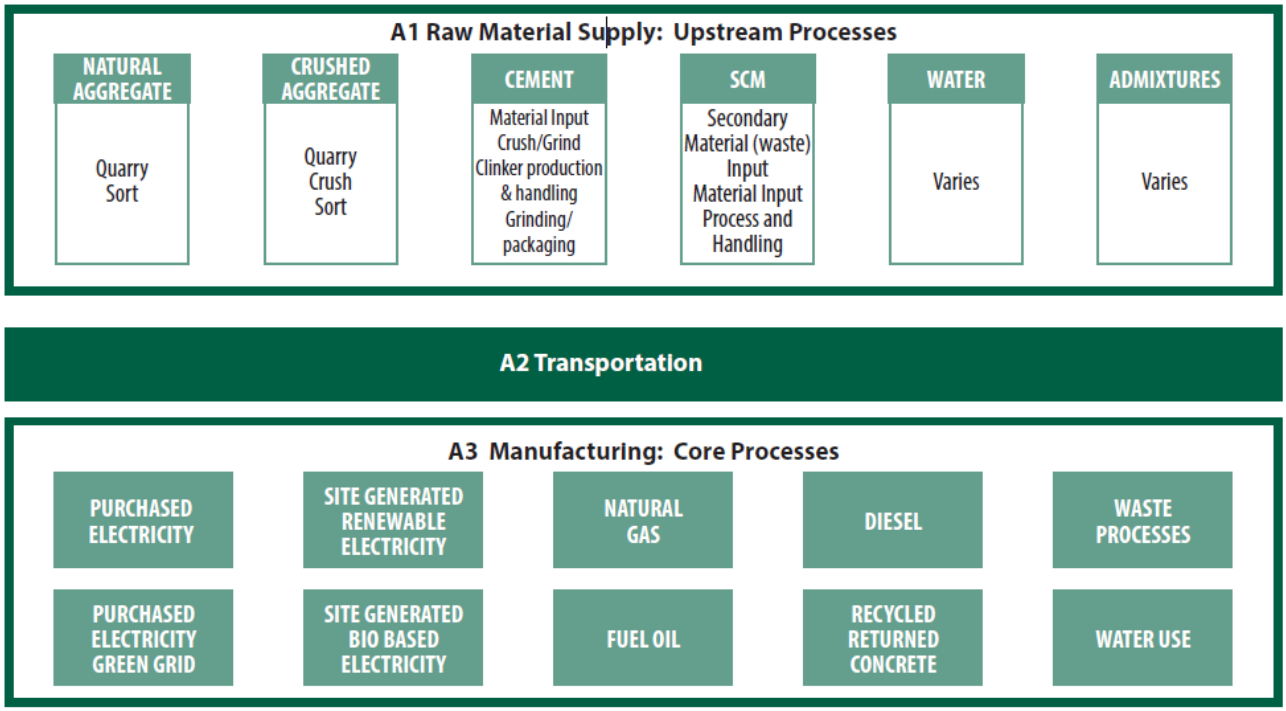

Figure 2 - Life cycle stage schematic – alpha-numeric designations as per NSF PCR

Building Life Cycle Information Modules (x: Included in LCA; mnd: Module Not Declared)														
Product stage			Construction Process stage		Use stage							End-of-life stage			
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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
x	x	x	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd

Note: A significant portion (>85%) of North American concrete plants are truck-mixing plants where the concrete mixing occurs within mixer trucks after they are loaded 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.

Cut-off Rules

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 (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 inventory.

Allocation

The allocation of co-products or secondary flows cross the system boundary conforms with ISO 21930: 2017 Section 7.2.4. Specifically, the allocation criteria were applied as follows:

- Allocation was not applied any of the gate-to-gate production facilities. For facilities that manufacture additional products (i.e. aggregate), the LCI flows at the facility specific to the concrete production were reported.
- For secondary data sources, the NSF PCR default allocation selection (i.e. "Cut-off" or "Alloc Rec") was applied.
- The product category rules for this EPD recognize fly ash, silica fume and slag as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a concrete material input
- A portion (30%) of the reported fleet energy use for truck mixing plants was allocated to the mixing facility.

Data Sources and Software

In 2014 NRMCA engaged the Athena Institute to develop a cradle-to-gate life cycle inventory questionnaire for the manufacture of ready mixed concrete and to survey a sub-population of its members to support the development of a life cycle assessment (LCA) and NRMCA member average environmental product declaration (EPD) for ready mixed concrete. In 2016, NRMCA re-engaged the Institute to capture additional member companies and plants that opted not to participate in the original 2014 effort and add them to the company and plant population such they are covered under an expanded and revised LCA and EPD (referred to as EPD Version 2). In 2019, a new NSF Concrete PCR was released and NRMCA once again engaged the Institute to re-survey and update the industry average LCA and EPD in accordance with this new PCR. This report is an intermediate work product describing the methods and revised summary statistics of the member LCI survey results, inclusive of the new plants and companies.

At the outset of this project the goal was to develop a "representative" statistical sample of NRMCA member plants with a 95% confidence level and a 5% margin of error. Based on NRMCA's 2017 ready mixed concrete production data for the US and estimated average plant production by region, a distribution of ready-mix plants across NRMCA's regions was estimated. There are approximately 8,000 plants across the US ready mixed concrete industry. NRMCA estimates that their membership represents 30% of all companies and 50% of all plants operating in 2017. Using a sample size calculator, it was determined that a minimum of 352 plants would need to be "sampled" to achieve the desired confidence level (95%) and margin of error (5%). However, because participation in the EPD project is voluntary and only reflects companies and their plants wishing to be included in the IW-EPD, the actual population is somewhat lower. After indicating willingness to participate each company provided a list of their plants by location, type and capacity. A total of 83 companies operating 1956 plants were included in the initial list, but due to inclusionary rules (e.g., plants operating less than 12 months, whether they were portable plants, etc.) a total 1772 plants were deemed eligible to be covered by the EPD. This new total became the new population and the sample size calculator was run again to determine the number of plants to sampled to achieve the 95% confidence level and a 5% margin of error. The sample size calculator returned a required sample size of 316 plants to satisfy the statistical "representative" goal.

As this is the third iteration of this IW-EPD, the participating companies span various temporal versions of the EPD. Version 1 companies provided plant data for 2013, which according to the core ISO 21930:2017 PCR falls outside the "primary data vintage" of no more than 5 years (these data are 6 years old) and hence these data needed to be reviewed for "material change" and where appropriate updated. Previous analyses indicated that the major technosphere flows contributing to the impact of ready-mix plants included electricity, natural gas and diesel use (A3) as well as the transport of high mass inputs (A2) – aggregates. All version 1 companies indicating their continued participation in this third version of the IW-EPD were returned their 2013 plant questionnaire for review and

updating. All plants provided updated production and fuel related input flows and some updated their mode and distance information concerning aggregates transportation if they were procuring these materials from new sources. Version 2 plants provided data for 2015 production year and being less than 5 years old did not need to provide more up to date data. Lastly, new companies wanting to participate in this third version provided both meta data and completed new plant surveys. Lastly, due to plants closing, divestitures and acquisitions a number of Version 1 and 2 companies also provided new complete plant surveys in addition to their previous plants' updates.

In total, 526 new or updated plant operations surveys were requested to support this third iteration of the IW-EPD. After completing mass/energy balance checks and following up with various companies concerning outliers and/or missing data a total of 489 were deemed usable. Based on a sample size of 489 plants and a total population of 1772 plants the achieved margin error was calculated to be 3.58%. The sample size represents approximately 6% of all US RMC plants (8000), 12% of NRMCA member's RMC plants (4000) and 28% of the total population (1772) eligible to be covered by the EPD.

This EPD represents a production weighted average result as compiled across all participating companies and their plants and is intended for business-to-business communication.

A list of participating companies is available at https://www.nrmca.org/sustainability/EPDProgram/search/. The primary data collection and data validation process is documented in detail in the LCA Project Report. Manufacturers seeking to benchmark their individual type III EPDs against an industry average EPD shall have participated in this industry average EPD.

All upstream material, resource and energy carrier inputs have been sourced from various industry average datasets and literature. Many of these data sets are defaulted to those specified for use in the NSF PCR 2019. For key A1 material inputs (Portland cement and slag cement) we have also estimated results for indicators required by this PCR but that were not originally reported in the EPDs published for those materials. These estimated supplemental results are included in the LCA Project Report to further enhance the reproducibility of the results.

This EPD was calculated using industry average Portland and slag cement data. Both Portland and slag cement LCA impacts can vary depending upon manufacturing processes, efficiency and fuel source by as much as 50% for some environmental impact categories. Portland and slag cements account for as much as 95% of the impacts of the concrete mixes included in this EPD and thus, manufacturer specific cement impacts could result in variation of as much as 48%.

The specified mixes are based on commonly available materials and thus any ready mixed concrete plant can produce any of the specified mixes. The A3 manufacturing energy for the declared mixes incorporates mixing energy that is assumed to be the same, regardless of the mix inputs (see Section 4.3 for more calculation methodology details). The A3 manufacturing energy input also includes region-specific facility operations energy (i.e. facility heating and cooling) that can not be separated from the mixing energy, and thus the A3 energy has been calculated on a region-specific basis. See Appendix D for region-specific energy consumption.

For purposes of calculating the requsite resource metrics and life cycle impact indicators (see Table 5), LCI datasets are created for each energy/fuel type as well as raw material (lb) and transportation mode (lb-miles), as specified by the RMC product mix design, in SimaPro v8.5.2.

Tables 2 to 4 describe each LCI data source and the data quality for each data source.

Table 2. A1 - Raw Material Supply				
Materials	**LCI Data Source**	**Geography**	**Year**	**Data Quality Assessment**
USA Cement ***ASTM C150, C595, C1157***	Portland Cement Association EPD USA Portland Cement (2016) (Modeled with complete LCI to support ISO 21930:2017)	USA	2016	• **Technology:** very good • **Time:** very good • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
CAN Cement ***ASTM C150, C595, C1157***	Cement Association of Canada EPD GU and GUL Cements (2016) (Modeled with complete LCI to support ISO 21930:2017)	Canada	2016	• **Technology:** very good • **Time:** very good • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Fly Ash ***ASTM C618***	None, no incoming burden, only transport is considered	N/A	N/A	• **N/A** • **Recovered material**
Silica Fume ***ASTM c1240***	None, no incoming burden, only transport is considered	N/A	N/A	• **N/A** • **Recovered material**
Slag Cement ***ASTM C989***	Slag Cement Association EPD of North America Slag Cement (2015) (Modeled with complete LCI to support ISO 21930:2017)	North America	2015	• **Technology:** very good • **Time:** very good • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Crushed Aggregates *coarse and fine* ***ASTM C33***	ecoinvent 3.4: "Gravel, crushed {RoW}| production | Cut-off, U" (2018) Modified foreground process with region-specific electricity grid.	World/ Regional	2001	• **Technology:** very good • **Time:** poor • **Geography:** good • **Completeness:** very good • **Reliability:** very good
Natural Aggregates *coarse and fine* ***ASTM C330***	ecoinvent 3.4: "Gravel, round {RoW}| gravel and sand quarry operation | Cut-off, U" (2018) Modified foreground process with region-specific electricity grid.	World/ Regional	2001	• **Technology:** very good • **Time:** poor • **Geography:** good • **Completeness:** very good • **Reliability:** very good
Manufactured Lightweight Aggregates	ecoinvent 3.4: Expanded clay {RoW}| production | Cut-off, U (2018) Modified foreground process with United States average electricity grid	World/ USA	2000	• **Technology:** good Expanded clay is representative per: http://www.epa.gov/ttnchie1/ap42/ch11/final/c11s20.pdf • **Time:** poor • **Geography:** good • **Completeness:** very good • **Reliability:** very good

Table 2. A1 - Raw Material Supply				
Materials	**LCI Data Source**	**Geography**	**Year**	**Data Quality Assessment**
Admixtures ***ASTM C494***	EFCA EPDs for Air Entrainers, Plasticisers and superplasticisers, Hardening Accelerators, Set Accelerators, Water Resisting Admixtures, and Retarders (2015) Non-supported LCIA indicators estimated – adjusted using TRACI equivalents	EU	2015	• **Technology:** very good • **Time:** very good • **Geography:** fair • **Completeness:** good • **Reliability:** very good
Batch and Wash Water ***ASTM C1602***	ecoinvent 3.4: Tap water {RoW}| market for | Cut-off, U (2018) Modified foreground process with United States average electricity grid	World/ USA	2011	• **Technology:** very good • **Time:** good • **Geography:** good • **Completeness:** very good • **Reliability:** very good

Table 3. A2 - Transportation				
Process	**LCI Data Source**	**Geography**	**Year**	**Data Quality Assessment**
Ocean	USLCI 2014: Transport, ocean freighter, average fuel mix /US U (2014)	USA	2007	• **Technology:** very good • **Time:** fair • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Rail	USLCI 2014: Transport, train, diesel powered /US U (2014)	USA	2007	• **Technology:** very good • **Time:** fair • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Road **Backhauls included within data**	USLCI 2014: Transport, combination truck, short-haul, diesel powered/tkm/RNA (2014)	USA	2010	• **Technology:** very good • **Time:** good • **Geography:** very good • **Completeness:** very good • **Reliability:** very good

Table 4. A3 - Manufacturing				
Process	**LCI Data Source**	**Geography**	**Year**	**Data Quality Assessment**
Electricity	ecoinvent 3.4: Electricity, low voltage {XX}| market for | Cut-off, U (2018) [18] NRMCA-specific electricity grids based on 2014 NERC regions.	USA	2015	• **Technology:** very good • **Time:** very good • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Diesel	USLCI 2014: Diesel, combusted in industrial boiler /US U (2014) [13]	USA	2007	• **Technology:** very good • **Time:** fair • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Gasoline	USLCI 2014: Gasoline, combusted in equipment /US U (2014) [13]	USA	2007	• **Technology:** very good • **Time:** fair • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Liquefied Propane Gas	USLCI 2014: Liquefied petroleum gas, combusted in industrial boiler /US U (2014) [13]	USA	2007	• **Technology:** very good • **Time:** fair • **Geography:** very good • **Completeness:** very good • **Reliability:** very good
Hazardous Solid Waste	ecoinvent 3.4: Hazardous waste, for incineration {RoW}| treatment of hazardous waste, hazardous waste incineration | Alloc Rec, U (2018) [18] Modified foreground process with United States average electricity grid	World/ USA	2011	• **Technology:** very good • **Time:** good • **Geography:** good • **Completeness:** very good • **Reliability:** very good
Non-Hazardous Solid Waste	ecoinvent 3.4: Inert waste {RoW}| treatment of, sanitary landfill | Alloc Rec, U (2018) [18] Modified foreground process with United States average electricity grid	World/ USA	2011	• **Technology:** very good • **Time:** good • **Geography:** good • **Completeness:** very good • **Reliability:** very good

Table 4. A3 - Manufacturing	
NRMCA Average Electricity Source Grid Breakdown	**% of Average Grid**
Electricity, low voltage {FRCC}| market for | Cut-off, U FRCC	11.22%
Electricity, low voltage {HICC}| market for | Cut-off, U HICC	0.51%
Electricity, low voltage {MRO}| market for | Cut-off, U MRO	5.65%
Electricity, low voltage {NPCC}| market for | Cut-off, U NPCC	4.34%
Electricity, low voltage {RFC}| market for | Cut-off, U RFC	12.13%
Electricity, low voltage {SERC}| market for | Cut-off, U SERC	24.81%
Electricity, low voltage {SPP}| market for | Cut-off, U SPP	1.87%
Electricity, low voltage {TRE}| market for | Cut-off, U TRE	9.59%
Electricity, low voltage {WECC}| market for | Cut-off, U WECC	29.89%

Life Cycle Assessment Results

The LCA results presented in this EPD are intended for use in Business to Business (B-to-B) communication. The EPD supports 25 life cycle impact assessment indicators and inventory metrics as listed in Table 5. The Impact Assessment method and other calculation methodologies are specified in Table 5.

Emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in categories marked with (*) in Table 5 below. Additionally, EPDs are comparable only if they comply with this document, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works. No regulated substances of very high concern were identified in the LCA.

Tables 6 through 14 present the LCA results for the mixes produced at the different facilities (Information module A1-A3 accumulated). The results are presented first based on a declared unit of 1 cubic meter (Tables 6a-14a) and based on 1 cubic yard (Tables 6b-14b). For more detailed information, the underlying LCA study is available on request from NRMCA.

Table 5. Life Cycle Category Indicators and Inventory Metrics

Core Mandatory Impact Indicator	**Abbreviation**	**Unit**	**Method/Source**
Global warming potential	GWP	kg CO2e	TRACI 2.1 V1.02
Depletion potential of the stratospheric ozone layer	ODP	kg CFC11e	TRACI 2.1 V1.02
Acidification potential of soil and water sources	AP	kg SO2e	TRACI 2.1 V1.02
Eutrophication potential	EP	kg Ne	TRACI 2.1 V1.02
Photochemical smog creation potential	POCP	kg O3e	TRACI 2.1 V1.02
Abiotic depletion potential (ADPfossil)*	ADPf	MJ, NCV	CML-IA Baseline V3.02
Abiotic depletion potential (ADPelements)*	ADPe	kg Sbe	CML-IA Baseline V3.02
Fossil fuel depletion	FFD	MJ Surplus	TRACI 2.1 V1.02
Use of Primary Resources			
Renewable primary energy carrier used as energy*	RPRE	MJ, NCV	CED V1.10 NCV
Renewable primary energy carrier used as material*	RPRM	MJ, NCV	LCI Indicator
Non-renewable primary energy carrier used as energy*	NRPRE	MJ, NCV	CED V1.10 NCV
Non-renewable primary energy carrier used as material*	NRPRM	MJ, NCV	LCI Indicator
Secondary Material, Secondary Fuel and Recovered Energy			
Secondary material*	SM	kg	LCI Indicator
Renewable secondary fuel *	RSF	MJ, NCV	LCI Indicator
Non-renewable secondary fuel*	NRSF	MJ, NCV	LCI Indicator
Recovered energy*	RE	MJ, NCV	LCI Indicator
Mandatory Inventory Parameters			
Consumption of freshwater resources;	FW	m3	LCI Indicator
Calcination and carbonation emissions	CCE	kg CO2e	LCI Indicator
Indicators Describing Waste			
Hazardous waste disposed*	HWD	kg	LCI Indicator
Non-hazardous waste disposed*	NHWD	kg	LCI Indicator
High-level radioactive waste*	HLRW	m3	LCI Indicator
Intermediate- and low-level radioactive waste*	ILLRW	m3	LCI Indicator
Components for re-use*	CRU	kg	LCI Indicator
Materials for recycling*	MR	kg	LCI Indicator
Materials for energy recovery*	MER	kg	LCI Indicator
Recovered energy exported from the product system*	EE	MJ, NCV	LCI Indicator

Table 6a. Summary Results (A1-A3): 0-2500 psi (0-17.2 MPa) RMC product mix design, per cubic meter											
		Minimum	Maximum	0000-2500-00-FA/SL	0000-2500-20-FA	0000-2500-30-FA	0000-2500-40-FA	0000-2500-30-SL	0000-2500-40-SL	0000-2500-50-SL	0000-2500-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	195.52	310.65	310.65	267.96	244.94	220.69	241.70	218.81	195.85	195.52
ODP	kg CFC11e	6.04E-06	8.31E-06	8.31E-06	7.23E-06	6.65E-06	6.04E-06	7.60E-06	7.37E-06	7.13E-06	6.49E-06
AP	kg SO_2e	0.80	1.04	1.04	0.92	0.87	0.80	1.00	0.99	0.98	0.89
EP	kg Ne	0.29	0.42	0.42	0.37	0.34	0.31	0.35	0.32	0.30	0.29
POCP	kg O_3e	17.40	22.24	22.24	19.95	18.71	17.40	20.38	19.76	19.14	17.99
ADPf	MJ, NCV	1,438.72	1,941.80	1,941.80	1,720.40	1,601.76	1,477.55	1,671.54	1,583.43	1,493.84	1,438.72
ADPe	kg Sbe	2.05E-04	2.93E-04	2.93E-04	2.62E-04	2.46E-04	2.28E-04	2.40E-04	2.23E-04	2.05E-04	2.07E-04
FFD	MJ Surplus	123.40	148.76	148.76	136.52	130.07	123.40	143.56	142.12	140.46	131.47
Use of Primary Resources											
RPRE	MJ, NCV	60.59	88.63	88.63	76.76	70.40	63.70	73.16	68.08	62.94	60.59
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	1,614.02	2,109.63	2,109.63	1,873.28	1,746.63	1,614.02	1,869.25	1,791.21	1,711.61	1,623.22
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	59.74	119.48	119.48	100.61	90.42	79.65	83.63	71.69	59.74	62.88
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.61	2.84	2.84	2.45	2.24	2.02	2.10	1.86	1.61	1.67
CCE	kg CO2e	61.73	123.45	123.45	103.96	93.42	82.30	86.42	74.07	61.73	64.98
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	2.25E-08	2.31E-08	2.31E-08	2.28E-08	2.27E-08	2.25E-08	2.30E-08	2.30E-08	2.30E-08	2.28E-08
LLRW	m^3	3.04E-07	3.13E-07	3.13E-07	3.09E-07	3.06E-07	3.04E-07	3.13E-07	3.13E-07	3.12E-07	3.08E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6b. Summary Results (A1-A3): 0-2500 psi (0-17.2 MPa) RMC product mix design, per cubic yard											
		Minimum	Maximum	0000-2500-00-FA/SL	0000-2500-20-FA	0000-2500-30-FA	0000-2500-40-FA	0000-2500-30-SL	0000-2500-40-SL	0000-2500-50-SL	0000-2500-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	149.48	237.51	237.51	204.87	187.27	168.73	184.79	167.29	149.74	149.48
ODP	kg CFC11e	4.62E-06	6.35E-06	6.35E-06	5.53E-06	5.08E-06	4.62E-06	5.81E-06	5.63E-06	5.45E-06	4.96E-06
AP	kg SO_2e	0.61	0.79	0.79	0.71	0.66	0.61	0.77	0.76	0.75	0.68
EP	kg Ne	0.22	0.32	0.32	0.28	0.26	0.24	0.26	0.25	0.23	0.22
POCP	kg O_3e	13.31	17.01	17.01	15.25	14.31	13.31	15.58	15.11	14.63	13.76
ADPf	MJ, NCV	1,099.98	1,484.61	1,484.61	1,315.34	1,224.63	1,129.67	1,277.99	1,210.62	1,142.12	1,099.98
ADPe	kg Sbe	1.57E-04	2.24E-04	2.24E-04	2.00E-04	1.88E-04	1.75E-04	1.84E-04	1.70E-04	1.57E-04	1.58E-04
FFD	MJ Surplus	94.35	113.73	113.73	104.38	99.44	94.35	109.76	108.66	107.39	100.52
Use of Primary Resources											
RPRE	MJ, NCV	46.32	67.76	67.76	58.69	53.82	48.70	55.94	52.05	48.12	46.32
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	1,234.00	1,612.93	1,612.93	1,432.23	1,335.39	1,234.00	1,429.14	1,369.48	1,308.62	1,241.04
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	45.67	91.35	91.35	76.92	69.13	60.90	63.94	54.81	45.67	48.08
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.23	2.17	2.17	1.87	1.71	1.54	1.61	1.42	1.23	1.28
CCE	kg CO_2e	47.19	94.39	94.39	79.48	71.43	62.92	66.07	56.63	47.19	49.68
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	1.72E-08	1.76E-08	1.76E-08	1.74E-08	1.73E-08	1.72E-08	1.76E-08	1.76E-08	1.76E-08	1.74E-08
LLRW	m^3	2.32E-07	2.40E-07	2.40E-07	2.36E-07	2.34E-07	2.32E-07	2.39E-07	2.39E-07	2.39E-07	2.36E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7a. Summary Results (A1-A3): 2501-3000 psi (17.2-20.7 MPa) RMC product mix design, per cubic meter											
		Minimum	Maximum	2501-3000-00-FA/SL	2501-3000-20-FA	2501-3000-30-FA	2501-3000-40-FA	2501-3000-30-SL	2501-3000-40-SL	2501-3000-50-SL	2501-3000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	215.98	346.49	346.49	298.11	271.94	244.44	268.27	242.31	216.36	215.98
ODP	kg CFC11e	6.60E-06	9.18E-06	9.18E-06	7.96E-06	7.30E-06	6.60E-06	8.38E-06	8.11E-06	7.84E-06	7.12E-06
AP	kg SO_2e	0.86	1.13	1.13	1.00	0.94	0.86	1.09	1.08	1.07	0.96
EP	kg Ne	0.32	0.46	0.46	0.40	0.37	0.34	0.38	0.35	0.32	0.32
POCP	kg O_3e	18.71	24.20	24.20	21.60	20.19	18.71	22.09	21.38	20.68	19.38
ADPf	MJ, NCV	1,555.87	2,126.93	2,126.93	1,875.85	1,739.68	1,598.54	1,818.81	1,718.57	1,618.33	1,555.87
ADPe	kg Sbe	2.17E-04	3.16E-04	3.16E-04	2.82E-04	2.63E-04	2.43E-04	2.57E-04	2.37E-04	2.17E-04	2.19E-04
FFD	MJ Surplus	129.93	159.01	159.01	145.11	137.54	129.93	152.83	151.14	149.45	139.27
Use of Primary Resources											
RPRE	MJ, NCV	66.58	98.39	98.39	84.94	77.66	70.06	80.80	75.02	69.25	66.58
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	1,742.52	2,306.59	2,306.59	2,038.56	1,893.20	1,742.52	2,032.20	1,943.36	1,854.51	1,754.36
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	67.69	135.39	135.39	114.01	102.45	90.26	94.77	81.23	67.69	71.26
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.77	3.17	3.17	2.73	2.49	2.23	2.33	2.05	1.77	1.84
CCE	kg CO_2e	69.95	139.89	139.89	117.80	105.86	93.26	97.92	83.94	69.95	73.63
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	2.23E-08	2.29E-08	2.29E-08	2.26E-08	2.25E-08	2.23E-08	2.29E-08	2.28E-08	2.28E-08	2.26E-08
LLRW	m^3	2.99E-07	3.10E-07	3.10E-07	3.05E-07	3.02E-07	2.99E-07	3.10E-07	3.09E-07	3.09E-07	3.04E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7b. Summary Results (A1-A3): 2501-3000 psi (17.2-20.7 MPa) RMC product mix design, per cubic yard											
		Minimum	Maximum	2501-3000-00-FA/SL	2501-3000-20-FA	2501-3000-30-FA	2501-3000-40-FA	2501-3000-30-SL	2501-3000-40-SL	2501-3000-50-SL	2501-3000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	165.13	264.91	264.91	227.92	207.91	186.88	205.10	185.26	165.42	165.13
ODP	kg CFC11e	5.05E-06	7.02E-06	7.02E-06	6.08E-06	5.58E-06	5.05E-06	6.40E-06	6.20E-06	6.00E-06	5.44E-06
AP	kg SO_2e	0.66	0.86	0.86	0.77	0.72	0.66	0.83	0.82	0.82	0.74
EP	kg Ne	0.24	0.35	0.35	0.31	0.28	0.26	0.29	0.27	0.25	0.24
POCP	kg O_3e	14.31	18.50	18.50	16.51	15.44	14.31	16.89	16.35	15.81	14.82
ADPf	MJ, NCV	1,189.55	1,626.15	1,626.15	1,434.19	1,330.08	1,222.17	1,390.58	1,313.94	1,237.30	1,189.55
ADPe	kg Sbe	1.66E-04	2.42E-04	2.42E-04	2.15E-04	2.01E-04	1.86E-04	1.96E-04	1.81E-04	1.66E-04	1.68E-04
FFD	MJ Surplus	99.34	121.57	121.57	110.95	105.15	99.34	116.85	115.56	114.27	106.48
Use of Primary Resources											
RPRE	MJ, NCV	50.90	75.22	75.22	64.94	59.37	53.56	61.77	57.36	52.94	50.90
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	1,332.25	1,763.51	1,763.51	1,558.59	1,447.46	1,332.25	1,553.73	1,485.80	1,417.88	1,341.30
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	51.76	103.51	103.51	87.17	78.33	69.01	72.46	62.11	51.76	54.48
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.36	2.42	2.42	2.08	1.90	1.71	1.78	1.57	1.36	1.41
CCE	kg CO_2e	53.48	106.96	106.96	90.07	80.94	71.30	74.87	64.17	53.48	56.29
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	1.71E-08	1.75E-08	1.75E-08	1.73E-08	1.72E-08	1.71E-08	1.75E-08	1.75E-08	1.75E-08	1.73E-08
LLRW	m^3	2.29E-07	2.37E-07	2.37E-07	2.33E-07	2.31E-07	2.29E-07	2.37E-07	2.37E-07	2.36E-07	2.33E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 8a. Summary Results (A1-A3): 3001-4000 psi (20.7-27.6 MPa) RMC product mix design, per cubic meter											
		Minimum	Maximum	3001-4000-00-FA/SL	3001-4000-20-FA	3001-4000-30-FA	3001-4000-40-FA	3001-4000-30-SL	3001-4000-40-SL	3001-4000-50-SL	6001-8000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	262.34	427.75	427.75	366.48	333.33	298.48	328.69	295.79	262.82	262.34
ODP	kg CFC11e	7.89E-06	1.11E-05	1.11E-05	9.60E-06	8.77E-06	7.89E-06	1.01E-05	9.80E-06	9.46E-06	8.54E-06
AP	kg SO_2e	1.01	1.34	1.34	1.18	1.10	1.01	1.29	1.28	1.26	1.13
EP	kg Ne	0.37	0.55	0.55	0.48	0.44	0.40	0.45	0.41	0.38	0.37
POCP	kg O_3e	21.68	28.62	28.62	25.33	23.55	21.68	25.95	25.06	24.17	22.52
ADPf	MJ, NCV	1,821.60	2,548.09	2,548.09	2,229.79	2,057.29	1,877.80	2,157.57	2,029.87	1,900.68	1,821.60
ADPe	kg Sbe	2.44E-04	3.69E-04	3.69E-04	3.26E-04	3.02E-04	2.77E-04	2.94E-04	2.69E-04	2.44E-04	2.46E-04
FFD	MJ Surplus	145.48	182.50	182.50	164.84	155.24	145.48	174.62	172.36	169.88	156.98
Use of Primary Resources											
RPRE	MJ, NCV	80.16	120.56	120.56	103.51	94.29	84.64	98.27	90.93	83.54	80.16
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	2,039.10	2,754.65	2,754.65	2,414.86	2,230.72	2,039.10	2,406.82	2,293.49	2,178.60	2,051.78
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	85.71	171.42	171.42	144.35	129.72	114.28	119.99	102.85	85.71	90.22
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.15	3.91	3.91	3.35	3.05	2.73	2.85	2.50	2.15	2.24
CCE	kg CO_2e	88.56	177.12	177.12	149.16	134.04	118.08	123.99	106.27	88.56	93.22
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	2.18E-08	2.25E-08	2.25E-08	2.22E-08	2.20E-08	2.18E-08	2.25E-08	2.25E-08	2.24E-08	2.21E-08
LLRW	m^3	2.89E-07	3.03E-07	3.03E-07	2.97E-07	2.93E-07	2.89E-07	3.02E-07	3.02E-07	3.02E-07	2.96E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 8b. Summary Results (A1-A3): 3001-4000 psi (20.7-27.6 MPa) RMC product mix design, per cubic yard											
		Minimum	Maximum	3001-4000-00-FA/SL	3001-4000-20-FA	3001-4000-30-FA	3001-4000-40-FA	3001-4000-30-SL	3001-4000-40-SL	3001-4000-50-SL	3001-4000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	200.58	327.04	327.04	280.19	254.85	228.20	251.30	226.15	200.94	200.58
ODP	kg CFC11e	6.03E-06	8.52E-06	8.52E-06	7.34E-06	6.70E-06	6.03E-06	7.75E-06	7.49E-06	7.23E-06	6.53E-06
AP	kg SO_2e	0.77	1.03	1.03	0.90	0.84	0.77	0.99	0.98	0.96	0.87
EP	kg Ne	0.28	0.42	0.42	0.37	0.34	0.31	0.34	0.32	0.29	0.28
POCP	kg O_3e	16.57	21.88	21.88	19.37	18.01	16.57	19.84	19.16	18.48	17.22
ADPf	MJ, NCV	1,392.71	1,948.15	1,948.15	1,704.80	1,572.91	1,435.68	1,649.58	1,551.94	1,453.17	1,392.71
ADPe	kg Sbe	1.87E-04	2.82E-04	2.82E-04	2.49E-04	2.31E-04	2.12E-04	2.25E-04	2.06E-04	1.87E-04	1.88E-04
FFD	MJ Surplus	111.23	139.53	139.53	126.03	118.69	111.23	133.50	131.78	129.88	120.02
Use of Primary Resources											
RPRE	MJ, NCV	61.29	92.17	92.17	79.14	72.09	64.72	75.14	69.52	63.87	61.29
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	1,559.00	2,106.08	2,106.08	1,846.29	1,705.51	1,559.00	1,840.14	1,753.50	1,665.66	1,568.70
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	65.53	131.06	131.06	110.37	99.18	87.37	91.74	78.64	65.53	68.98
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.64	2.99	2.99	2.56	2.33	2.09	2.18	1.91	1.64	1.71
CCE	kg CO_2e	67.71	135.42	135.42	114.04	102.48	90.28	94.79	81.25	67.71	71.27
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	1.67E-08	1.72E-08	1.72E-08	1.70E-08	1.68E-08	1.67E-08	1.72E-08	1.72E-08	1.72E-08	1.69E-08
LLRW	m^3	2.21E-07	2.32E-07	2.32E-07	2.27E-07	2.24E-07	2.21E-07	2.31E-07	2.31E-07	2.31E-07	2.26E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 9a. Summary Results (A1-A3): 4001-5000 psi (27.6-34.5 MPa) RMC product mix design, per cubic meter											
		Minimum	Maximum	4001-5000-00-FA/SL	4001-5000-20-FA	4001-5000-30-FA	4001-5000-40-FA	4001-5000-30-SL	4001-5000-40-SL	4001-5000-50-SL	4001-5000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	317.30	523.68	523.68	447.31	406.04	362.45	400.25	359.11	317.89	317.30
ODP	kg CFC11e	9.38E-06	1.34E-05	1.34E-05	1.15E-05	1.05E-05	9.38E-06	1.22E-05	1.18E-05	1.13E-05	1.02E-05
AP	kg SO_2e	1.17	1.59	1.59	1.39	1.29	1.17	1.53	1.51	1.49	1.33
EP	kg Ne	0.44	0.66	0.66	0.57	0.52	0.47	0.53	0.49	0.45	0.44
POCP	kg O_3e	25.23	33.89	33.89	29.79	27.57	25.23	30.56	29.45	28.34	26.28
ADPf	MJ, NCV	2,141.59	3,049.20	3,049.20	2,653.30	2,439.54	2,213.44	2,564.71	2,403.21	2,240.23	2,141.59
ADPe	kg Sbe	2.72E-04	4.29E-04	4.29E-04	3.74E-04	3.45E-04	3.13E-04	3.35E-04	3.04E-04	2.72E-04	2.75E-04
FFD	MJ Surplus	165.05	211.17	211.17	189.32	177.54	165.05	201.73	198.58	195.21	179.13
Use of Primary Resources											
RPRE	MJ, NCV	96.18	146.62	146.62	125.40	113.95	101.84	118.92	109.69	100.40	96.18
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	2,394.79	3,286.98	3,286.98	2,864.35	2,636.15	2,394.79	2,855.88	2,712.18	2,566.92	2,408.74
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	106.91	213.81	213.81	180.05	161.80	142.54	149.67	128.29	106.91	112.53
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.58	4.79	4.79	4.09	3.71	3.31	3.47	3.02	2.58	2.69
CCE	kg CO_2e	110.46	220.93	220.93	186.04	167.19	147.28	154.65	132.56	110.46	116.28
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	2.07E-08	2.16E-08	2.16E-08	2.12E-08	2.09E-08	2.07E-08	2.16E-08	2.15E-08	2.15E-08	2.11E-08
LLRW	m^3	2.73E-07	2.91E-07	2.91E-07	2.82E-07	2.78E-07	2.73E-07	2.90E-07	2.89E-07	2.89E-07	2.81E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 9b. Summary Results (A1-A3): 4001-5000 psi (27.6-34.5 MPa) RMC product mix design, per cubic yard											
		Minimum	Maximum	4001-5000-00-FA/SL	4001-5000-20-FA	4001-5000-30-FA	4001-5000-40-FA	4001-5000-30-SL	4001-5000-40-SL	4001-5000-50-SL	4001-5000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	242.59	400.38	400.38	341.99	310.44	277.11	306.01	274.56	243.05	242.59
ODP	kg CFC11e	7.17E-06	1.03E-05	1.03E-05	8.81E-06	8.01E-06	7.17E-06	9.31E-06	8.99E-06	8.67E-06	7.79E-06
AP	kg SO_2e	0.90	1.22	1.22	1.07	0.98	0.90	1.17	1.16	1.14	1.02
EP	kg Ne	0.33	0.51	0.51	0.44	0.40	0.36	0.41	0.37	0.34	0.33
POCP	kg O_3e	19.29	25.91	25.91	22.78	21.08	19.29	23.37	22.52	21.67	20.09
ADPf	MJ, NCV	1,637.36	2,331.28	2,331.28	2,028.59	1,865.16	1,692.30	1,960.86	1,837.38	1,712.78	1,637.36
ADPe	kg Sbe	2.08E-04	3.28E-04	3.28E-04	2.86E-04	2.63E-04	2.40E-04	2.56E-04	2.32E-04	2.08E-04	2.11E-04
FFD	MJ Surplus	126.19	161.45	161.45	144.74	135.74	126.19	154.23	151.83	149.25	136.95
Use of Primary Resources											
RPRE	MJ, NCV	73.54	112.10	112.10	95.88	87.12	77.86	90.92	83.86	76.76	73.54
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	1,830.95	2,513.07	2,513.07	2,189.95	2,015.48	1,830.95	2,183.48	2,073.61	1,962.55	1,841.62
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	81.73	163.47	163.47	137.66	123.71	108.98	114.43	98.08	81.73	86.04
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.97	3.66	3.66	3.13	2.84	2.53	2.65	2.31	1.97	2.06
CCE	kg CO_2e	84.45	168.91	168.91	142.24	127.82	112.61	118.24	101.35	84.45	88.90
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	1.58E-08	1.65E-08	1.65E-08	1.62E-08	1.60E-08	1.58E-08	1.65E-08	1.65E-08	1.65E-08	1.61E-08
LLRW	m^3	2.09E-07	2.22E-07	2.22E-07	2.16E-07	2.12E-07	2.09E-07	2.21E-07	2.21E-07	2.21E-07	2.15E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 10a. Summary Results (A1-A3): 5001-6000 psi (34.5-41.4 MPa) RMC product mix design, per cubic meter											
		Minimum	Maximum	5001-6000-00-FA/SL	5001-6000-20-FA	5001-6000-30-FA	5001-6000-40-FA	5001-6000-30-SL	5001-6000-40-SL	5001-6000-50-SL	5001-6000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	333.55	551.50	551.50	470.82	427.20	381.16	421.10	377.64	334.17	333.55
ODP	kg CFC11e	9.83E-06	1.41E-05	1.41E-05	1.21E-05	1.10E-05	9.83E-06	1.28E-05	1.23E-05	1.19E-05	1.07E-05
AP	kg SO_2e	1.23	1.67	1.67	1.46	1.35	1.23	1.61	1.59	1.57	1.40
EP	kg Ne	0.46	0.70	0.70	0.60	0.55	0.49	0.56	0.51	0.47	0.46
POCP	kg O_3e	26.39	35.54	35.54	31.21	28.86	26.39	32.02	30.85	29.68	27.50
ADPf	MJ, NCV	2,241.04	3,198.64	3,198.64	2,780.27	2,554.00	2,315.08	2,686.60	2,515.92	2,345.24	2,241.04
ADPe	kg Sbe	2.83E-04	4.48E-04	4.48E-04	3.90E-04	3.59E-04	3.26E-04	3.49E-04	3.16E-04	2.83E-04	2.86E-04
FFD	MJ Surplus	171.36	220.19	220.19	197.08	184.57	171.36	210.18	206.84	203.51	186.51
Use of Primary Resources											
RPRE	MJ, NCV	100.93	154.17	154.17	131.75	119.63	106.83	124.90	115.14	105.39	100.93
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	2,503.18	3,446.39	3,446.39	2,999.77	2,758.23	2,503.18	2,990.74	2,838.86	2,686.98	2,519.89
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	112.93	225.86	225.86	190.19	170.92	150.57	158.10	135.51	112.93	118.87
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.71	5.04	5.04	4.30	3.90	3.48	3.64	3.17	2.71	2.83
CCE	kg CO_2e	116.69	233.37	233.37	196.52	176.61	155.58	163.36	140.02	116.69	122.83
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	2.08E-08	2.17E-08	2.17E-08	2.13E-08	2.10E-08	2.08E-08	2.17E-08	2.17E-08	2.16E-08	2.12E-08
LLRW	m^3	2.74E-07	2.93E-07	2.93E-07	2.84E-07	2.79E-07	2.74E-07	2.92E-07	2.92E-07	2.91E-07	2.83E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 10b. Summary Results (A1-A3): 5001-6000 psi (34.5-41.4 MPa) RMC product mix design, per cubic yard											
		Minimum	Maximum	5001-6000-00-FA/SL	5001-6000-20-FA	5001-6000-30-FA	5001-6000-40-FA	5001-6000-30-SL	5001-6000-40-SL	5001-6000-50-SL	5001-6000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	255.02	421.65	421.65	359.97	326.62	291.42	321.96	288.72	255.49	255.02
ODP	kg CFC11e	7.52E-06	1.08E-05	1.08E-05	9.25E-06	8.41E-06	7.52E-06	9.78E-06	9.44E-06	9.10E-06	8.17E-06
AP	kg SO_2e	0.94	1.28	1.28	1.12	1.03	0.94	1.23	1.21	1.20	1.07
EP	kg Ne	0.35	0.53	0.53	0.46	0.42	0.38	0.43	0.39	0.36	0.35
POCP	kg O_3e	20.18	27.17	27.17	23.86	22.07	20.18	24.48	23.59	22.69	21.03
ADPf	MJ, NCV	1,713.40	2,445.54	2,445.54	2,125.67	1,952.68	1,770.01	2,054.05	1,923.56	1,793.06	1,713.40
ADPe	kg Sbe	2.16E-04	3.42E-04	3.42E-04	2.98E-04	2.75E-04	2.49E-04	2.67E-04	2.42E-04	2.16E-04	2.19E-04
FFD	MJ Surplus	131.01	168.34	168.34	150.68	141.12	131.01	160.69	158.14	155.59	142.60
Use of Primary Resources											
RPRE	MJ, NCV	77.17	117.87	117.87	100.73	91.46	81.68	95.49	88.03	80.57	77.17
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	1,913.82	2,634.95	2,634.95	2,293.49	2,108.82	1,913.82	2,286.58	2,170.46	2,054.34	1,926.60
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	86.34	172.68	172.68	145.41	130.68	115.12	120.88	103.61	86.34	90.88
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.07	3.85	3.85	3.29	2.98	2.66	2.78	2.43	2.07	2.16
CCE	kg CO_2e	89.21	178.43	178.43	150.25	135.02	118.95	124.90	107.06	89.21	93.91
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	1.59E-08	1.66E-08	1.66E-08	1.63E-08	1.61E-08	1.59E-08	1.66E-08	1.66E-08	1.66E-08	1.62E-08
LLRW	m^3	2.10E-07	2.24E-07	2.24E-07	2.17E-07	2.14E-07	2.10E-07	2.23E-07	2.23E-07	2.23E-07	2.16E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 11a. Summary Results (A1-A3): 6001-8000 psi (41.3-55.1 MPa) RMC product mix design, per cubic meter											
		Minimum	Maximum	6001-8000-00-FA/SL	6001-8000-20-FA	6001-8000-30-FA	6001-8000-40-FA	6001-8000-30-SL	6001-8000-40-SL	6001-8000-50-SL	6001-8000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	385.23	642.02	642.02	546.99	495.61	441.31	488.43	437.16	385.97	385.23
ODP	kg CFC11e	1.13E-05	1.63E-05	1.63E-05	1.39E-05	1.26E-05	1.13E-05	1.47E-05	1.42E-05	1.37E-05	1.23E-05
AP	kg SO_2e	1.39	1.91	1.91	1.66	1.53	1.39	1.83	1.81	1.78	1.58
EP	kg Ne	0.52	0.80	0.80	0.69	0.63	0.56	0.64	0.58	0.53	0.52
POCP	kg O_3e	29.69	40.47	40.47	35.36	32.60	29.69	36.32	34.94	33.56	31.00
ADPf	MJ, NCV	2,538.60	3,669.01	3,669.01	3,175.83	2,909.13	2,626.05	3,065.27	2,862.54	2,661.29	2,538.60
ADPe	kg Sbe	3.13E-04	5.07E-04	5.07E-04	4.39E-04	4.03E-04	3.64E-04	3.91E-04	3.52E-04	3.13E-04	3.17E-04
FFD	MJ Surplus	188.70	246.57	246.57	219.29	204.52	188.70	234.67	230.48	226.51	206.50
Use of Primary Resources											
RPRE	MJ, NCV	116.11	178.90	178.90	152.49	138.20	123.07	144.41	132.86	121.36	116.11
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	2,833.43	3,946.80	3,946.80	3,420.32	3,135.61	2,833.43	3,409.41	3,228.71	3,049.58	2,852.84
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	132.98	265.96	265.96	223.96	201.26	177.30	186.17	159.57	132.98	139.98
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	3.12	5.87	5.87	5.00	4.52	4.03	4.22	3.67	3.12	3.26
CCE	kg CO_2e	137.40	274.81	274.81	231.42	207.96	183.21	192.37	164.88	137.40	144.64
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	2.02E-08	2.13E-08	2.13E-08	2.08E-08	2.05E-08	2.02E-08	2.13E-08	2.12E-08	2.12E-08	2.07E-08
LLRW	m^3	2.63E-07	2.85E-07	2.85E-07	2.75E-07	2.69E-07	2.63E-07	2.84E-07	2.84E-07	2.83E-07	2.73E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 11b. Summary Results (A1-A3): 6001-8000 psi (41.3-55.1 MPa) RMC product mix design, per cubic yard											
		Minimum	Maximum	6001-8000-00-FA/SL	6001-8000-20-FA	6001-8000-30-FA	6001-8000-40-FA	6001-8000-30-SL	6001-8000-40-SL	6001-8000-50-SL	6001-8000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	294.53	490.86	490.86	418.20	378.92	337.40	373.43	334.24	295.09	294.53
ODP	kg CFC11e	8.61E-06	1.25E-05	1.25E-05	1.06E-05	9.66E-06	8.61E-06	1.13E-05	1.09E-05	1.05E-05	9.38E-06
AP	kg SO_2e	1.06	1.46	1.46	1.27	1.17	1.06	1.40	1.38	1.36	1.21
EP	kg Ne	0.39	0.61	0.61	0.53	0.48	0.43	0.49	0.45	0.40	0.39
POCP	kg O_3e	22.70	30.94	30.94	27.04	24.93	22.70	27.77	26.71	25.66	23.70
ADPf	MJ, NCV	1,940.90	2,805.16	2,805.16	2,428.10	2,224.19	2,007.76	2,343.56	2,188.57	2,034.70	1,940.90
ADPe	kg Sbe	2.39E-04	3.88E-04	3.88E-04	3.36E-04	3.08E-04	2.78E-04	2.99E-04	2.69E-04	2.39E-04	2.42E-04
FFD	MJ Surplus	144.27	188.52	188.52	167.66	156.37	144.27	179.42	176.22	173.18	157.88
Use of Primary Resources											
RPRE	MJ, NCV	88.77	136.78	136.78	116.58	105.66	94.09	110.41	101.58	92.78	88.77
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	2,166.31	3,017.54	3,017.54	2,615.02	2,397.35	2,166.31	2,606.68	2,468.53	2,331.57	2,181.15
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	101.67	203.34	203.34	171.23	153.88	135.56	142.34	122.00	101.67	107.02
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.39	4.49	4.49	3.82	3.46	3.08	3.23	2.81	2.39	2.49
CCE	kg CO_2e	105.05	210.11	210.11	176.93	159.00	140.07	147.07	126.06	105.05	110.58
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	1.54E-08	1.63E-08	1.63E-08	1.59E-08	1.57E-08	1.54E-08	1.63E-08	1.62E-08	1.62E-08	1.58E-08
LLRW	m^3	2.01E-07	2.18E-07	2.18E-07	2.10E-07	2.06E-07	2.01E-07	2.17E-07	2.17E-07	2.16E-07	2.09E-07
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 12a. Summary Results (A1-A3): 0-3000 psi Lightweight (0-20.7 MPa) RMC product mix design, per cubic meter

		Minimum	Maximum	LW-3000-00-FA/SL	LW-3000-20-FA	LW-3000-30-FA	LW-3000-40-FA	LW-3000-30-SL	LW-3000-40-SL	LW-3000-50-SL	LW-3000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	416.67	596.09	596.09	512.64	467.62	497.83	425.53	468.88	416.67	439.94
ODP	kg CFC11e	1.48E-05	2.05E-05	2.05E-05	1.77E-05	1.61E-05	1.90E-05	1.48E-05	1.87E-05	1.65E-05	1.84E-05
AP	kg SO_2e	2.02	2.70	2.70	2.36	2.18	2.58	2.02	2.57	2.29	2.56
EP	kg Ne	0.72	0.99	0.99	0.86	0.79	0.88	0.72	0.84	0.75	0.81
POCP	kg O_3e	29.23	38.42	38.42	33.93	31.50	35.46	29.23	34.68	31.21	33.90
ADPf	MJ, NCV	3,122.24	4,218.66	4,218.66	3,675.73	3,383.15	3,774.20	3,122.24	3,659.74	3,273.85	3,545.28
ADPe	kg Sbe	2.71E-04	3.95E-04	3.95E-04	3.43E-04	3.15E-04	3.24E-04	2.88E-04	3.02E-04	2.71E-04	2.80E-04
FFD	MJ Surplus	219.90	282.18	282.18	251.29	234.69	269.23	219.90	266.86	241.48	264.49
Use of Primary Resources											
RPRE	MJ, NCV	266.37	367.31	367.31	316.27	288.78	333.87	266.37	327.35	290.13	320.83
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	3,400.37	4,586.11	4,586.11	3,998.57	3,681.95	4,169.08	3,400.37	4,067.06	3,632.01	3,965.04
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	75.08	150.16	150.16	126.45	113.63	105.11	100.10	90.09	79.03	75.08
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.17	3.73	3.73	3.20	2.92	2.79	2.62	2.48	2.22	2.17
CCE	kg CO_2e	77.58	155.15	155.15	130.66	117.41	108.61	103.44	93.09	81.66	77.58
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	5.06E-08	6.35E-08	6.35E-08	5.68E-08	5.32E-08	6.10E-08	5.06E-08	6.10E-08	5.58E-08	6.10E-08
LLRW	m^3	1.60E-06	2.10E-06	2.10E-06	1.84E-06	1.70E-06	2.00E-06	1.60E-06	2.00E-06	1.80E-06	2.00E-06
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 12b. Summary Results (A1-A3): 0-3000 psi Lightweight (0-20.7 MPa) RMC product mix design, per cubic yard

		Minimum	Maximum	LW-3000-00-FA/SL	LW-3000-20-FA	LW-3000-30-FA	LW-3000-40-FA	LW-3000-30-SL	LW-3000-40-SL	LW-3000-50-SL	LW-3000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	318.57	455.74	455.74	391.95	357.52	380.62	325.34	358.49	318.57	336.36
ODP	kg CFC11e	1.13E-05	1.57E-05	1.57E-05	1.35E-05	1.23E-05	1.45E-05	1.13E-05	1.43E-05	1.26E-05	1.41E-05
AP	kg SO_2e	1.55	2.07	2.07	1.81	1.67	1.98	1.55	1.96	1.75	1.95
EP	kg Ne	0.55	0.76	0.76	0.66	0.60	0.67	0.55	0.65	0.58	0.62
POCP	kg O_3e	22.35	29.38	29.38	25.94	24.08	27.11	22.35	26.51	23.86	25.92
ADPf	MJ, NCV	2,387.13	3,225.39	3,225.39	2,810.29	2,586.60	2,885.58	2,387.13	2,798.07	2,503.03	2,710.56
ADPe	kg Sbe	2.07E-04	3.02E-04	3.02E-04	2.62E-04	2.41E-04	2.47E-04	2.20E-04	2.31E-04	2.07E-04	2.14E-04
FFD	MJ Surplus	168.12	215.74	215.74	192.13	179.43	205.84	168.12	204.03	184.63	202.22
Use of Primary Resources											
RPRE	MJ, NCV	203.65	280.83	280.83	241.81	220.79	255.27	203.65	250.28	221.82	245.29
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	2,599.77	3,506.33	3,506.33	3,057.12	2,815.05	3,187.49	2,599.77	3,109.49	2,776.87	3,031.49
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	57.40	114.80	114.80	96.68	86.88	80.36	76.53	68.88	60.42	57.40
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.66	2.85	2.85	2.45	2.23	2.13	2.00	1.89	1.70	1.66
CCE	kg CO_2e	59.31	118.62	118.62	99.89	89.77	83.04	79.08	71.17	62.43	59.31
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	3.87E-08	4.86E-08	4.86E-08	4.34E-08	4.07E-08	4.67E-08	3.87E-08	4.66E-08	4.27E-08	4.66E-08
LLRW	m^3	1.22E-06	1.60E-06	1.60E-06	1.41E-06	1.30E-06	1.53E-06	1.22E-06	1.53E-06	1.38E-06	1.53E-06
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 13a. Summary Results (A1-A3): 3001-4000 psi Lightweight (20.7-27.6 MPa) RMC product mix design, per cubic meter

		Minimum	Maximum	LW-4000-00-FA/SL	LW-4000-20-FA	LW-4000-30-FA	LW-4000-40-FA	LW-4000-30-SL	LW-4000-40-SL	LW-4000-50-SL	LW-4000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	475.10	690.86	690.86	595.41	540.36	576.35	487.83	539.70	475.10	498.48
ODP	kg CFC11e	1.63E-05	2.29E-05	2.29E-05	1.98E-05	1.80E-05	2.15E-05	1.63E-05	2.12E-05	1.84E-05	2.06E-05
AP	kg SO_2e	2.19	2.97	2.97	2.61	2.39	2.89	2.19	2.87	2.52	2.82
EP	kg Ne	0.80	1.11	1.11	0.96	0.88	0.98	0.80	0.94	0.83	0.89
POCP	kg O_3e	32.65	43.58	43.58	38.44	35.47	40.37	32.65	39.38	35.07	38.14
ADPf	MJ, NCV	3,453.82	4,727.84	4,727.84	4,130.57	3,777.49	4,252.64	3,453.82	4,107.72	3,632.50	3,922.37
ADPe	kg Sbe	3.05E-04	4.56E-04	4.56E-04	3.95E-04	3.60E-04	3.70E-04	3.26E-04	3.43E-04	3.05E-04	3.13E-04
FFD	MJ Surplus	238.57	310.82	310.82	276.94	256.91	299.49	238.57	296.50	265.14	291.16
Use of Primary Resources											
RPRE	MJ, NCV	285.38	397.51	397.51	345.26	312.84	367.19	285.38	358.93	313.63	345.12
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	3,753.24	5,129.18	5,129.18	4,484.25	4,102.43	4,697.28	3,753.24	4,568.10	4,031.95	4,394.54
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	95.06	190.12	190.12	160.10	143.87	133.08	126.75	114.07	100.06	95.06
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.59	4.56	4.56	3.91	3.55	3.38	3.17	2.99	2.66	2.59
CCE	kg CO_2e	98.22	196.45	196.45	165.43	148.66	137.51	130.96	117.87	103.39	98.22
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	5.05E-08	6.41E-08	6.41E-08	5.78E-08	5.37E-08	6.31E-08	5.05E-08	6.30E-08	5.68E-08	6.20E-08
LLRW	m^3	1.61E-06	2.13E-06	2.13E-06	1.89E-06	1.73E-06	2.09E-06	1.61E-06	2.09E-06	1.85E-06	2.05E-06
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 13b. Summary Results (A1-A3): 3001-4000 psi Lightweight (20.7-27.6 MPa) RMC product mix design, per cubic yard

		Minimum	Maximum	LW-4000-00-FA/SL	LW-4000-20-FA	LW-4000-30-FA	LW-4000-40-FA	LW-4000-30-SL	LW-4000-40-SL	LW-4000-50-SL	LW-4000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	363.24	528.20	528.20	455.22	413.14	440.65	372.97	412.63	363.24	381.12
ODP	kg CFC11e	1.25E-05	1.75E-05	1.75E-05	1.51E-05	1.37E-05	1.65E-05	1.25E-05	1.62E-05	1.41E-05	1.57E-05
AP	kg SO_2e	1.68	2.27	2.27	1.99	1.83	2.21	1.68	2.19	1.93	2.16
EP	kg Ne	0.61	0.85	0.85	0.74	0.67	0.75	0.61	0.72	0.63	0.68
POCP	kg O_3e	24.96	33.32	33.32	29.39	27.12	30.86	24.96	30.11	26.81	29.16
ADPf	MJ, NCV	2,640.64	3,614.69	3,614.69	3,158.05	2,888.09	3,251.38	2,640.64	3,140.58	2,777.24	2,998.86
ADPe	kg Sbe	2.33E-04	3.49E-04	3.49E-04	3.02E-04	2.75E-04	2.83E-04	2.49E-04	2.62E-04	2.33E-04	2.39E-04
FFD	MJ Surplus	182.40	237.64	237.64	211.74	196.42	228.98	182.40	226.69	202.71	222.61
Use of Primary Resources											
RPRE	MJ, NCV	218.19	303.92	303.92	263.97	239.18	280.73	218.19	274.42	239.79	263.86
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	2,869.56	3,921.54	3,921.54	3,428.46	3,136.53	3,591.32	2,869.56	3,492.57	3,082.65	3,359.87
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	72.68	145.36	145.36	122.41	110.00	101.75	96.90	87.21	76.50	72.68
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	1.98	3.49	3.49	2.99	2.71	2.58	2.43	2.28	2.03	1.98
CCE	kg CO_2e	75.10	150.19	150.19	126.48	113.66	105.14	100.13	90.12	79.05	75.10
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	3.86E-08	4.90E-08	4.90E-08	4.42E-08	4.10E-08	4.82E-08	3.86E-08	4.82E-08	4.34E-08	4.74E-08
LLRW	m^3	1.23E-06	1.63E-06	1.63E-06	1.44E-06	1.32E-06	1.60E-06	1.23E-06	1.60E-06	1.41E-06	1.57E-06
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 14a. Summary Results (A1-A3): 4001-5000 psi Lightweight (27.6-34.5 MPa) RMC product mix design, per cubic meter

		Minimum	Maximum	LW-5000-00-FA/SL	LW-5000-20-FA	LW-5000-30-FA	LW-5000-40-FA	LW-5000-30-SL	LW-5000-40-SL	LW-5000-50-SL	LW-5000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	517.88	771.41	771.41	659.35	594.46	634.28	534.08	592.38	517.88	543.62
ODP	kg CFC11e	1.75E-05	2.53E-05	2.53E-05	2.16E-05	1.94E-05	2.34E-05	1.75E-05	2.30E-05	1.98E-05	2.22E-05
AP	kg SO_2e	2.34	3.26	3.26	2.82	2.56	3.12	2.34	3.10	2.70	3.03
EP	kg Ne	0.86	1.22	1.22	1.05	0.95	1.06	0.86	1.02	0.89	0.96
POCP	kg O_3e	35.23	48.02	48.02	41.98	38.48	44.01	35.23	42.88	37.92	41.37
ADPf	MJ, NCV	3,717.43	5,220.09	5,220.09	4,511.33	4,090.32	4,621.91	3,717.43	4,456.22	3,907.21	4,229.87
ADPe	kg Sbe	3.30E-04	5.06E-04	5.06E-04	4.34E-04	3.94E-04	4.05E-04	3.55E-04	3.73E-04	3.30E-04	3.38E-04
FFD	MJ Surplus	254.40	339.68	339.68	299.44	275.53	323.55	254.40	320.12	283.94	313.18
Use of Primary Resources											
RPRE	MJ, NCV	302.39	436.90	436.90	373.61	334.17	394.71	302.39	385.26	332.70	367.50
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	4,035.00	5,658.68	5,658.68	4,892.89	4,437.34	5,104.64	4,035.00	4,956.95	4,337.72	4,742.68
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	108.69	217.37	217.37	183.05	164.50	152.16	144.92	130.42	114.41	108.69
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.88	5.15	5.15	4.40	3.98	3.79	3.55	3.34	2.97	2.88
CCE	kg CO_2e	112.30	224.61	224.61	189.14	169.97	157.23	149.74	134.76	118.21	112.30
Indicators Describing Waste											
HWD	kg	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
NHWD	kg	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64	9.64
HLRW	m^3	5.12E-08	6.79E-08	6.79E-08	6.01E-08	5.49E-08	6.54E-08	5.12E-08	6.54E-08	5.80E-08	6.39E-08
LLRW	m^3	1.64E-06	2.28E-06	2.28E-06	1.98E-06	1.78E-06	2.18E-06	1.64E-06	2.18E-06	1.90E-06	2.13E-06
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 14b. Summary Results (A1-A3): 4001-5000 psi Lightweight (27.6-34.5 MPa) RMC product mix design, per cubic yard

		Minimum	Maximum	LW-5000-00-FA/SL	LW-5000-20-FA	LW-5000-30-FA	LW-5000-40-FA	LW-5000-30-SL	LW-5000-40-SL	LW-5000-50-SL	LW-5000-50-FA/SL
Core Mandatory Impact Indicators											
GWP	kg CO_2e	395.95	589.79	589.79	504.11	454.50	484.94	408.33	452.91	395.95	415.63
ODP	kg CFC11e	1.34E-05	1.93E-05	1.93E-05	1.65E-05	1.49E-05	1.79E-05	1.34E-05	1.76E-05	1.52E-05	1.70E-05
AP	kg SO_2e	1.79	2.49	2.49	2.16	1.96	2.39	1.79	2.37	2.06	2.32
EP	kg Ne	0.65	0.94	0.94	0.80	0.72	0.81	0.65	0.78	0.68	0.73
POCP	kg O_3e	26.94	36.71	36.71	32.10	29.42	33.65	26.94	32.78	28.99	31.63
ADPf	MJ, NCV	2,842.18	3,991.04	3,991.04	3,449.16	3,127.27	3,533.71	2,842.18	3,407.02	2,987.28	3,233.97
ADPe	kg Sbe	2.52E-04	3.87E-04	3.87E-04	3.32E-04	3.01E-04	3.10E-04	2.71E-04	2.85E-04	2.52E-04	2.59E-04
FFD	MJ Surplus	194.50	259.70	259.70	228.94	210.66	247.37	194.50	244.75	217.09	239.45
Use of Primary Resources											
RPRE	MJ, NCV	231.19	334.04	334.04	285.65	255.49	301.77	231.19	294.56	254.37	280.97
RPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRPRE	MJ, NCV	3,084.97	4,326.37	4,326.37	3,740.88	3,392.59	3,902.78	3,084.97	3,789.86	3,316.43	3,626.03
NRPRM	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy											
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ, NCV	83.10	166.19	166.19	139.95	125.77	116.34	110.80	99.72	87.47	83.10
RE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mandatory Inventory Parameters											
FW	m^3	2.21	3.94	3.94	3.36	3.04	2.90	2.72	2.55	2.27	2.21
CCE	kg CO_2e	85.86	171.72	171.72	144.61	129.95	120.21	114.48	103.03	90.38	85.86
Indicators Describing Waste											
HWD	kg	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NHWD	kg	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37	7.37
HLRW	m^3	3.91E-08	5.19E-08	5.19E-08	4.59E-08	4.20E-08	5.00E-08	3.91E-08	5.00E-08	4.44E-08	4.88E-08
LLRW	m^3	1.26E-06	1.75E-06	1.75E-06	1.52E-06	1.36E-06	1.67E-06	1.26E-06	1.67E-06	1.46E-06	1.62E-06
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EE	MJ, NCV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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