

cradle to cradle  
**products**  
**innovation**  
**institute**

# **CRADLE TO CRADLE CERTIFIED® VERSION 4.0**

**WATER & SOIL STEWARDSHIP  
KEY MATERIALS**

## Key Materials: Materials Typically Associated with Pollutant Intense and/or High-Volume Water Use Processes

A key material is defined as a material that is typically produced using a high-volume water use process or a pollutant intense process. The production of a key material may also typically include one or more processes that negatively impact aquatic and soil environments (e.g., deforestation, soil erosion, runoff into surface waters). The table below contains the list of key materials and processes that, if applicable to the product seeking certification, must be addressed to meet the Bronze, Silver, and Gold level requirements where key materials are referenced in the Water & Soil Stewardship category.

A high-volume water use process is a process that typically requires a high volume of water. Facilities (including supplier facilities where key materials are manufactured) that use (i.e., withdraw and/or purchase)  $\geq 100,000$  cubic meters ( $m^3$ ) of fresh water per year are considered high-volume water users. Any supplier of a key material carrying out a process marked as “high volume” below is considered to use a high volume of water unless water use data are provided that demonstrate otherwise.

A pollutant intense process is a process with high potential to negatively affect conventional water quality parameters such as biological oxygen demand (BOD), chemical oxygen demand (COD), and total suspended solids (TSS), and/or result in the release of hazardous chemicals with effluent or runoff. A pollutant intense process is defined broadly to include soil erosion and loss, which, in addition to resulting in reduced topsoil quality and availability on land, also contributes to poor surface water quality.

Key Material	Manufacturing, Extractive, and Environmental Process(es)	High-volume Water Use	Pollutant Intense	
			Chemicals and Effluent Quality Impacts	Soil Erosion Impacts
Cement	Slurry preparation, use of wet kiln instead of dry kiln process	✓	-	-
Ceramic tile	Wet process: milling	✓	-	-
Chemicals (i.e., the transformation of organic and inorganic raw materials by a chemical process to form products) Includes plastics (primary production only)	Process cooling and heating (high volume); Cleaning/rinsing, process water and sludge disposal (pollutant intense)	✓	✓	-

Crops: cotton, maize/corn, soy, sugarcane	<p>Irrigation</p> <p>Use of pesticides (insecticides, herbicides, fungicides, etc.) and fertilizers, associated chemical runoff to surface water.</p> <p>Deforestation and other unmanaged/poorly managed land conversion to agriculture, excessive tilling and associated soil erosion and siltation of surface water.</p>	✓	✓	✓
Other crops	<p>Use of pesticides (insecticides, herbicides, fungicides, etc.) and fertilizers, associated chemical runoff to surface water.</p> <p>Deforestation and other unmanaged/poorly managed land conversion to agriculture, excessive tilling and associated soil erosion and siltation of surface water.</p>	-	✓	✓
Glass	Float process - cooling, washing recycled material	✓	-	-
Leather	All wet leather processing steps including curing, prepping, tanning, and dyeing; waste handling.	✓	✓	-
Material sourced from grazing species/ungulates (leather, wool, etc.)	Deforestation and poor management resulting in soil erosion and runoff	-	-	✓
Metals (ferrous and non-ferrous)	Primary metal production processes: cleaning, cooling, etc.	✓	✓	-
Mined metal ores (includes iron, aluminum, nickel, copper, zinc, and other ores <sup>1</sup> )	<p>Hydraulic mining. Mine dewatering, acid and metalliferous drainage and tailings production, soil erosion and runoff (from surface mining), material separation and transport, etc.</p> <p>Extraction of valuable metals (silver and gold) using mercury and cyanide</p>	✓	✓	✓

<sup>1</sup> Refer to the following reference for a full list of metal ores included in this key material category: U.S. EPA, "Mineral Mining and Processing Effluent Guidelines," United States Environmental Protection Agency. Available: <https://www.epa.gov/eg/ore-mining-and-dressing-effluent-guidelines>. [Accessed 01 February 2021].

Mined minerals (includes stone, sand, gravel, gypsum, clay, and other minerals <sup>2</sup> )	High volume: Mine dewatering (if necessary) - potential to lower the water table. Pollutant intense: soil erosion and runoff	✓	-	✓
Metal finishes (includes chrome, galvanization, etc.)	Finishing/plating, rinsing/cleaning, rectifier cooling	✓	✓	-
Oil and gas	Hydraulic fracturing/fracking, water injection/waterflooding.	✓	✓	-
Plastics (recycled)	Washing post-consumer plastic for recycling	✓	-	-
Pulp and paper (includes all cellulosic pulp, e.g., pulp used to make textile fibers)	Debarking, pulping, pulp washing, pulp bleaching. Papermaking: Pulp dilution and dewatering	✓	✓	-
Semiconductors	Cleaning/rinsing with ultrapure water (UPW) and ultrapure water production, cooling	✓	✓	-
Textiles (includes fiber and yarn stages)	Wet processing, including scouring, bleaching and other wet pre-treatment steps, sizing and desizing woven textile materials, dyeing, finishing including denim finishing, washing, coatings	✓	✓	-
Wood/timber	Debarking (high volume), sawmill timber processing (pollutant intense)	✓	✓	-
Wood/timber	Deforestation, forest management (poor management resulting in soil erosion and runoff, use of pesticides and fertilizers)	-	✓	✓

<sup>2</sup> Refer to the following reference for a full list of minerals included in this key material category: U.S. EPA, "Mineral Mining and Processing Effluent Guidelines," United States Environmental Protection Agency, [Online]. Available: <https://www.epa.gov/eg/mineral-mining-and-processing-effluent-guidelines#facilities>. [Accessed 01 February 2021].