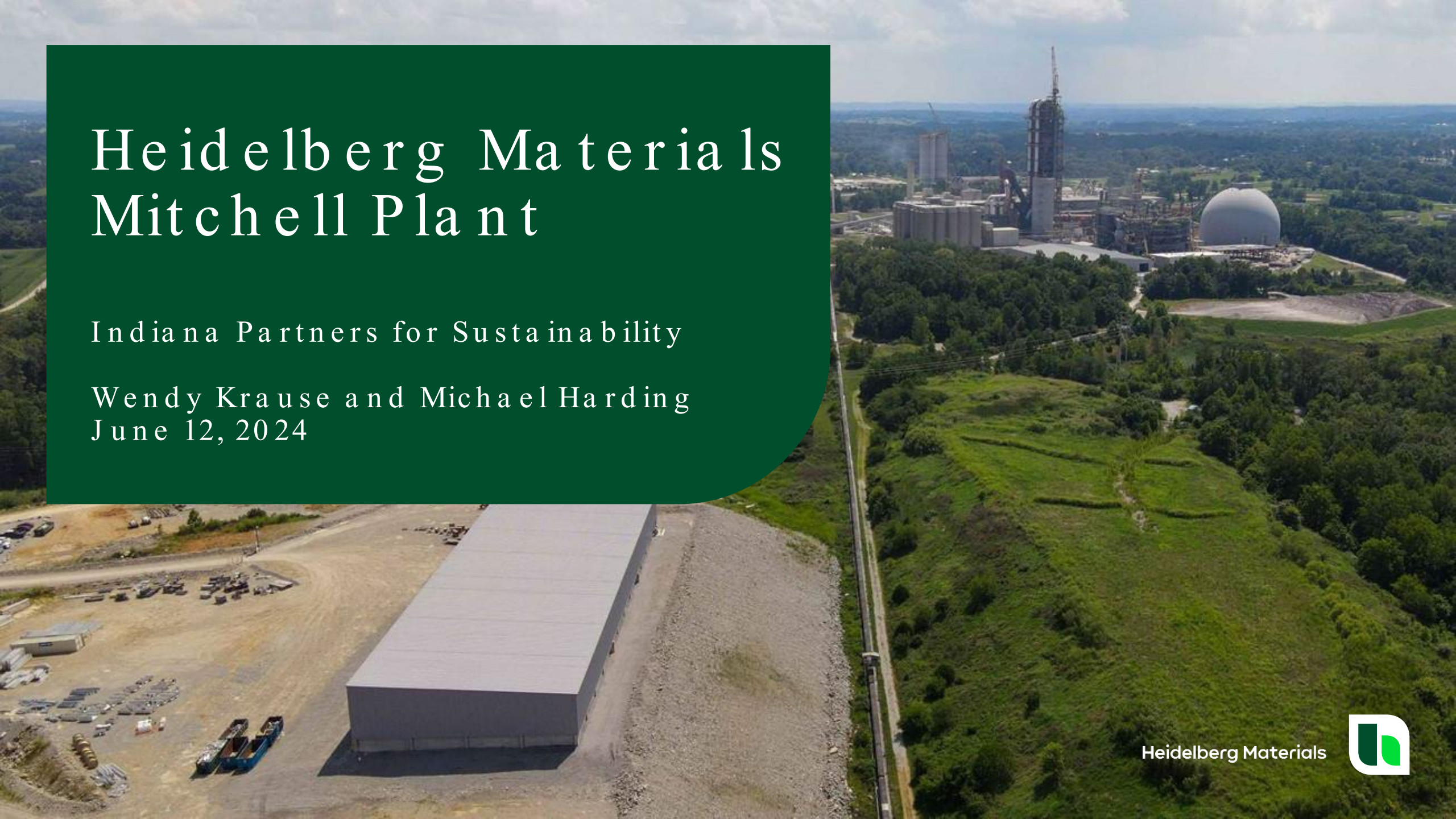
Heidelberg Materials Mitchell Plant

Indiana Partners for Sustainability

Wendy Krause and Michael Harding
June 12, 2024



Agenda

- Introductions
- Company Overview and History in Mitchell
- Cement Manufacturing Process
- Mitchell Plant Overview
- Mitchell K4 Modernization Project
- Emission Limits and Controls
- Other Environmental Aspects of Plant
- HM Sustainability Commitments
- Land Use and Biodiversity
- CO2 Emission Reduction Strategies
- Mitchell Carbon Capture and Storage Project
- Community Benefits, Outreach, and Engagement
- Tours

Wendy M. Krause, CHMM

Midwest Director Environment & Sustainability

- B.S. Biology, Xavier University focus in Ecology, University of Cincinnati
- 19 years in environmental consulting
- Joined Heidelberg Materials in 2019
- Certified Hazardous Materials Manager, Executive Committee INAHMP section
- Executive Committee Indiana Partners for Sustainability
- Heidelberg Materials Employee Resource Group, Network of Women
- National Association of Women in Construction

Michael Harding, CHMM

Environmental Manager

Mitchell Cement Plant

- B.S. Environmental and Occupational Health Sciences, Purdue University West Lafayette
- 8 years in environmental consulting
- Joined Heidelberg Materials in December 2021
- Certified Hazardous Materials Manager, Executive Committee INAHMP section
- Certified Wastewater Operator, Class A-SO
- Certified Land Disposal Facility Operator, Category II

Our purpose: Material to build our future

The world is undergoing profound changes. Our building materials and solutions shape significant development worldwide. We build on one and a half centuries of experience. Now is the time to lay the foundation for our future.

At the center of our actions lies our responsibility for the environment. **We want to be the leader in the industry on the path to carbon -neutrality.**

We deliver long -term financial performance through operational excellence, dedication, and openness for change.

We are progressive minds with the ambition to drive transformation. We push the boundaries to strengthen innovation and deepen partnerships with our customers and other stakeholders. Together we craft material solutions for the future. So that the world can always build on us.

Heidelberg Materials North America

~9,000

employees
in 28 states and 6 provinces

>450

manufacturing locations, distribution terminals and sales yards

Leading positions in: cement, aggregates, and ready -mixed concrete

Heidelberg Materials is evolving our portfolio, products and services—providing the materials to build the future.

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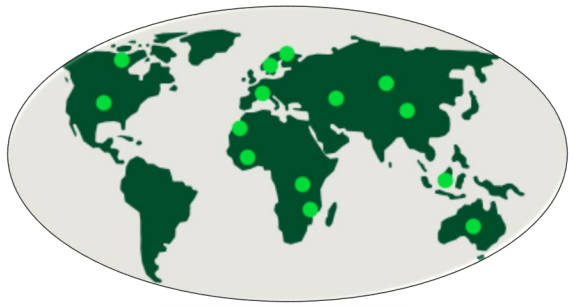
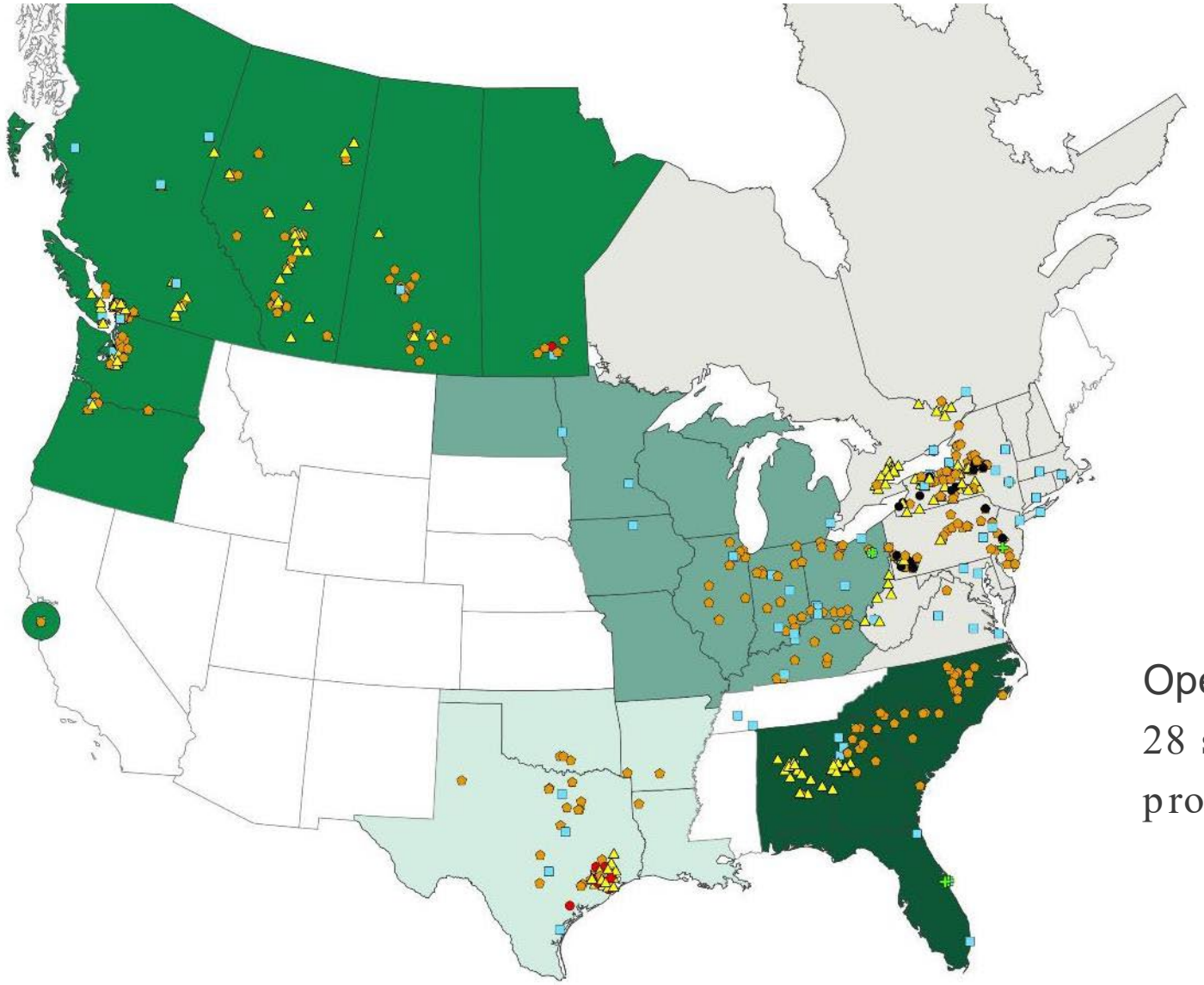
Heidelberg Materials North America ...our numbers

Revenue	Cementitious	Aggregates	Concrete & Asphalt	Other
5.6	38.0	36.4	19.8	5.8
Billion USD	% of Revenue	% of Revenue	% of Revenue	% of Revenue
>450 locations	10 Plants	>205 facilities	~220 Plants	Services, JVs
	Wide distribution with over 65 terminals plus 5 slag grinding and 5 coal ash beneficiation plants	Additions of Aggregate recycling plants increases our offerings and areas	The majority of these locations are offering transparent lower carbon alternatives with EvoBuild	

Our geographic footprint





Operations in 28 states and 6 provinces

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Our concrete promises

1. We focus on heavy building materials

2. We commit to generate 50% of our revenue from sustainable products by 2030.

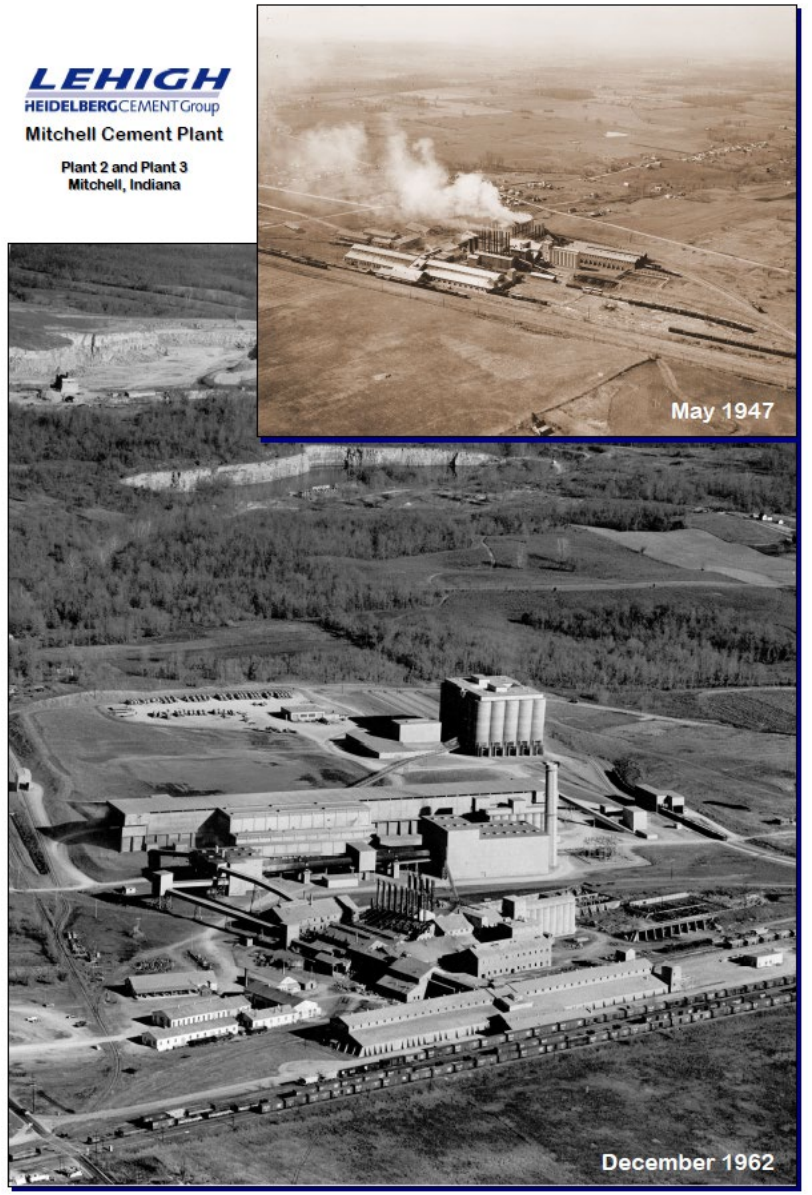
3. We commit to reduce CO_2 emissions by almost 50% to 400 kg CO_2/t CEM by 2030.

4. We will make this transition a successful business case: on growth, margins, cash flow, ROIC, and leverage.

5. We drive the change for the benefit of our customers, our shareholders, our employees, and the society we live in

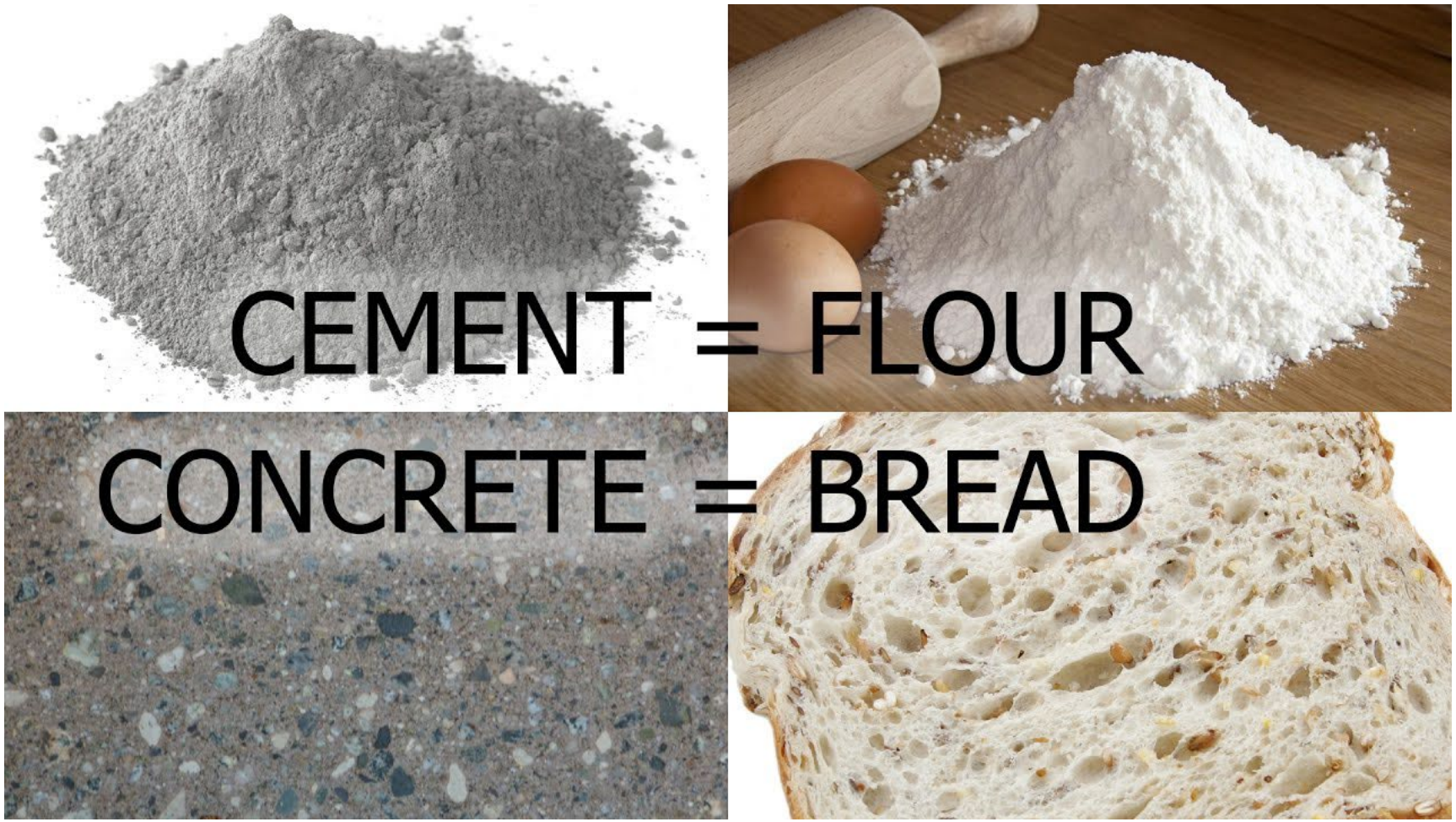
History and Legacy in Mitchell: Lehigh Cement & Heidelberg Materials

- Lehigh Portland Cement Company began operating a cement mill in Mitchell in August 1902 (Plant #1) that produced 150,000 tons of cement annually
- Success led to Plant #2 (pictured top right) opening in 1906, complete with company housing, a hospital, a convenience store, and a chapel. The plant employed about 1,300 people around 1912
- In 1928 Lehigh deeded 258 acres of land to the Indiana Department of Conservation which became part of Spring Mill State Park
- Plant #3 began operation in July 1961 with two kilns. Plant #3 operated until April 2023 and produced about 2,000 tons per day or about 600,000 tons per year.
- In 1965 operations at the current quarry and crushing plant began
- In 1972 a third kiln was added to Plant #3
- In 1977 Lehigh Portland Cement Company was bought by Heidelberger Zement AG
- Lehigh Cement Company was the North American cement operations of HeidelbergCement Group until January 1, 2023, when all of the over 70 global brands united under the Heidelberg Materials name



Cement Manufacturing Process

Cement Process Overview



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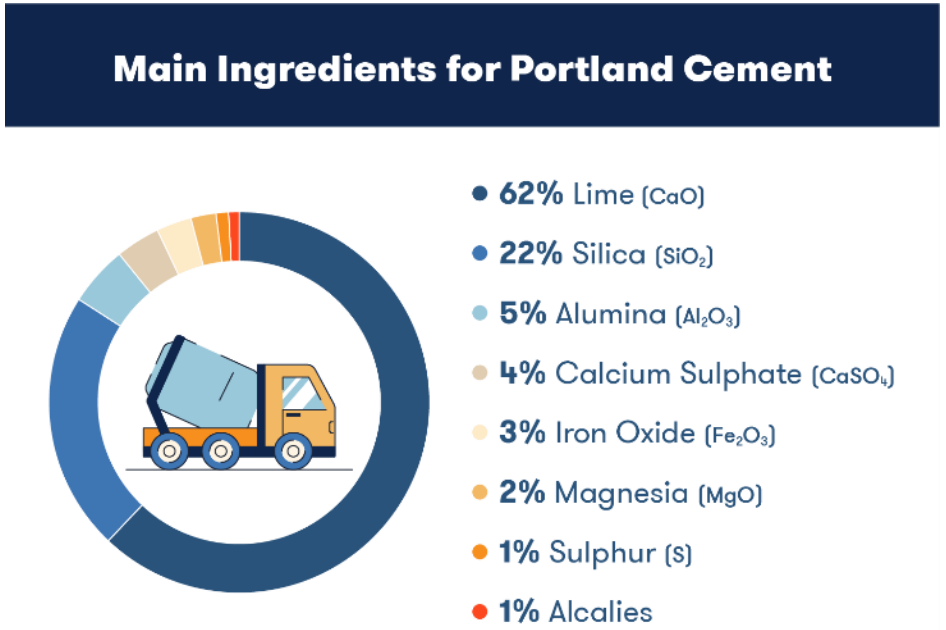
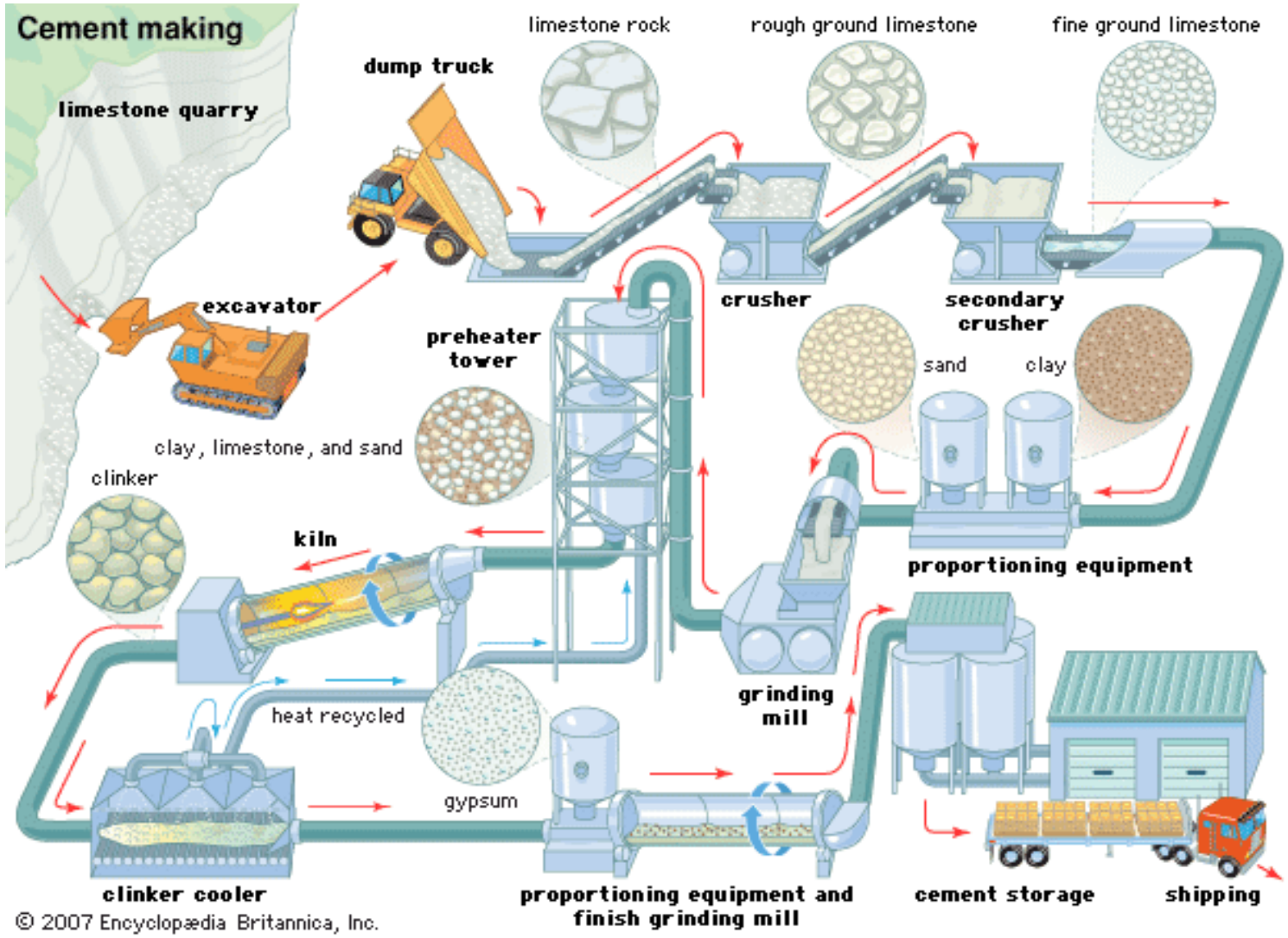
What is Cement?

- Cement is a fine powder material that sets, hardens, and adheres to other materials to bind them together
- Cement binds sand and gravel (construction aggregate) to produce concrete
- Hydraulic cements set in the presence of water
- Portland cement is by far the most common type of cement in use globally (named in early 19th century for a type of limestone on the Isle of Portland, England)
- Recently industry has shifted from Ordinary Portland Cement (OPC or Type I) to Portland Limestone Cement (PLC or Type IL)
- PLC/ Type IL (Branded: EcoCem) is the main product produced at the Mitchell plant
- Mitchell plant also produces Type III (high early strength) and Masonry Cement Types M, S, N to produce masonry mortar



Cement Process Overview



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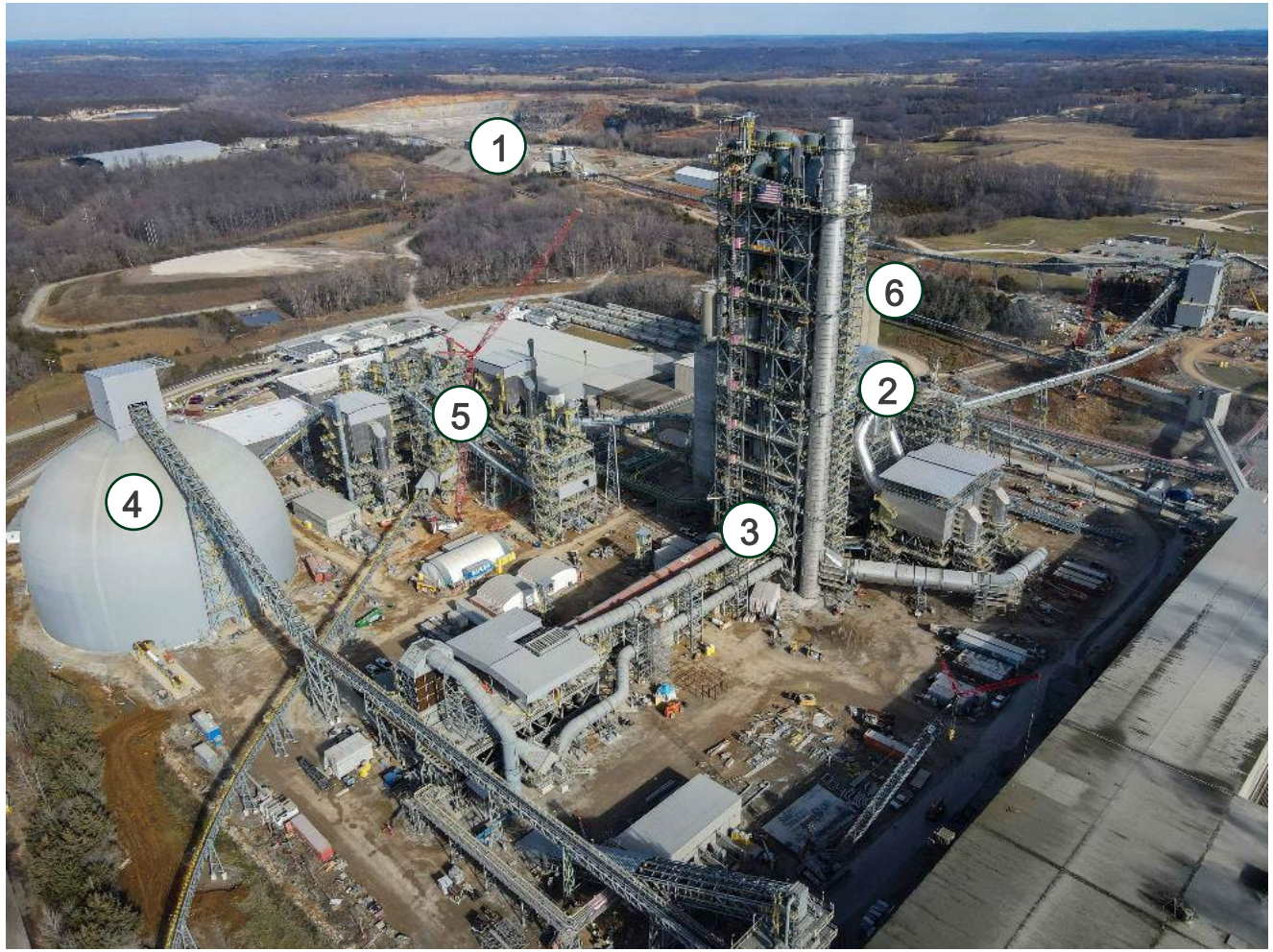
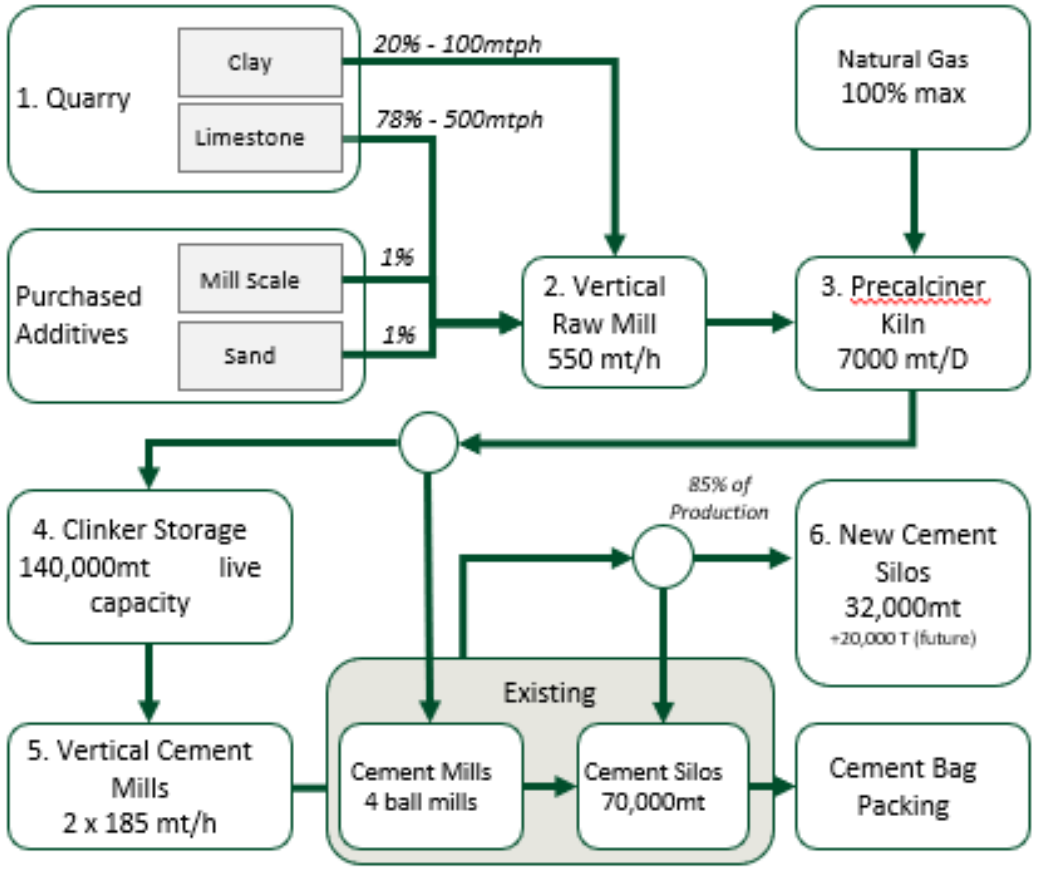
Mitchell K4 (Plant #4) today

Mitchell Plant Overview



Plant Flowchart



Mitchell Plant Modernization 2019 -2023

- New plant w/7,000 mt/day clinker production
- Converted from coal to natural gas
- Replaced 5 kilns in the Midwest with one modern more efficient kiln
- Resulting in -74 kg CO_2/tonne cement improvement
- Largest investment in company history

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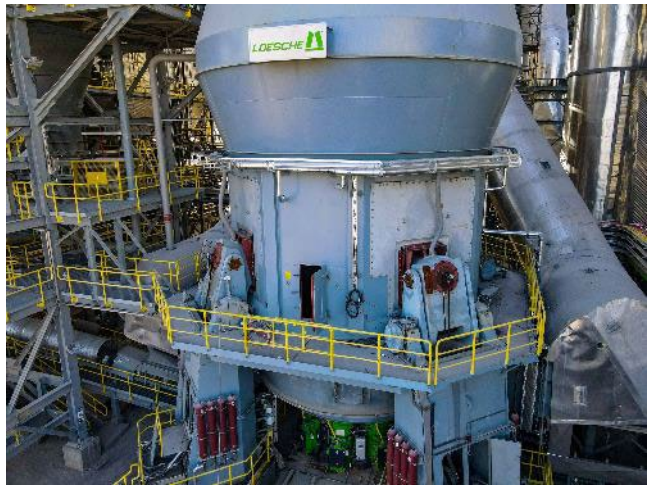
Mitchell Plant Overview

Key Production Areas



Raw Mill

Preheater/Precalciner

Kiln

Finish Mill

Baghouse

Loadout

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MAY 2021

A Changing Landscape

JULY 2021

A Changing Landscape

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DECEMBER 2021

A Changing Landscape

APRIL 2022

A Changing Landscape

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JULY 2022

A Changing Landscape

FALL 2023

A Changing Landscape

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Emission Limits and Controls

Air Quality Regulations

- Portland Cement MACT/NESHAP (40 CFR 63 Subpart LLL)
- NSPS for Portland Cement Plants (40 CFR 60 Subpart F)
- NSPS for Nonmetallic Mineral Processing Plants (40 CFR 60 Subpart OOO)
- PSD BACT: NOx, CO, VOC, GHG
- PSD Avoidance Limits for Particulate Matter

Emissions Limits (New Plant vs. Old Plant)

Pollutant	Old Limit	New Limit	Units
PM – filterable	0.07	0.02	Lb/ton clinker
Total Hydrocarbons (THC)	24	24	Ppmvd @ 7% O2
Volatile Organics (VOC)	0.30*	0.12	Lb/ton clinker
Hydrochloric Acid (HCl)	3	3	Ppmvd @ 7% O2
Sulfur Dioxide (SO2)	7.51*	0.4	Lb/ton clinker
Nitrogen Oxides (NOx)	11.14*	1.5	Lb/ton clinker
Mercury (Hg)	55	21	Lb/mmton clinker
Dioxins/Furans	0.2	0.2	Ng/dscm TEQ
Carbon Monoxide (CO)	1.67*	1.4	Lb/ton clinker
Greenhouse Gases (CO2e)	NA	0.97	Lb/ton clinker

Continuous Emissions Monitoring System (CEMS)

All are required except CO and CO2, and all require quarterly audits of calibration mechanisms and an annual recertification (RATA)

Pollutant
PM – filterable
Total Hydrocarbons (THC)
Sulfur Dioxide (SO2) Also as HCl surrogate
Nitrogen Oxides (NOx)
Mercury (Hg) Both STS and CEMS
BH Inlet Temp Surrogate for D/F
Carbon Monoxide (CO)
CO2

Stack Emissions Testing

Robust initial stack testing program for kiln, finish mills, nuisance dust collectors

Initial 3-hour Method 9 required on 77 dust collectors

Initial PM testing required on 20 dust collectors

Initial testing on Kiln 4 (in addition to CEMS pollutants):

- PM, PM10, PM2.5
- D/F
- THC, VOC
- HCl
- CO
- Be
- H2SO4
- Pb
- H2S

These are required to be repeated every 2.5 or 5 years

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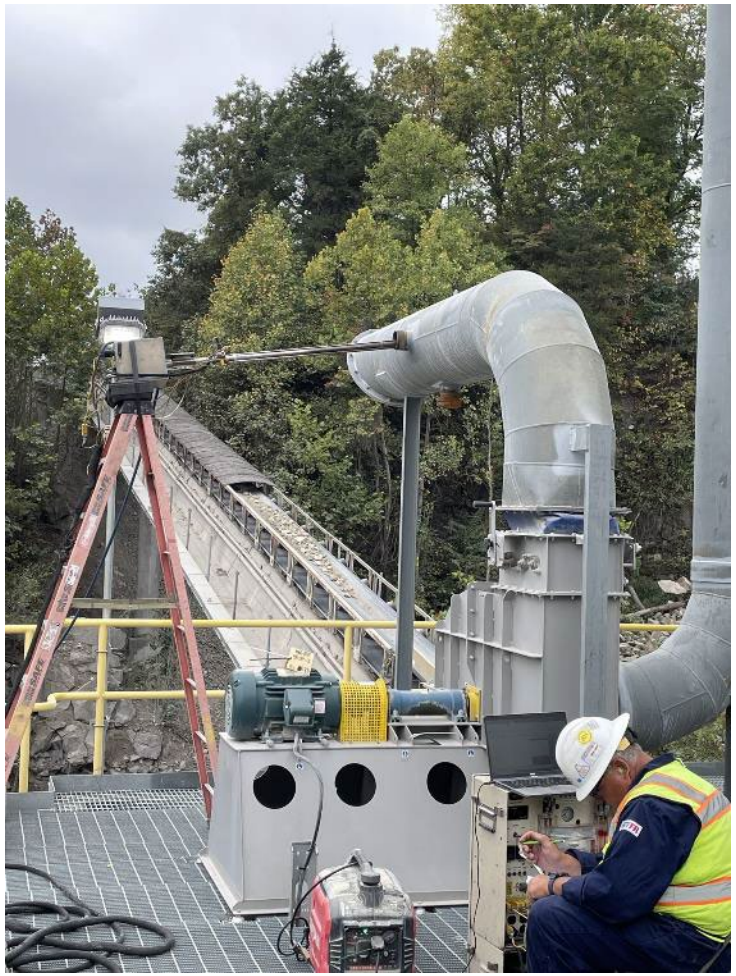
Stack Emissions Testing



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Selective Non-Catalytic Reduction (SNCR)

Injection of 19% aqueous ammonia solution to reduce NOx to 'normal' nitrogen and water in the flue gas

Injection occurs into calciner at 850-1050 C or 1550-2000 F which is optimal temperature range for this reaction

Injection occurs with compressed air and lances

Ideal molar ratio range for NH3 to NOx is 1 to 2

Typically see 30 – 60 % reduction rate in NOx emissions

Minimal NH3 slip when Raw Mill off

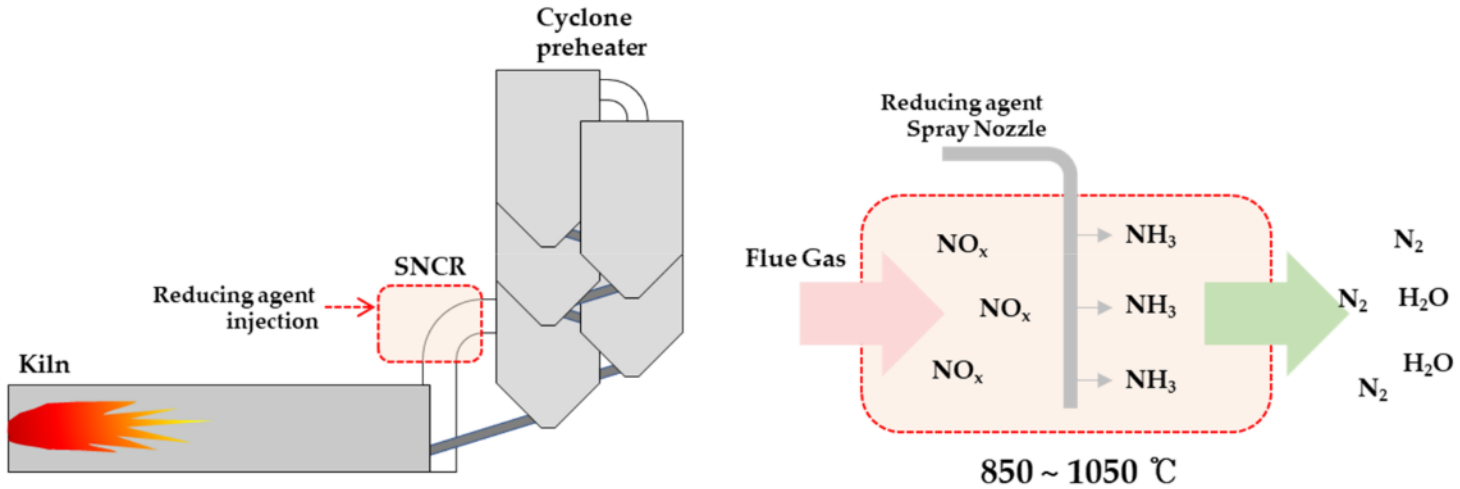

Image Source: Kim et al, 2022

Dry Sorbent Injection – Hydrated Lime

- SO2 emissions control system
- Hydrated lime (dry sorbent) introduced with kiln feed at the top of the preheater tower but follows the flue gas rather than traveling down the preheater tower with the kiln feed
- Hydrated lime reacts directly with the SO2 in the flue gas and the particles are captured downstream in the baghouse
- Hydrated lime ideal reaction temperature with SO2 below 350 F makes it ideally suited for our process

Activated Carbon

Mercury emissions control system

Porous and fine-grained with large internal surface area

Adsorbent for heavy metals such as mercury from flue gas

Adsorption is purely physical, not chemically bonded to AC material

Injected into flue gas prior to baghouse, mechanism continues as activated carbon particles coat bags

Particles removed by baghouse cleaning system

CKD Reuse

Cement kiln dust (CKD) the filterable particulate matter collected by the baghouse from the flue gas from a cement kiln

CKD has cementitious properties (as partially calcined and sintered material)

In the old kiln system, almost all CKD had to be removed from the system and landfilled (very small quantities were reused)

In the new kiln system, NO CKD is wasted:

- Most CKD is returned to kiln feed bin along with fresh kiln feed from raw mill and then reintroduced into the pyro system and made into clinker
- Some CKD is transferred out of the pyro system and into the cement mills (finish mills) where it is incorporated into the finished cement product
- Transferring the material out of the pyro system benefits stack emission concentrations, especially mercury

CKD may have other beneficial reuses, like as a soil stabilizer or mineral filler in asphalt pavement

Other Environmental Aspects at Mitchell

Cement kiln dust landfill (inactive but still open)

Eight NPDES outfalls discharging stormwater and non-contact cooling water, with monthly/ quarterly sampling

Treatment of some water high in pH with CO2 gas to neutralize and sediment treatment prior to discharge

Certified Wastewater Operator (A-SO) and Certified Landfill Operator

Wetlands permitting and mitigation regarding quarry expansion

Storage and use of coal combustion residuals (synthetic gypsum, bottom ash)

Four inactive USTs pulled in 2023

PCBs, asbestos-containing transite siding at old plant

15-Minute Break