



**CONVERTING INDUSTRIAL WASTE
INTO ALTERNATE RAW MATERIALS
THROUGH
BENEFICIAL REUSE AND RECYCLING**

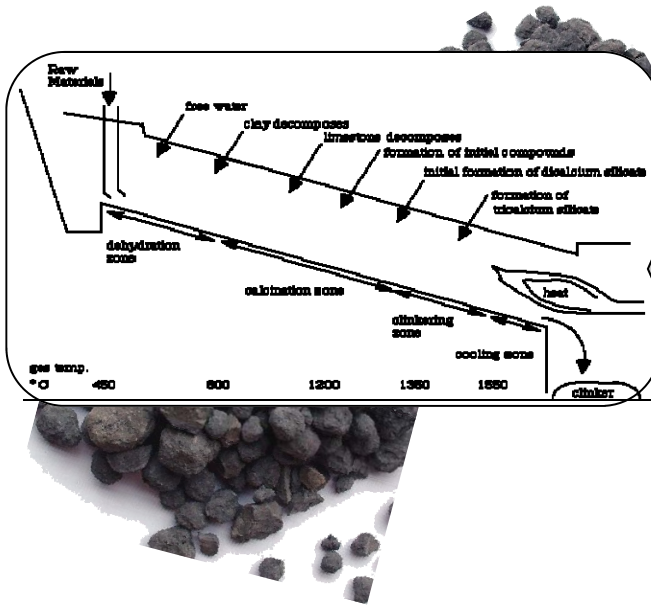
Cement Industry...

Cementitious concrete is the second most used material in the world next to water. As growth continues and improvement is characterized by development activities, cement consumption to create concrete will not diminish and the demand is not expected to go away.

The cement industry offers a unique opportunity to co-process waste material, thereby saving natural resources.

A modern kiln uses 6,000–8,000 tons of ingredients to produce 4,000–5,000 tons of clinker daily.

The pyroprocessing in cement making is the key component to KIS Beneficial Reuse Program. Pyroprocessing is *the path* of Total Destruction.

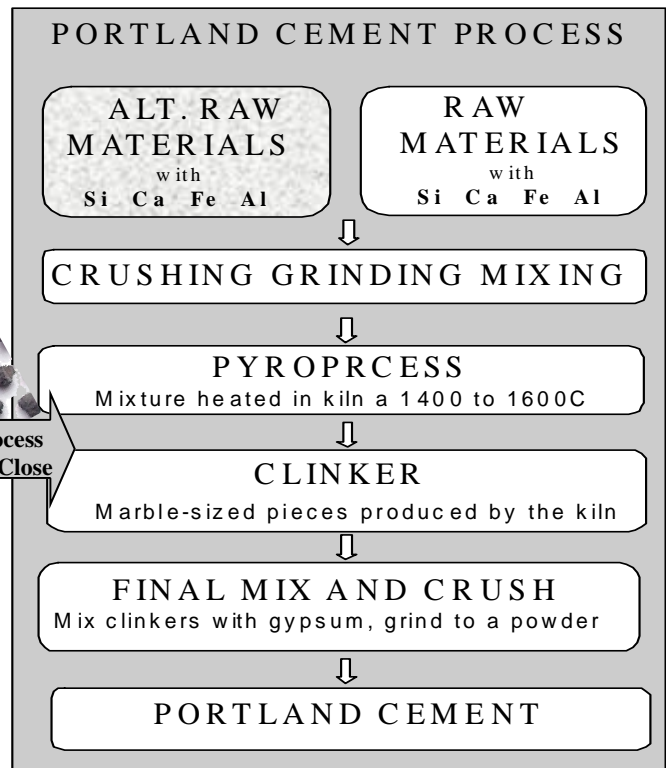


What is Portland Cement?

Portland Cement is a mixture of ingredients that are fused together through pyroprocessing of temperatures up to 1600 C and are chemically transformed into a *new material* called clinker. The clinker is ground to a fine powder that we know as cement.

Pyroprocessing is *the path* to Total Destruction for Alternate Material when used in the Portland Cement mix design.

Necessary ingredients for cement are typically limestone (Ca), sand (Si), iron ore (Fe), and bauxite clay (Al). A mix design of these elements are blended, milled and introduced into a kiln where the process takes shape.



Introducing Alternate Raw Materials To The Mix Design

Any materials that contain 1 or more components of (Ca) (Si) (Fe) (Al) may be a candidate for Beneficial Reuse as an Alternate Raw Material for the manufacture of Portland cement. (See Chart Below) The material is evaluated and if approved is incorporated into the mix design and blended with the other necessary raw ingredients and processed.

INDUSTRIAL WASTE IS CONVERTED INTO FEEDSTOCK RESULTING IN TOTAL DESTRUCTION!

EXAMPLES	Si	Al	Fe	Ca
ALTERNATE RAW MATERIAL	Sand	Bauxite	Iron Ore	Limestone
Cracking Catalyst	X	X		
Filter Cake	X	X	X	
Water Treatment Sludge	X	X		
Spent Abrasive Blast Media	X	X	X	
Blast Furnace Slag	X	X	X	
Foundry Sand	X		X	
Bottom Ash	X	X		
Lime				X
Fly Ash	X	X	X	
Refractory Brick	X	X		

KIS Alternate Raw Material Reuse Program

Beneficial reuse of industrial waste used for Alternate Raw Material is carefully profiled and complies with Local, State, and Federal Regulations. And, in most cases is considered to be Best Demonstrated Available Technology (BDAT) for disposal/recycling of Industrial Waste.

Converting Industrial Waste into Alternate Raw Material via the KIS Beneficial Reuse and Recycling Program *eliminates* costly landfill and generator liability.

Getting Started:

1. Use Worksheet to identify waste streams.
2. Contact Kleen Industrial Services to schedule an Alternate Raw Material Evaluation.
3. KIS Representative assists with the initial assessment, procures samples for testing and profiling.
4. Sample material is tested in accordance with State and Federal regulations.
5. Review Lab Analytical, classify and designate material. (Non Haz*, Cal Haz, and RCRA)
6. Match Designated Alternate Raw Material to Beneficial Reuse Recycler.
7. Organize Logistics through KIS Facility.
8. Prepare ALL Necessary Documents.
9. Maintain all records for minimum 10years.
10. Generator Liability Eliminated through Total Destruction of Waste!

KIS Beneficial Reuse Program Benefits

- Environmentally Responsible
- Reduce Landfilling
- Reduce Green House Gas
- Conserve Natural Resources
- REDUCE, REUSE, RECYCLE!**

Generator's Benefits

- Reduce Disposal Costs
- Reduce Landfilling
- Possible Recycling Credits
- TOTAL DESTRUCTION OF WASTE ELIMINATES GENERATOR LIABILITY**



Beneficial Reuse/Recycling through the manufacture of Portland Cement is the optimum way to covert waste into feedstock.

A WIN—WIN!

Regulatory Structure

In addition to Federal requirements, California has additional specifications for industrial wastes and requirements for recycling that other states do not have to comply with. The following provides information on an alternate raw material program according to State hazardous waste regulations and Title 22* of the California Code of Regulations (CCR), and statutory requirements for recycling set forth in the California Health and Safety Code and U.S. EPA guidelines.

For spent industrial wastes, the “hazardous waste” determination is usually made based on whether or not the material satisfies the toxicity criteria. Under RCRA, toxicity is determined based on the Toxicity Characteristic Leaching Procedure (TCLP) test for soluble metals, whereas in California, toxicity is based on both total and soluble concentrations of metals. California’s toxicity testing requirements are contained in Title 22 CCR Section 66261. The hazardous waste vs. excluded recyclable material determination and other project information are used to determine how an industrial waste can be managed.

California allows for recycling of Non-RCRA regulated hazardous waste without permits or manifests if the conditions in HSC 25143.2 are complied with. The chemical composition of spent FCC cat fines for instance is ideal for the manufacture of Portland cement clinker. Beneficial reuse of spent FCC cat fine wastes (which meet the conditions of an excluded recyclable material under HSC 25143.2) in Portland cement is the most common recycling option for this material. Some of the recycling conditions contained in HSC 25143.2 include:

- Storage requirements (preventing wind dispersal, storm water run-on and runoff);
- Handling requirements, (i.e., labeling);
- Reporting requirements, such as hazardous materials business plans and notifications to the lead enforcement agency;
- Final product verifications of quality standards; and
- Testing to demonstrate a binding of hazardous constituents in the manufacturing process (HSC 25143.2 and Title 22 CCR 66261.21).

* California Only

WHO WE ARE

Kleen Industrial Services (KIS) operates Beneficial Reuse/Recycling programs under the authorities granted by the EPA in their RCRA Regulations, and adaptations in California DTSC and DHS regulations. The goal at KIS is to continue providing solutions for Generators of waste and emphasize the beneficial reuse of materials, meeting EPA's objectives for resource recovery and contributing to the reduction of greenhouse gases and other criteria pollutants.

The KIS Beneficial Reuse Program results reduce the reliance on naturally occurring raw materials and fuels for manufacturing, while providing a safe, effective and compliant use of Alternate Raw Materials for Beneficial Re-use.

WHAT WE DO

- Innovator in Beneficial Reuse/Recycling
- Five Reuse/Recycling locations on the West Coast
- Reuse/Recycling partners Across North America
- 20 Years Industrial Waste Recycling
- 100's of Thousands of Tons Diverted From Landfill to Beneficial Reuse
- Expert Regulatory Knowledge and Compliance
- Complete Record Keeping
- Demonstrated Logistic and Infrastructure for Transportation and Management of Waste.



MEET SOME OF OUR CUSTOMERS

Shell	USAF
Valero	BAE Systems
Texaco	Army Corps of Engineers
US Navy	Northrop Grumman

Alternate Raw Material Reuse Program for
Manufacture of PORTLAND CEMENT



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Candidates for Alternate Raw Material: Any Materials containing 1 or more of: Si Al Fe Ca		
1. WASTE DESCRIPTION	2. WASTE DESCRIPTION	3. WASTE DESCRIPTION
CONTENT <input type="checkbox"/> Si <input type="checkbox"/> Al <input type="checkbox"/> Fe <input type="checkbox"/> Ca	CONTENT <input type="checkbox"/> Si <input type="checkbox"/> Al <input type="checkbox"/> Fe <input type="checkbox"/> Ca	CONTENT <input type="checkbox"/> Si <input type="checkbox"/> Al <input type="checkbox"/> Fe <input type="checkbox"/> Ca
DESIGNATION <input type="checkbox"/> Non Haz <input type="checkbox"/> Cal Haz <input type="checkbox"/> RCRA	DESIGNATION <input type="checkbox"/> Non Haz <input type="checkbox"/> Cal Haz <input type="checkbox"/> RCRA	DESIGNATION <input type="checkbox"/> Non Haz <input type="checkbox"/> Cal Haz <input type="checkbox"/> RCRA
TRANSPORT <input type="checkbox"/> Bins <input type="checkbox"/> Bags <input type="checkbox"/> Drums <input type="checkbox"/> Bulk <input type="checkbox"/> Other	TRANSPORT <input type="checkbox"/> Bins <input type="checkbox"/> Bags <input type="checkbox"/> Drums <input type="checkbox"/> Bulk <input type="checkbox"/> Other	TRANSPORT <input type="checkbox"/> Bins <input type="checkbox"/> Bags <input type="checkbox"/> Drums <input type="checkbox"/> Bulk <input type="checkbox"/> Other
TYPE OF WASTE <input type="checkbox"/> Wet <input type="checkbox"/> Dry <input type="checkbox"/> Slurry <input type="checkbox"/> Dusty <input type="checkbox"/> Yes <input type="checkbox"/> No	TYPE OF WASTE <input type="checkbox"/> Wet <input type="checkbox"/> Dry <input type="checkbox"/> Slurry <input type="checkbox"/> Dusty <input type="checkbox"/> Yes <input type="checkbox"/> No	TYPE OF WASTE <input type="checkbox"/> Wet <input type="checkbox"/> Dry <input type="checkbox"/> Slurry <input type="checkbox"/> Dusty <input type="checkbox"/> Yes <input type="checkbox"/> No
DISPOSAL METHOD <input type="checkbox"/> Land Fill <input type="checkbox"/> Recycle <input type="checkbox"/> Other	DISPOSAL METHOD <input type="checkbox"/> Land Fill <input type="checkbox"/> Recycle <input type="checkbox"/> Other	DISPOSAL METHOD <input type="checkbox"/> Land Fill <input type="checkbox"/> Recycle <input type="checkbox"/> Other
DISPOSAL LOCATION NAME	DISPOSAL LOCATION NAME	DISPOSAL LOCATION NAME
DISPOSAL COST Transportation & Tax Included \$	DISPOSAL COST Transportation & Tax Included \$	DISPOSAL COST Transportation & Tax Included \$
COMMENTS	COMMENTS	COMMENTS