

Precast Concrete Tanks – How Sustainable Are They?

**Southwest Onsite Wastewater Conference 2016
February 3rd, 2016**

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Contents

- **Decentralized Wastewater Treatment**
- **Precast Tank Sustainability**
 - Impacts
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- **What NPCA and Manufacturers Are Doing Now to Enhance Sustainability**

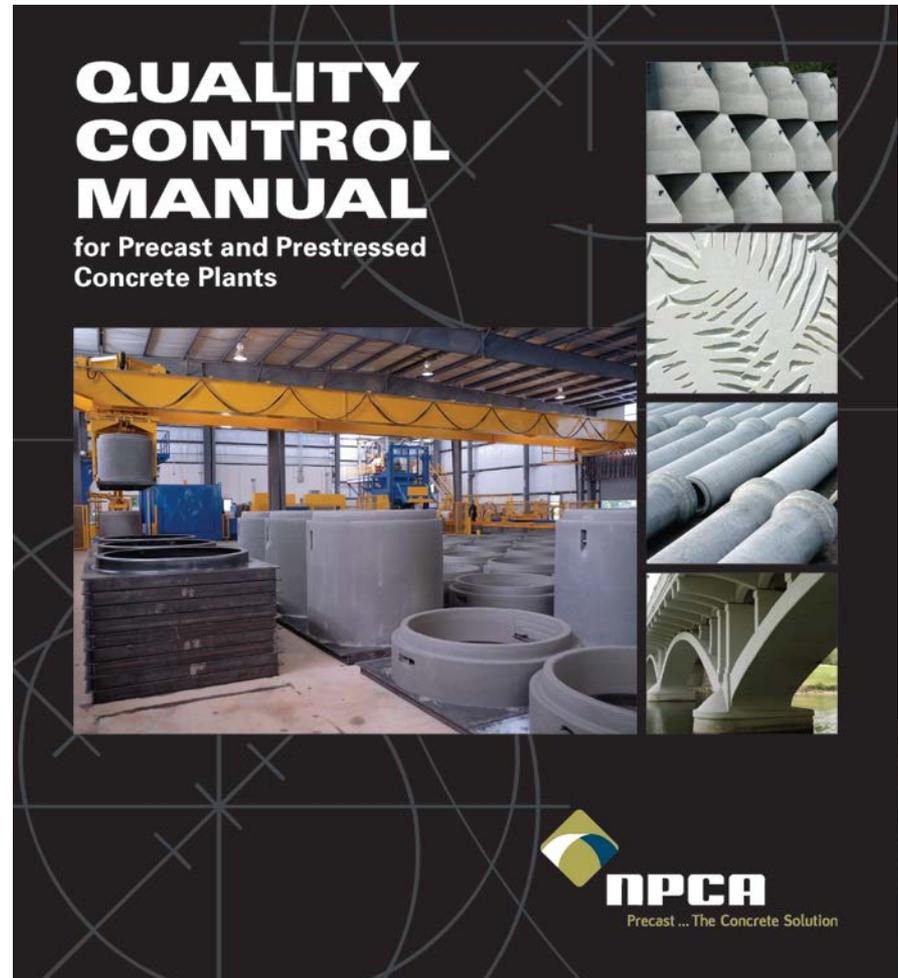
About NPCA

- International trade association
- Established in 1965
- Dedicated to expanding the use of quality concrete products

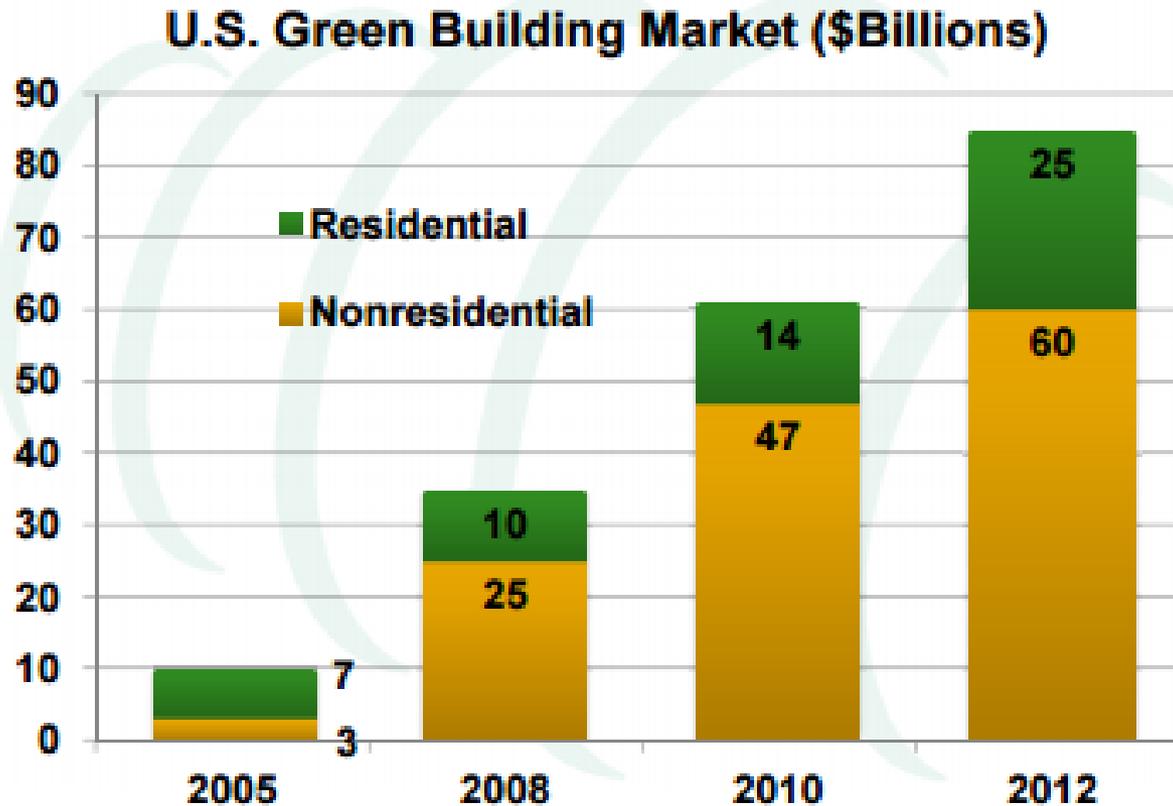


About NPCA

- The Precast Show
- Educational seminars
- Industry publications
- Technical service
- Quality Control Program
- Committees



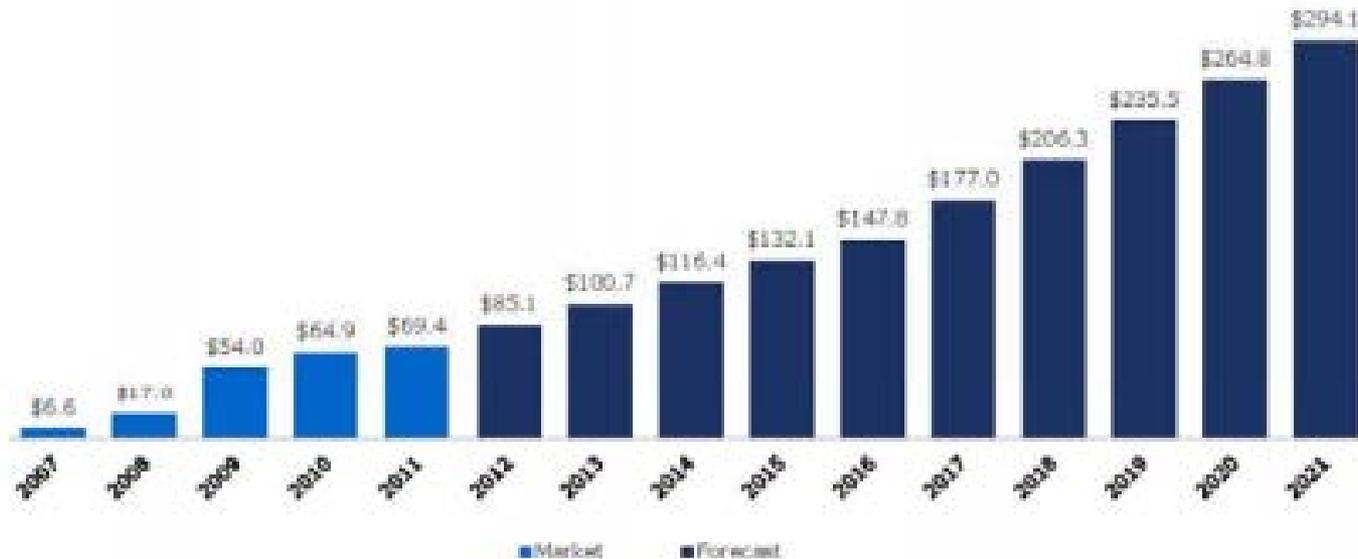
Opportunities for growth



Source: McGraw-Hill Green Outlook 2013

International Trend

Global Market for Green Construction, 2007-2011,
and Forecast, 2012-2021
(\$ Billion)



Source: SBI Research, Green Building Materials and Construction, 3rd Edition

Source: SBI Research, Green Building Materials and Construction, 3rd Edition

What does it mean to be sustainable?



© Getty Images

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What is Sustainability?

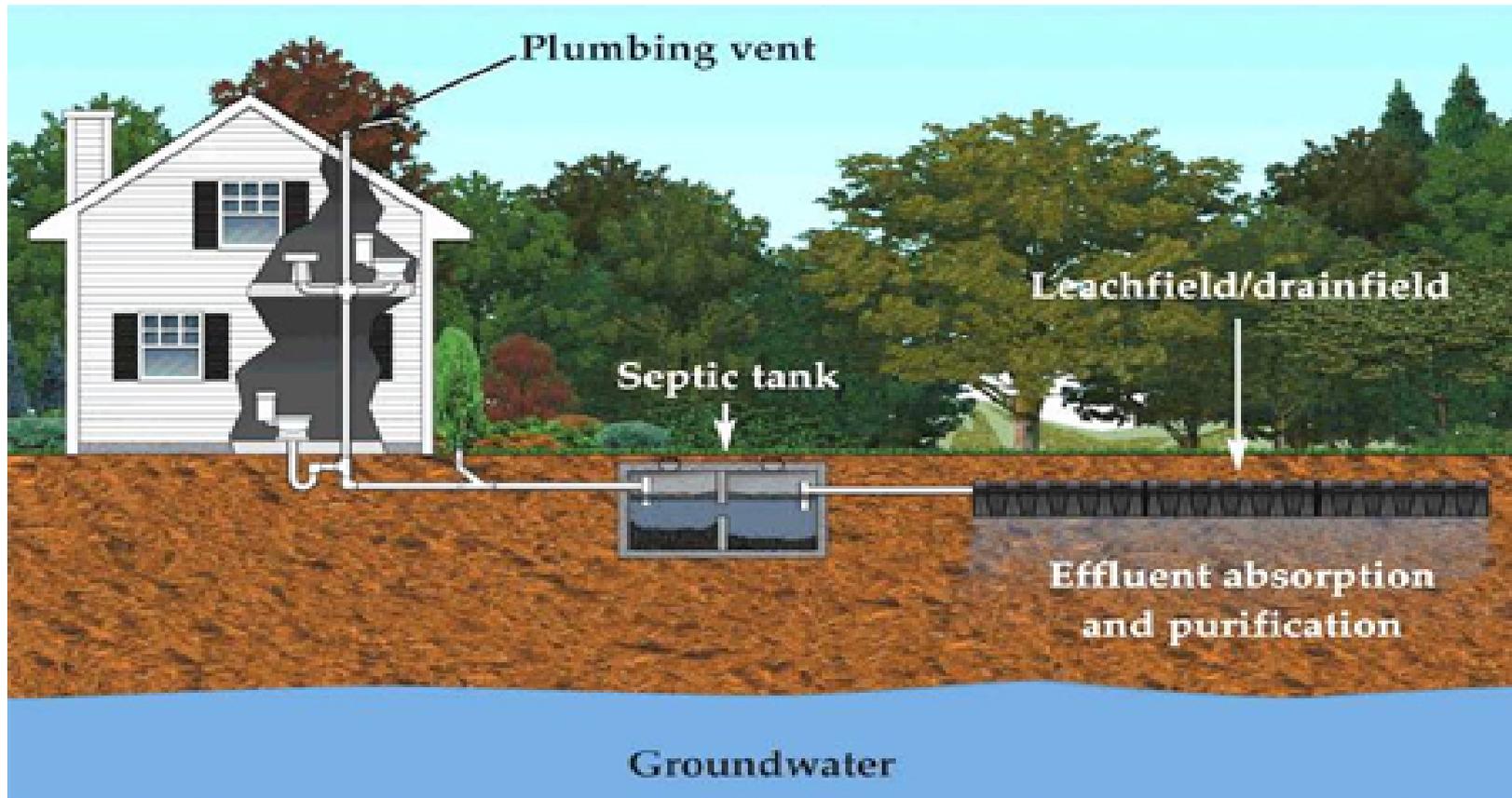
“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Brundtland Report

Triple Bottom Line



IS THIS SUSTAINABLE?



Decentralized Treatment

- increases water quality and availability,
- *uses energy and land wisely,*
- *responds to growth while preserving green space, and*
- *uses the natural treatment properties of the soil.*

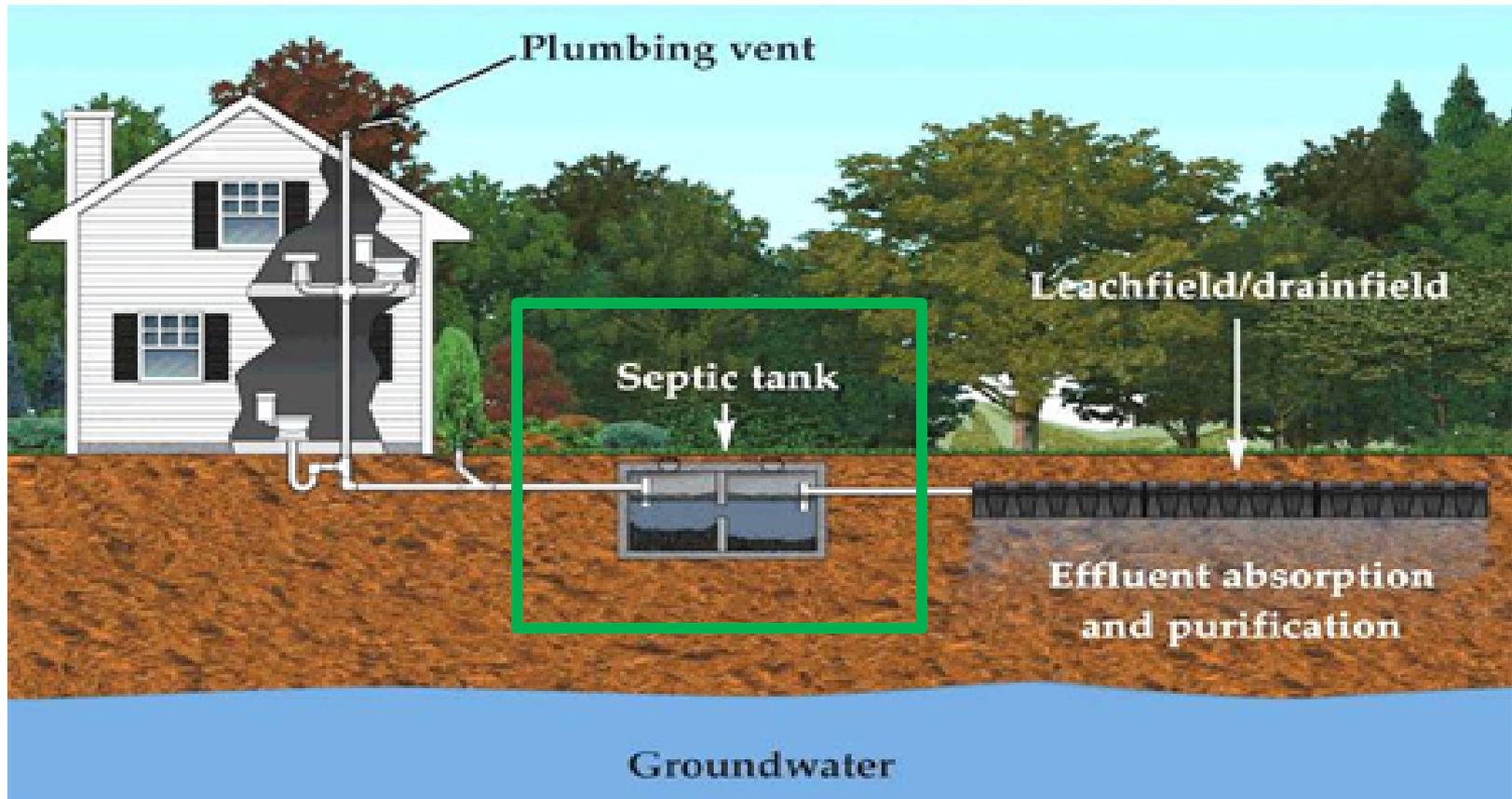
EPA Decentralized Wastewater Memorandum of Understanding

Returning to the Original Infrastructure





IS THIS SUSTAINABLE? YES!!



The Precast Septic Tank



Quick Look at Precast

Concrete



Green Elephant in the Room



IPCH

Precast ... The Concrete Solution

Sustainable Practices - Cement

Largest impact

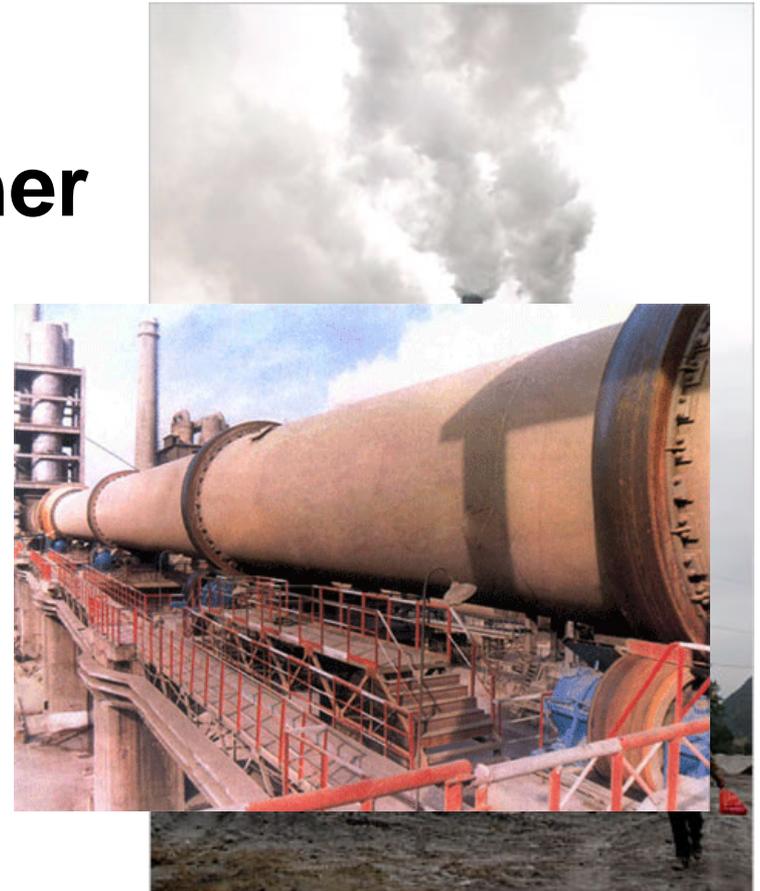
Iron and Steel Higher

CO2 emissions

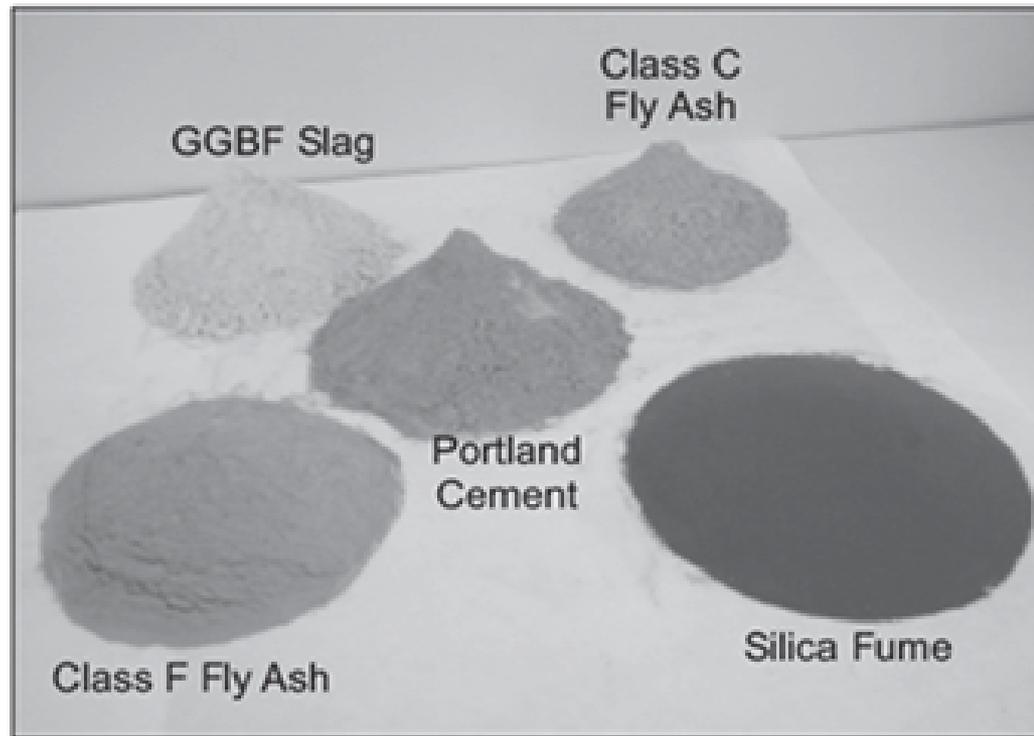
Combustion (40%)

Calcination (60%)

Consume Electricity



Supplementary Cementitious Materials



Supplementary Cementitious Materias

**All this material could
go to the landfill**



OR

**Used as a partial cement
replacement**



Water Use

**Major Sources:
Batch Water
Process Water
Coring**



Aggregates



Reinforcement



Manufacturing / Delivery / Installation Energy Use

plant operating expenses
7.5% of total production
costs.

\$200 million on energy

48% fuel

52% electricity





Life Cycle Assessment

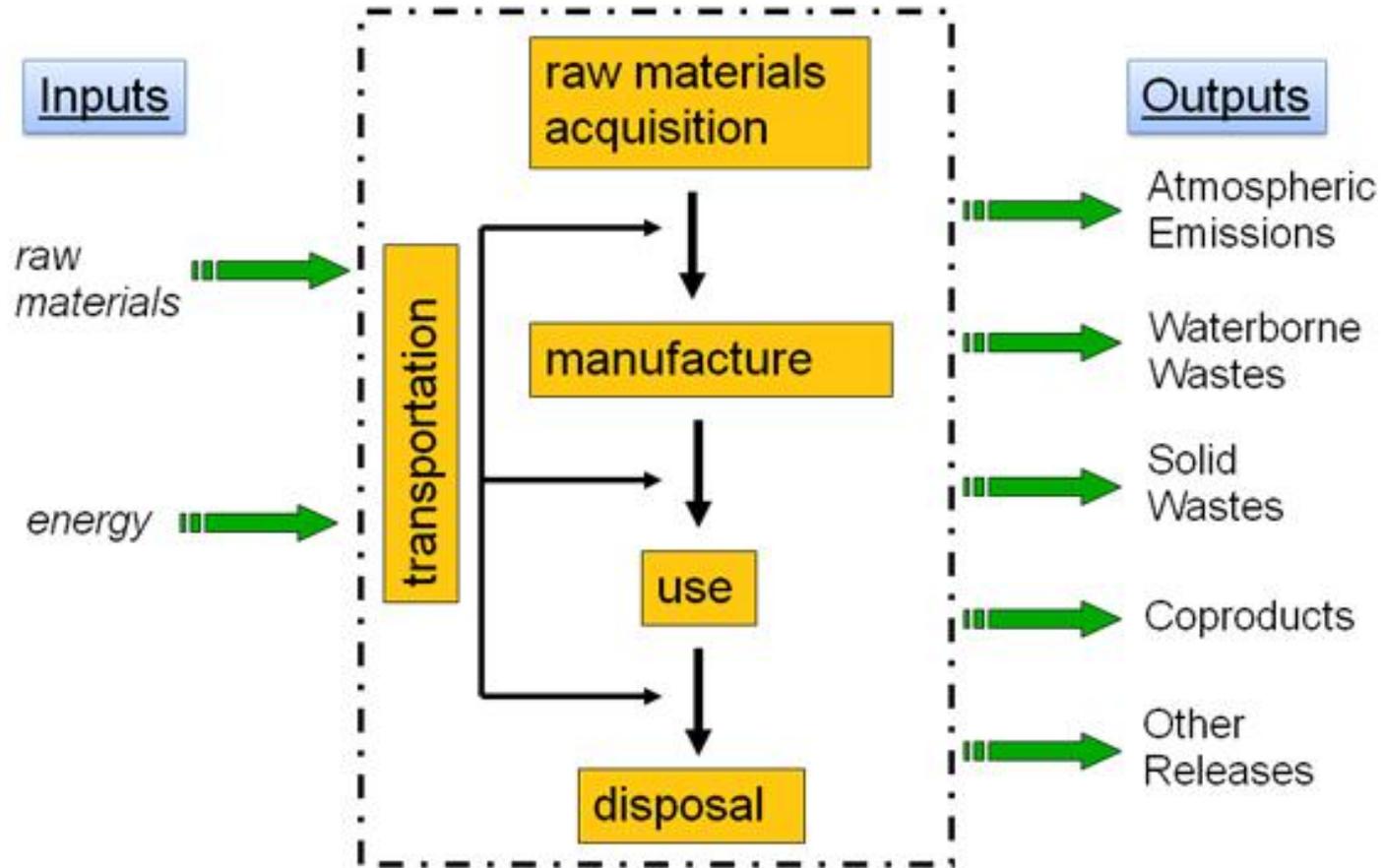


Figure 2. Inputs and outputs for a life cycle assessment.

Precast Concrete Tanks Sustainable Attributes

Resource Efficiency

Made of Abundant Materials

Recycled Content

Precast Concrete Tanks Sustainable Attributes

Designed and manufactured to withstand
loading and environmental conditions

Extreme Loading Conditions

Engineered for Intended Use



DURABILITY



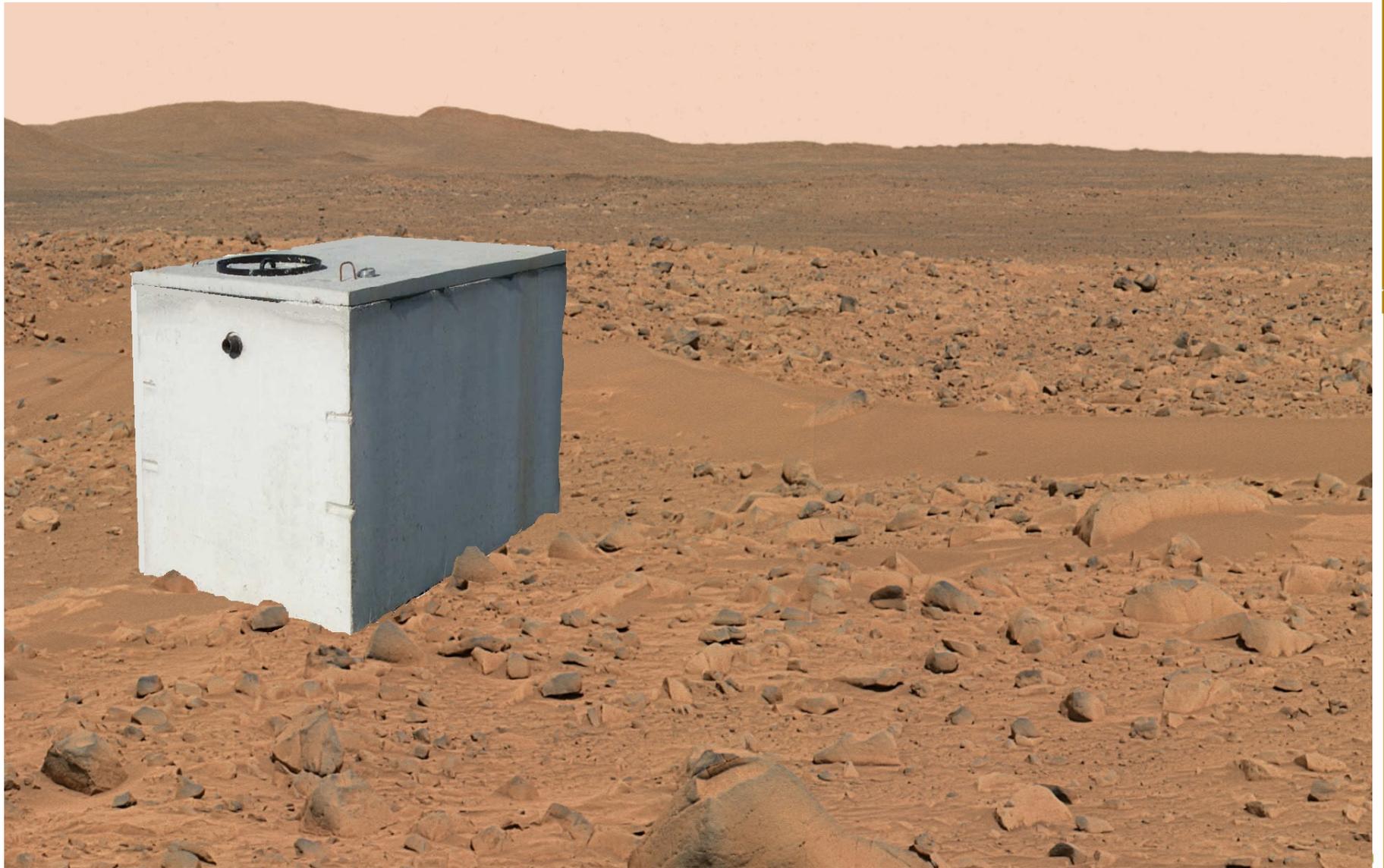
Precast Concrete Tanks Sustainable Attributes

Available Locally

Lower Transportation Impacts

Supports Local Economy

Unless...



Resiliency

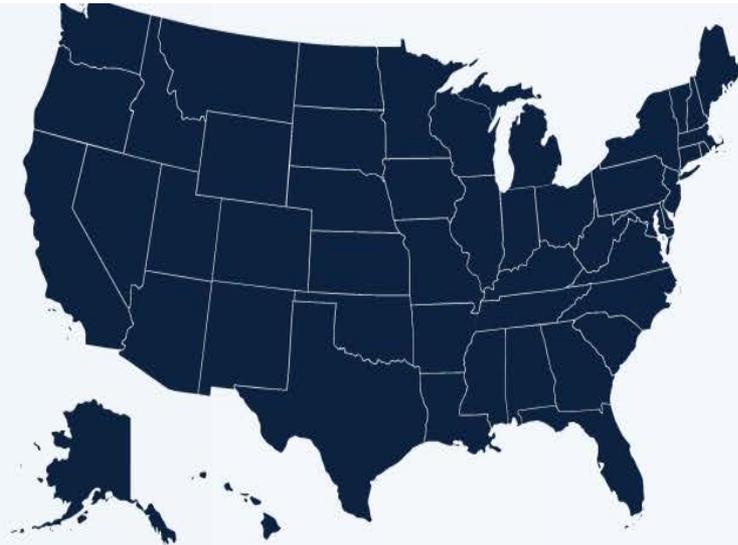


Resilience

The ability to adapt to changing conditions and prepare for, withstand, and rapidly recover from disruption.

***-Department of Homeland Security,
Risk Lexicon 2010***

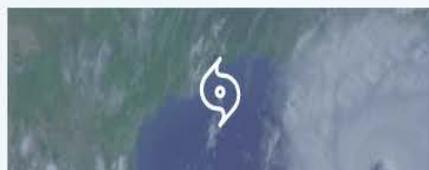
Disastersafety.org



Discover the risks you face.

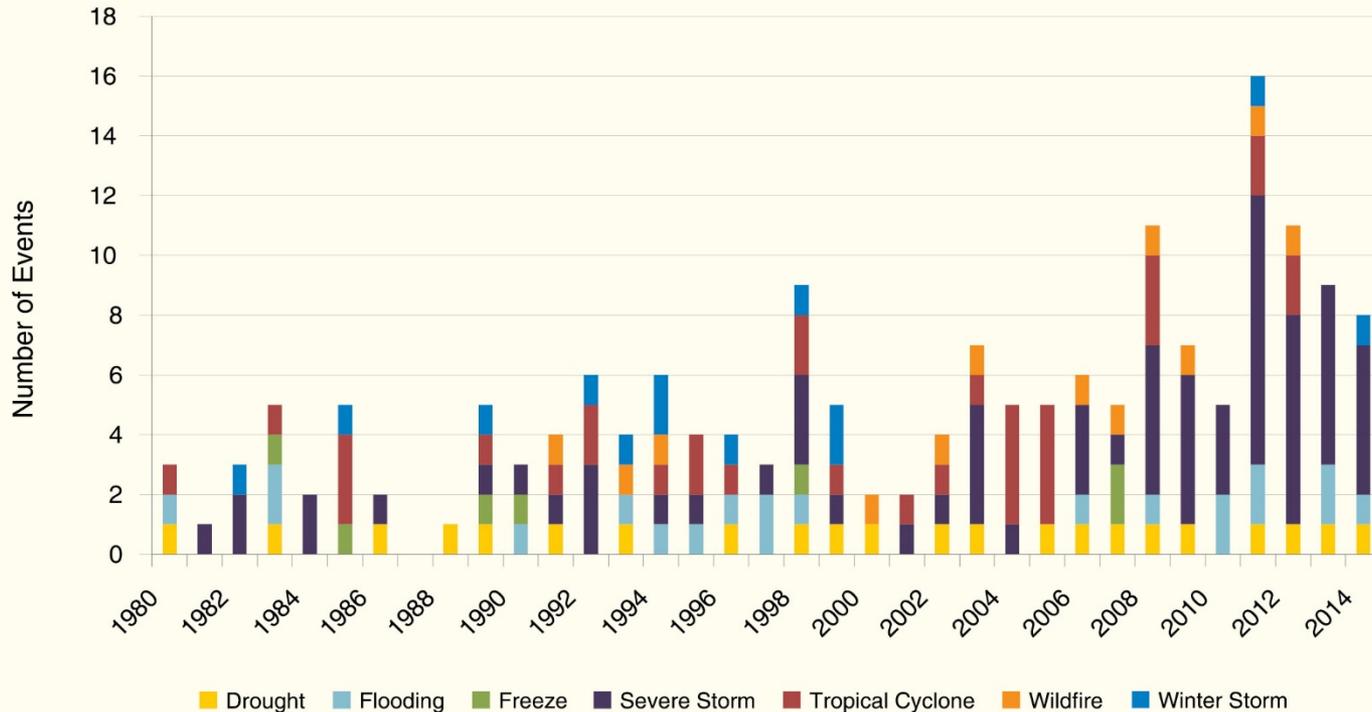
Click your state on the map
or enter your Zip Code below.

Results highlighted below ↓



Disaster Costs

Figure 2. Billion-Dollar Disaster Events by Type, 1980–2014



Recreated with permission from the National Climatic Data Center.

Source: National Climatic Data Center. "Billion-Dollar Weather and Climate Disasters: Time Series" (www.ncdc.noaa.gov/billions/time-series).

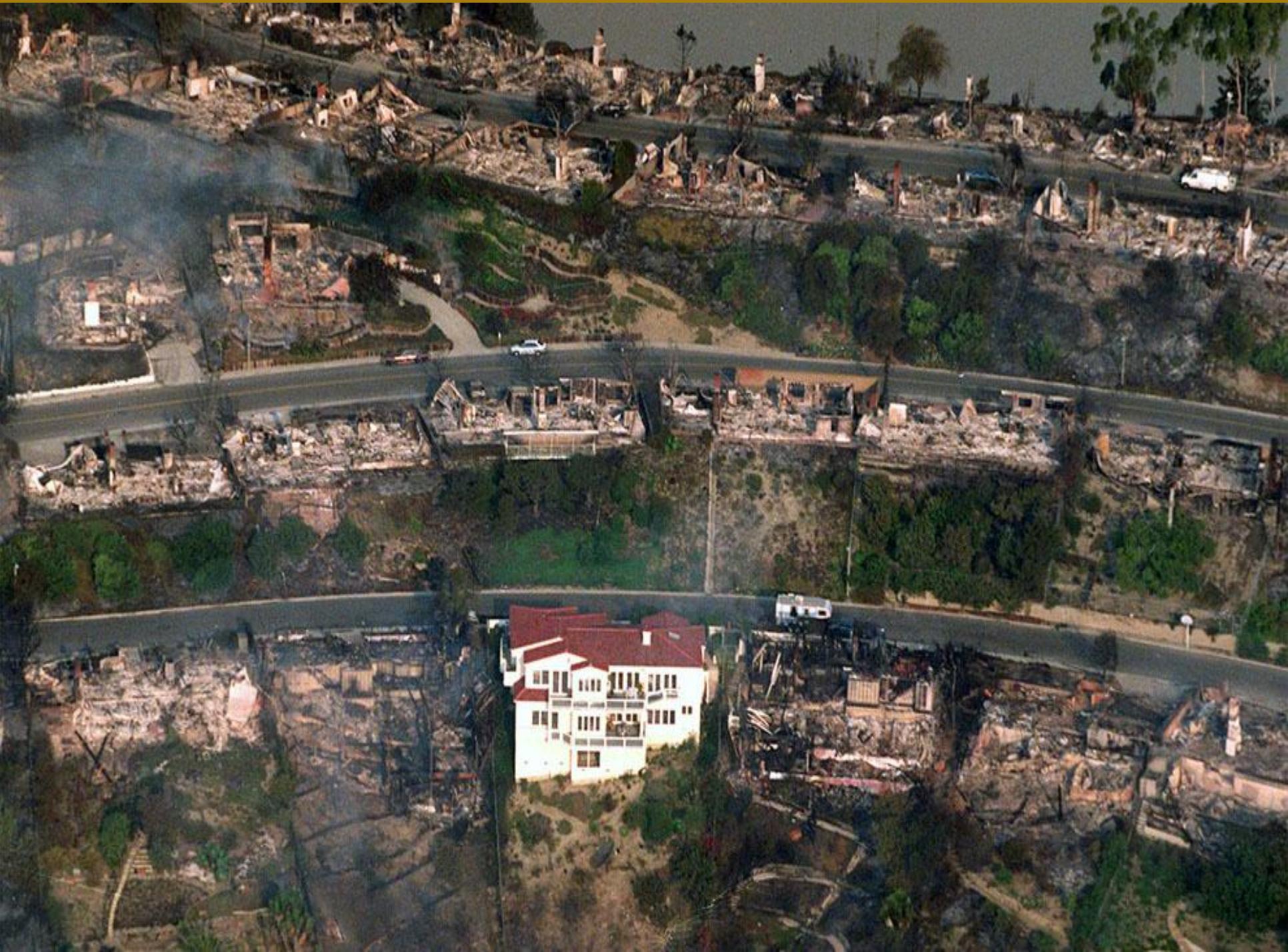
Accessed 6 February 2015.

Disaster types

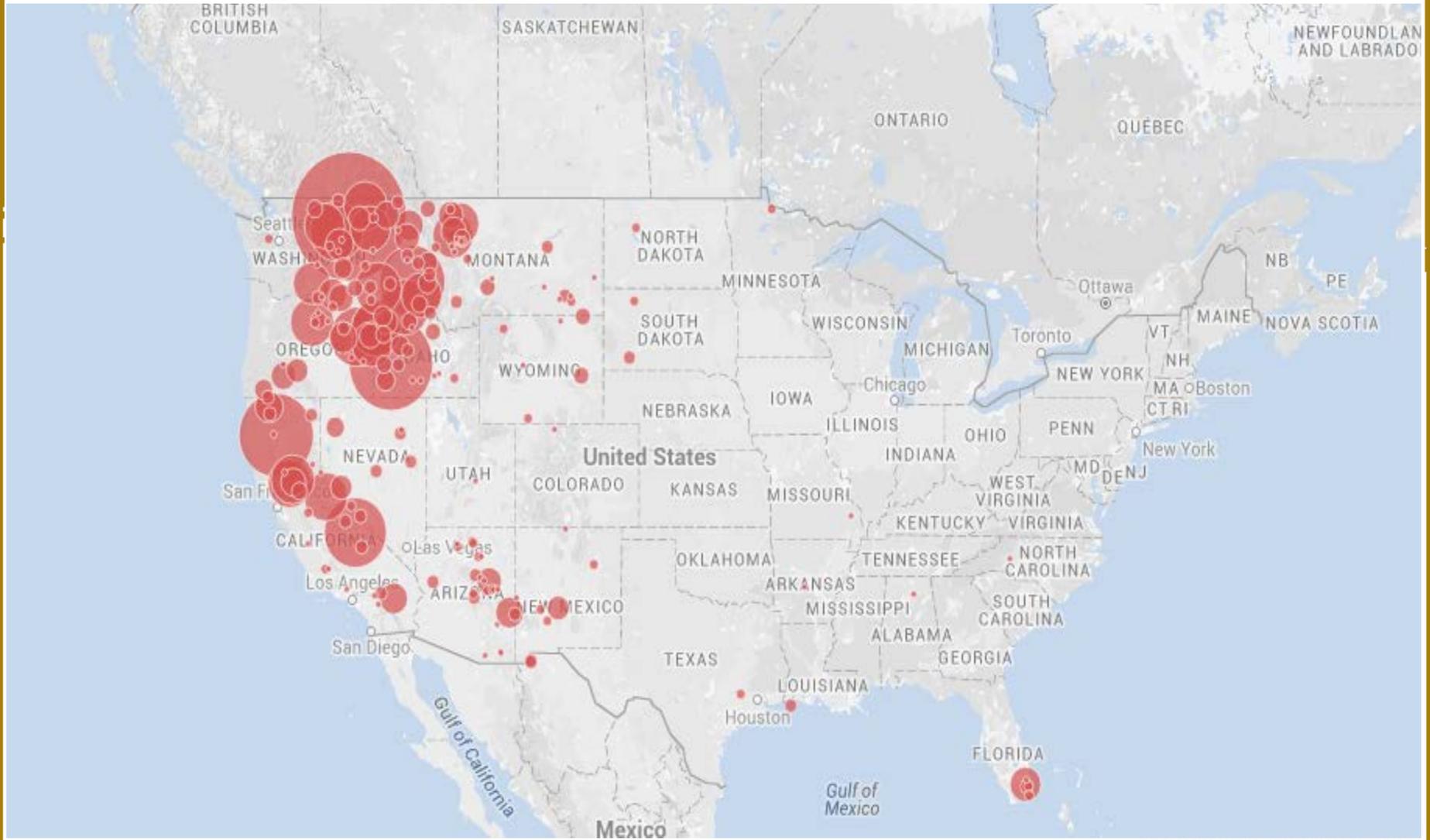
- **Wildfires**
- **Flooding**
- **Earthquakes**

WILDFIRES



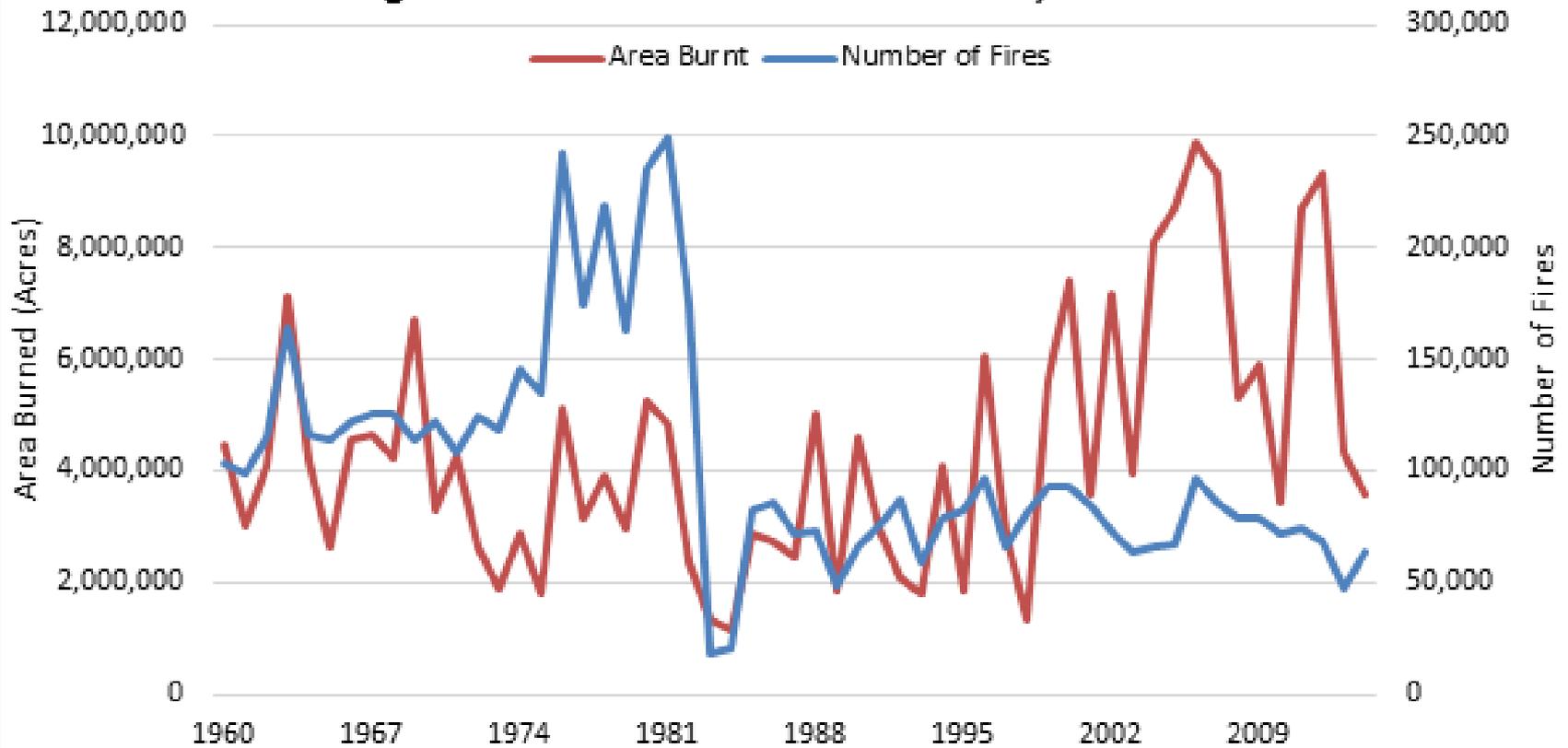


US Wildfires in 2015



Wildfires

Figure 2: Wildfires in the United States, 1960-2014



National Interagency Fire Center

Non-Combustible

- **Inorganic**
- **History of good performance in fire**
- **Low thermal conductivity**
- **Maintains cool inner core during fires**



Fire Resistance



Table 1 Minimum thickness for cast in place floor and roof slabs, in.

Concrete type	Fire resistance rating				
	1 hr.	1.5 hr.	2 hr.	3 hr	4 hr.
Siliceous aggregate	3.5	4.3	5.0	6.2	7.0
Carbonate aggregate	3.2	4.0	4.6	5.7	6.6
Sand-lightweight	2.7	3.3	3.8	4.6	5.4
Lightweight	2.5	3.1	3.6	4.4	5.1

FLOODS

An aerial photograph showing a residential neighborhood completely inundated with floodwater. The houses, which are mostly two-story brick and siding structures, are partially submerged, with only their roofs and upper floors visible. The water is a deep, dark blue-grey color. In the background, a city skyline with several tall skyscrapers is visible under a clear sky. The overall scene depicts the devastating impact of flooding on urban and suburban areas.

©National Geographic Stock / Tyrone Turner / WWF

Partnership for Environment and Disaster Risk Reduction – PEDRR

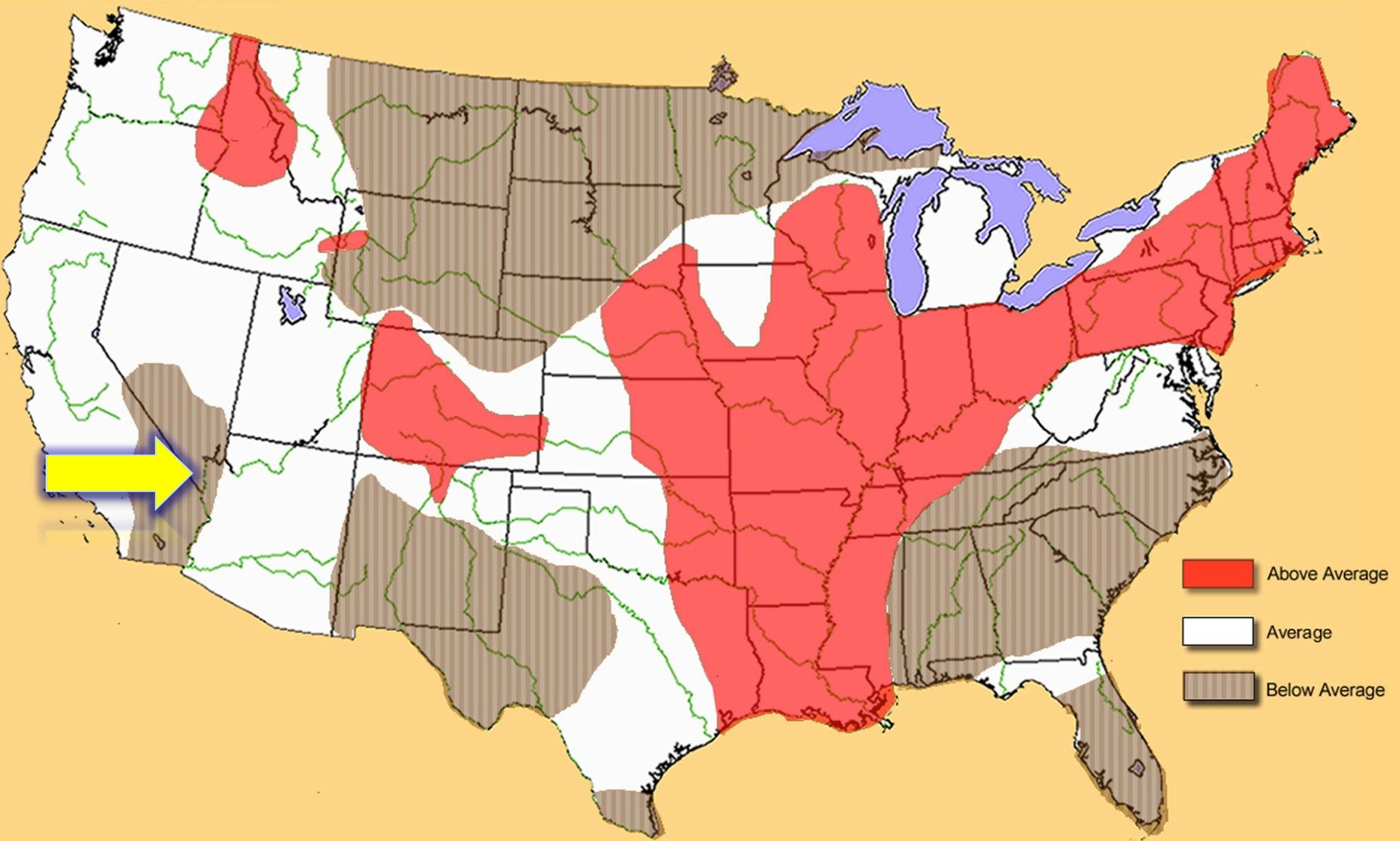


New Orleans – August 2005



Flood Risk

(as of March 14, 2008)



Buoyancy





Greensburg, KS – May
2007





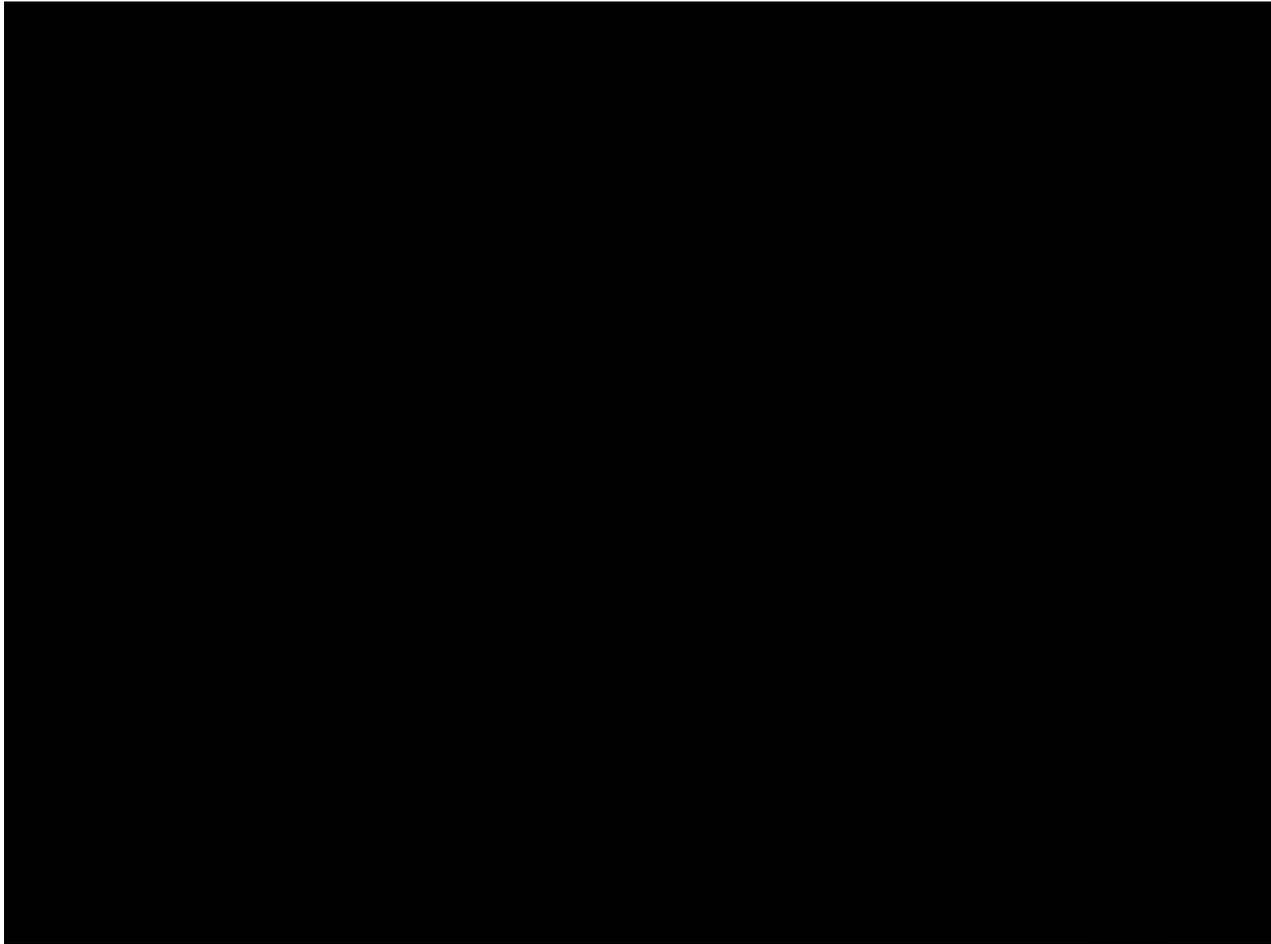
**FORTIFIED for Safer Living[®]
Homes
Pre-Hurricane Ike
Bolivar Peninsula, Texas**



**FORTIFIED for Safer Living[®]
Homes
Post-Hurricane Ike
Bolivar Peninsula, Texas**



Precast used to protect families



Resilient Attributes

Inherent with Precast Concrete

- **Versatile and Customized Design Options**
- **Strength and Stiffness**
- **Non-combustible**
- **Water Resistance**
- **Durability**

What are Manufacturers Doing?

- **Quality Control**
- **Enhancing Durability**
- **Education and Training**
- **Lowering Fossil Fuel Use**
- **Using More Recycled Content**
- **Reducing Waste**

Shea Concrete Products Amesbury, MA



What is NPCA Doing?

- Studying
- Even More
- LCA/PC
- Education
- Awarding

The image shows the cover of an Environmental Product Declaration (EPD) report for Precast Concrete. The title is "Environmental Product Declaration (EPD) for Precast Concrete" and it is issued by CPCI, NPCA, and PCI. The report is based on ISO 14025 and ISO 21930 standards. The cover features three main images: a large precast concrete pipe being installed in a trench, a worker handling a precast concrete block, and a stack of precast concrete pipes. The text "Underground Precast Concrete Industry Wide EPD" is prominently displayed. The ASTM International logo is at the bottom.

Raw Material/
Energy Extraction

Preliminary
Production

Manufacture of
End Products

Environmental Product Declaration (EPD) for Precast Concrete

CPCI
NPCA
PCI

According to ISO 14025 and ISO 21930

Underground
Precast Concrete
Industry Wide EPD

ASTM
ASTM INTERNATIONAL

ability

Adopters



Summary

- **Decentralized Wastewater Treatment is Sustainable!**
- **Precast Tank Sustainability**
 - Impacts
 - Attributes
 - Resiliency
- **What Manufacturers Are Doing**
- **What NPCA is Doing**

Questions?

- If you have any questions about this presentation or anything about precast concrete onsite wastewater structures, please contact:

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THANK YOU!



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