Coke Drum Support Structure Repairs

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Bottom of the Barrel - May 2001 -
Deterioration Mechanisms

- Elevated Temperatures
- Mass Concrete Shrinkage
- Dynamic Loadings
- Fire Damage
- Concrete Structure Repair
Embedded Metal Corrosion

**Cause: Carbonation**

- Carbon dioxide
- Moisture
- pH 13
- pH decreases to pH 10

**Thermal Effects**

**Fire Exposure**

- Aggregate swells
- $\text{H}_2\text{O}$ to steam
- Chemical change
Deterioration in Octagons

Insulated Coke Drum
800°F

CO₂ & CO

308°F

Octagon Face Temperatures

273°F

160°F
Concrete Repair is a Process!

**Cause & Effect**
- Defect, damage or deterioration
  - Leakage
  - Settlement
  - Deflection
  - Wear
  - Spall
  - Disintegration
  - Crack

**Repair required?**
- Safety
- Structural catastrophe
- Use disfunction
- Leakage
- Effects on environment
- Aesthetics
- Preventive maintenance

**Condition Survey**
- Evaluate
- Quantify

**Repair Analysis**
- Owner Criteria
  - Urgency
  - Cost
  - Expectations
  - Useful life
  - Aesthetics
- Engineering Criteria
  - Structural req.
  - Effect
  - Constructability
  - Environment
  - Safety

**Repair Strategy**
- Methods
  - Surface repair
  - Stabilization
  - Strengthening
  - Waterproofing
  - Protection
- Techniques
- Materials

**Repair**