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VC

MORE PRODUCTION - LESS RISK!



Coking

**Bob Hall** 

bhall@structural.net

23, 2010

Texas, US

847.429.1648

# Key Take Aways



# Safety As A Core Value

#### Safety First and Always

- Continuous employee training on everyday safe work practices and specific client safety requirements.
- Corporate safety culture includes formalized training emphasizing proper safety behavior; a safe, drug-free, and productive work environment. Safety execution plans generated for every project.
- Employees attend routine safety meetings and training sessions.
- Contractors should provide training in hazard recognition and safe work practices.





# Repairing A Coker Unit Is A Process



# Structure Elements Of Interest Within Coking Units



# Deterioration & Damage Mechanisms In Cover Un

- Elevated temperatures
- Mass concrete shrinkage
- Dynamic loading
- Impact damage
- Fire damage
- Corrosion-induced deterioration
- Failed patch repairs
- Bucket 5mpact
- Dynamic, soil & hydrostatic loads



#### **Octagon Wall**

## **Temperature Readings**



Thermocouple Thermometer Readings Measured Temperatures On Octagon Faces

# **Microcracking of Cover Concrete**



## **Fire Damage**

Aggregate
 swells

♦ H<sub>2</sub>O to steam

 Chemical alteration to concrete matrix



# Factors Leading To Corrosion Within A Coker Unit

- Cast-in-chlorides
  Air-borne chlorides
  High temperature
  Moist/wet conditions inherent to process
  Shortcut access of elements through cracks
- High concentration of CO<sub>2</sub>



## **Critical Unit Event Scenarios**

Dynamic & vibration Process loading
Explosion/fire
Hurricane/tornado
High winds
Earthquake



# **Condition Survey**

- Field Investigation
  - Visual Inspection Site Survey
  - Acoustic Impact Testing
  - Rebound Hammer Testing
  - Ferroscan Pachometer Survey
  - Ultrasonic Testing
  - Impact-Echo Testing
  - Ground Penetrating Radar
  - Sample Extraction
- Laboratory Tests
  - pH Testing and Carbonation Depth Determination
  - Chloride Ion Content
  - Compressive Strength Testing
  - ASR Testing via Uraynal Acetate Reagent

## **Condition Survey**



**Evaluate, Quantify, Document, Prioritize** 

#### **Chloride-Induced Corrosion**



## **Carbonation-Induced Corrosion**



# Fast-Track & Turn-Key Opportunity

 Condition evaluation, site presentation & order of magnitude repair costs

- Engineering
- Repair & rehabilitation

On line and/or turnaround repairs

Quality assurance & quality control

# Special Considerations For Coker Unit Repairs

#### Determine need for shoring

 Corrosion protection: use of sacrificial discreet anodes

 Mechanical anchorage of substrate and repair material



# Engineered Coke Support Structure Shoring Plan



## **Finite Element Analysis**



# Coke Pit Panel Lining And Wall Extension Concept



#### REPAIR STRATEGIES: Repair-In-Kind













## **Engineered Repairs**



Before

During

# **Octagon Wall Repair**



Before

During

# **Sluiceway Repair**



Before

During

# Fireproofing



Before

During

## **Coke Pit Wall**





Before



#### COKER REPAIR SPECIALISTS: Dedicated Crews





#### coker repair specialists: Vast Experience









bp



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# **Questions**?



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