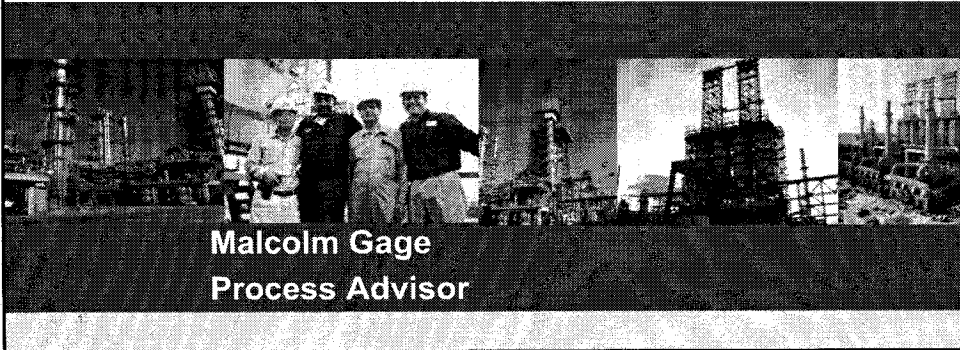


DELAYED COKING SAFETY



Delayed Coking Safety

Managing Safety

Who are the managers of coker safety?

- We are
- Coker operators, engineers, supervisors and managers



Delayed Coking Safety

What is a Doctor of Delayed Coking (DDC)?

- Anyone who works in a coker unit
- Analogy of human body from Basic Operating training video in 1960's and 70's
 - Heart: pumps and valves
 - Arteries: pipelines, large bore pipes
 - Veins: small bore pipes

The refinery is a complete body and functions as such

Delayed Coking Safety

Coker Body

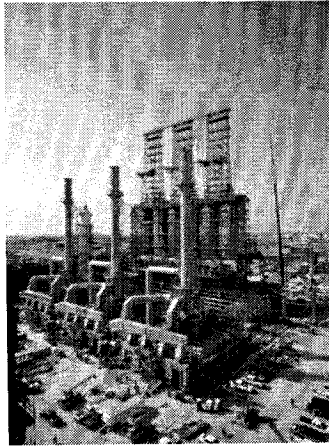
Needs

- Food (residue feedstock)
- Water (BFW, cutting, condensate and steam)
- Clothing (insulation)
- Heat (furnaces, exchangers)
- Cooling (air fans, condensers, coolers)

Delayed Coking Safety

Coker Body

Heart of the Coker is the Charge Pump and Heater



Delayed Coking Safety

Coker Body

Training and safety

- Would you trust your body to an UNTRAINED MEDICAL STUDENT?
- If human body were sold for parts, it is worth less than \$1MM
- Minimum cost of a new Delayed Coker unit is around \$150 MM
- Average cost of new refinery is around \$4 to 6 billion

And who is running the plant?

Delayed Coking Safety

Managing Safety

Coker safety

- How to manage?
 - Changes to our industry
- What is needed?
 - Experience
 - Back to basics
 - Safe startups

Delayed Coking Safety

Changes To Our Industry

Changes in the last 20 years

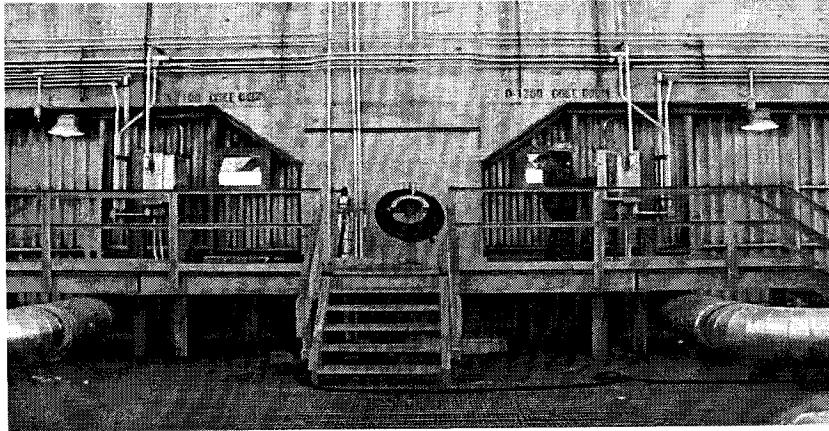
- Air tugging, sled cart & manually hoisted chutes replaced by automation
- Automatic unheading, interlocks, motorized valves, ESD's and computerized controls
- Slide valves

Technology we are seeing today is necessary for a better industry

Delayed Coking Safety

Changes To Our Industry

Barrier walls

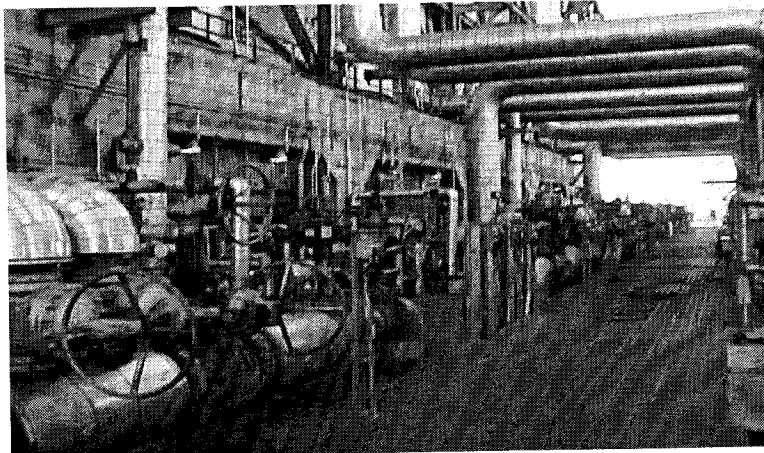


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Delayed Coking Safety

Changes To Our Industry

Operator Friendly Layout

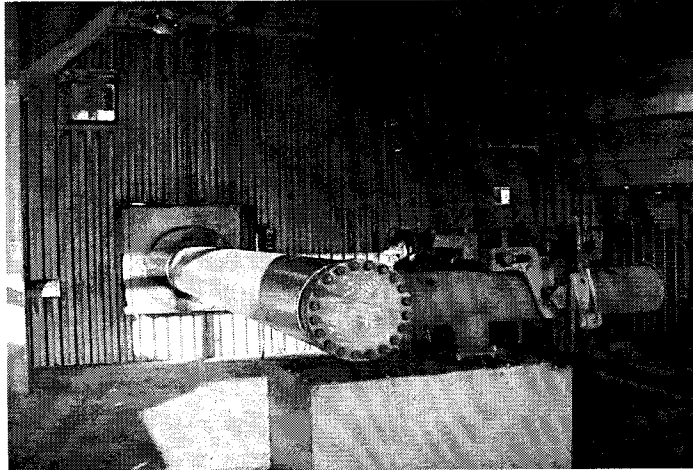


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Delayed Coking Safety

Changes To Our Industry

Bolt-free Graylock Connections

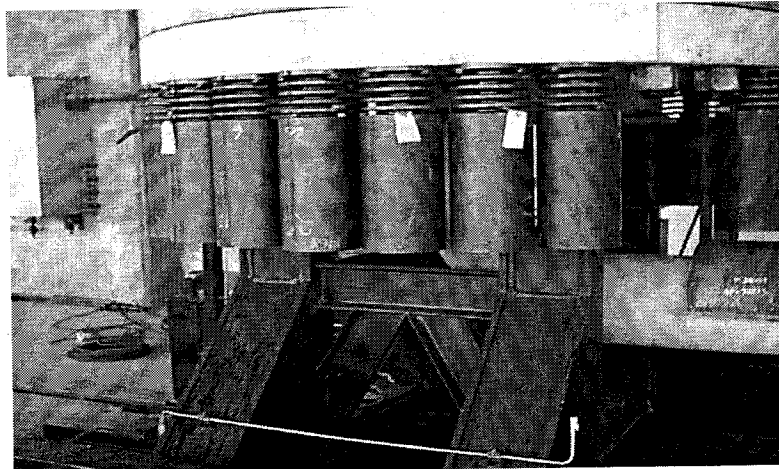


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Delayed Coking Safety

Changes To Our Industry

Automatic Unheading

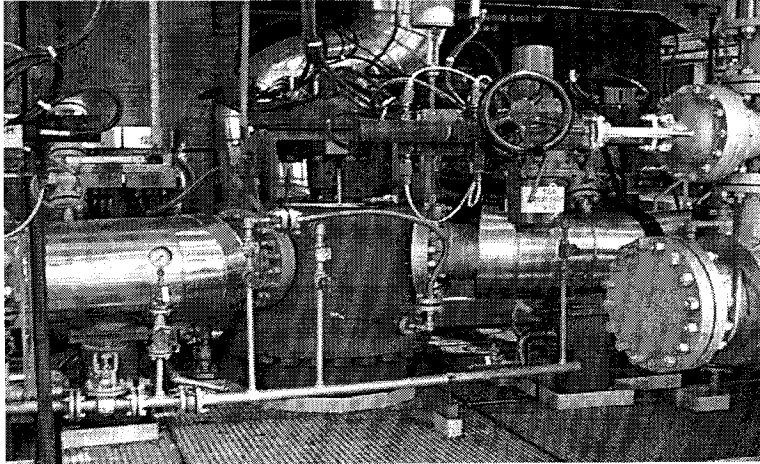


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Delayed Coking Safety

Changes To Our Industry

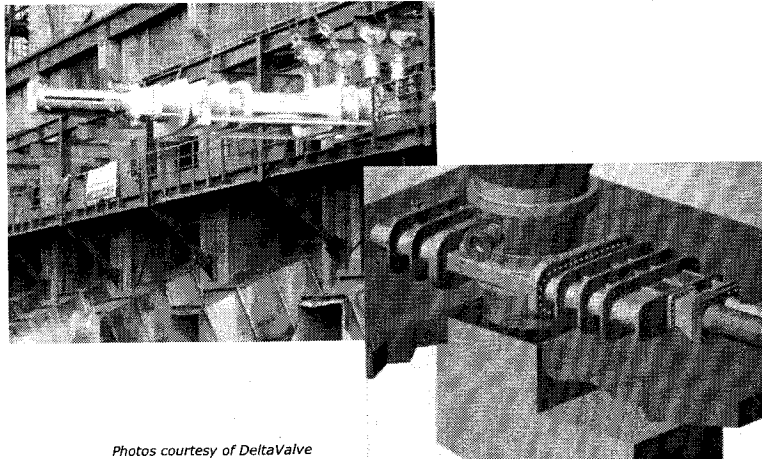
Automatic Switching



Delayed Coking Safety

Changes To Our Industry

Slide Valves



Photos courtesy of DeltaValve

Delayed Coking Safety

Changes To Our Industry

What else has changed?

- Lack of progress in operator training
- Cutbacks in training funds
- Reductions in workforce
 - Solomon 250 bbl/man rule
 - Natural attrition
- More hours (OT)
- Refinery expansions

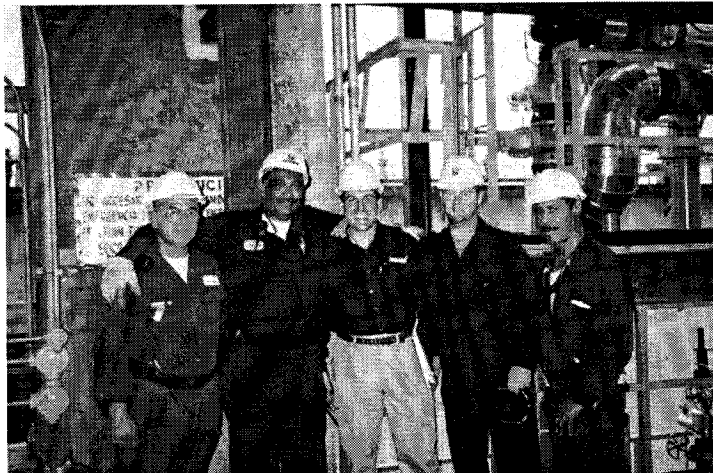
A clear need for operator training

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Delayed Coking Safety

Changes To Our Industry

And What About Experience?



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Delayed Coking Safety

Experience

- What price do we put on experience?
- What price do we put on safety?
- Cost is figured into the bottom line
- Result is reduced training costs
- Experienced retired operators brought back as advisors and trainers

But what about the future?

Delayed Coking Safety

Coker Safety

Back to basics

- Well-trained operator is the key to a safer coker
- Automation alone is not enough
- Clear, concise procedures needed for operators to follow and use as a training tool
- Opportunity and time to practice emergency drills
- Continuous improvement in safe work practices

Delayed Coking Safety

Coker Safety

Back to basics cont'd

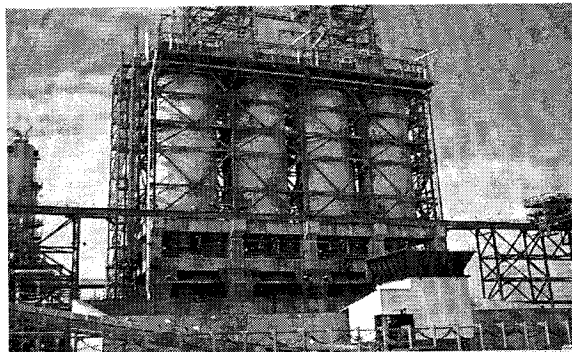
- Validation of procedures regularly
- Use of outside consulting for up-to-date practices and procedures
- Emergency and crisis prevention
- Equipment isolation and preparation for maintenance
- Troubleshooting (listening to your unit)
- Process knowledge (empowering the operator)

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Delayed Coking Safety

Safe Startups

- Without accidents or incidents
- No loss time injuries

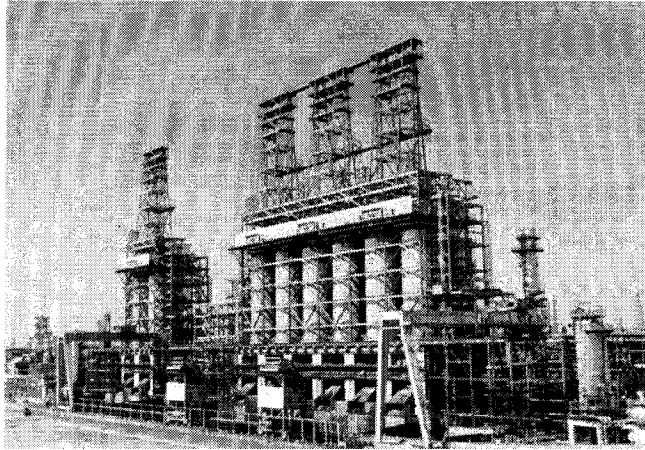


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Delayed Coking Safety

Safe Startups

Reliance – Jamnagar, India



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Photo courtesy of Reliance

Delayed Coking Safety

Safe Startups

Valero – Port Arthur, TX (formerly Clark, Premcor)

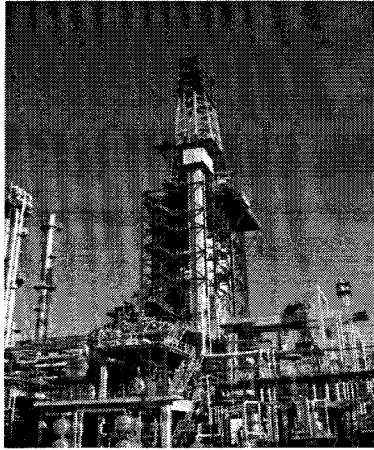


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Delayed Coking Safety

Safe Startups

MOL Hungarian Oil Co. – Szazhalombatta, Hungary

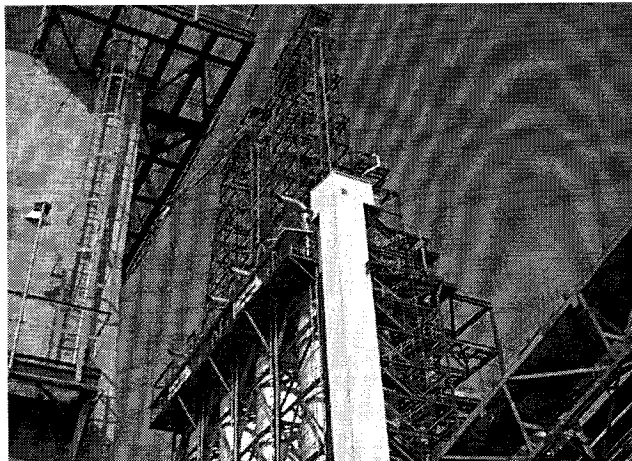


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Delayed Coking Safety

Safe Startups

Pemex – Madero, Mexico

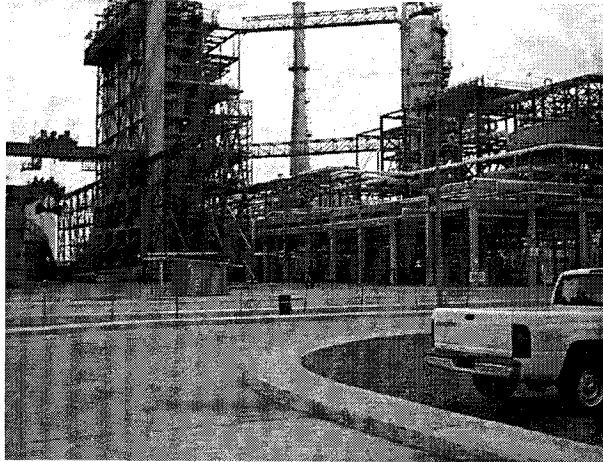


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Delayed Coking Safety

Safe Startups

Pemex – Cadereyta, Mexico

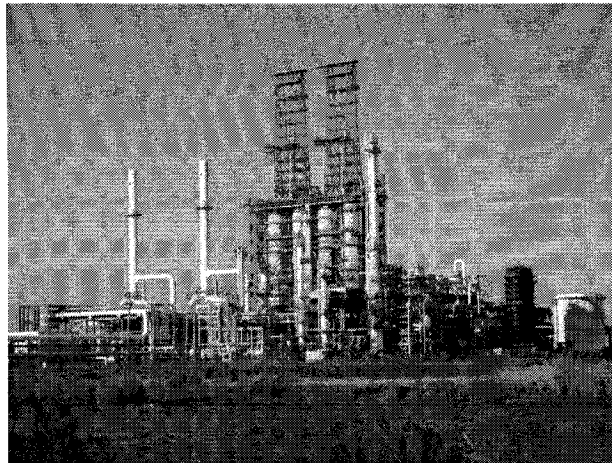


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Delayed Coking Safety

Safe Startups

Valero – Texas City, TX



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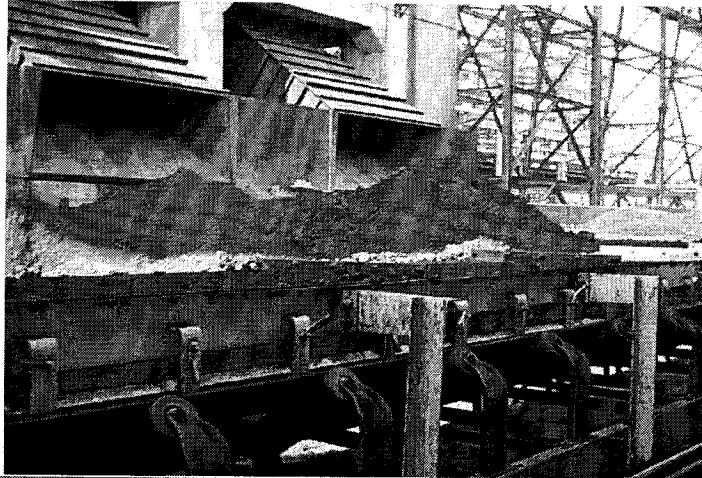
Delayed Coking Safety
Safe Startups
Sincor – Jose, Venezuela
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Delayed Coking Safety
Conclusions
<ul style="list-style-type: none">• Well-trained operators are necessary for safe coker operations• It is essential to update procedures and make sure they are followed• We are the managers of coker safety
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Delayed Coking Safety

Coker Body

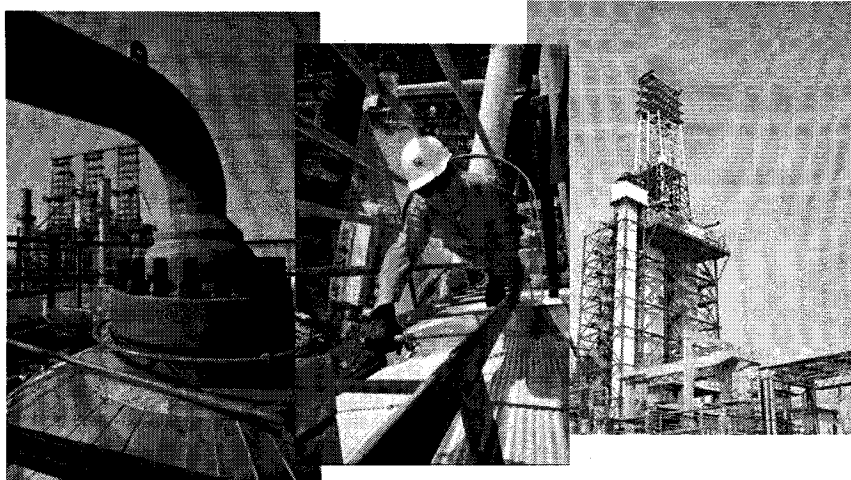
The End...



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Delayed Coking Safety

Questions?



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FOSTER  WHEELER

Thank you

malcolm_gage@fwhou.fwc.com

