

Engineered Concepts'  
Quantum Leap Natural Gas Dehydration  
Technology (QLT)

**11th Annual  
Natural Gas STAR  
Implementation Workshop**

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Engineered Concepts, LLC

## Engineered Concepts' Quantum Leap Natural Gas Dehydration Technology (QLT)

- converts virtually all hydrocarbon emissions to revenue
- reduces carbon dioxide emissions
- reduces operating cost



- reduces operating maintenance
- improves safety
- eliminates odors



Natural Gas Dehydration is the 3rd largest source of methane emissions in the natural gas production industry



## Methane as a Greenhouse Gas is

- 21 times more potent than Carbon Dioxide
- Responsible for 10% of the total global warming effect attributed to greenhouse gases



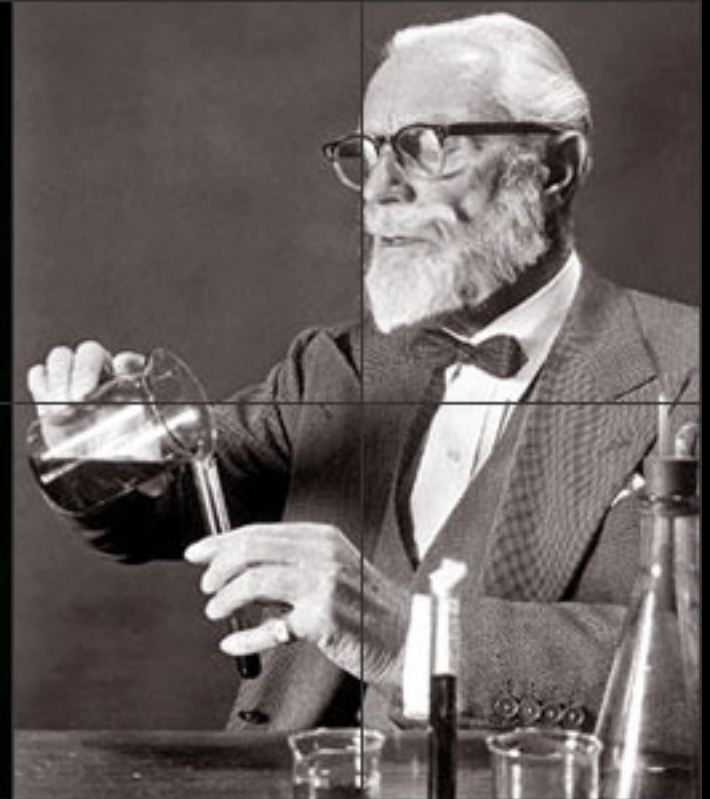
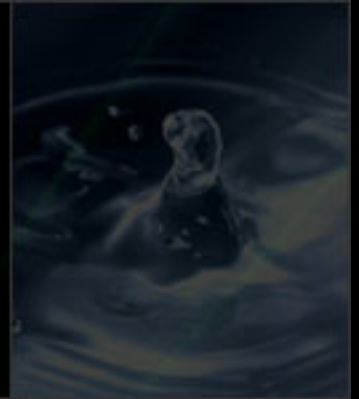


## Why Dehydrate Natural Gas?

- Prevent pipeline blockage due to hydrates
- Prevent pipeline corrosion

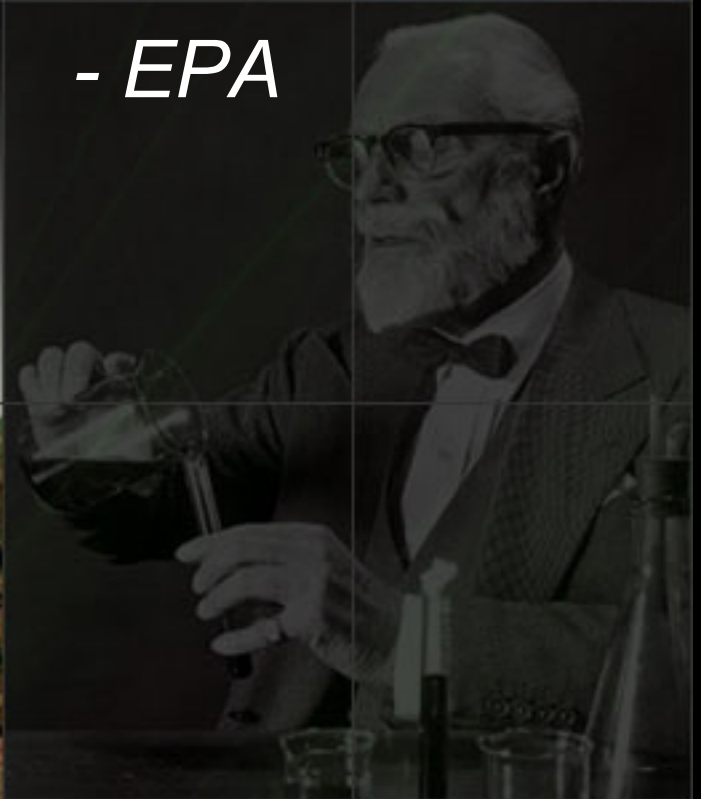
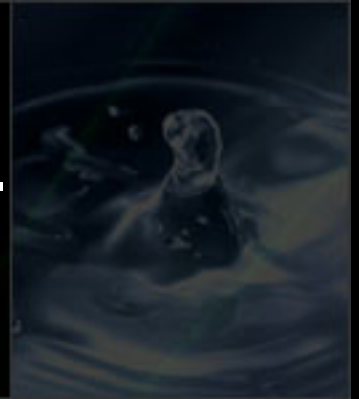


TEG Dehydration is  
1940's technology



- **252,000** natural gas wells in the U.S.
- **38,000** active TEG dehydrators

- *EPA*





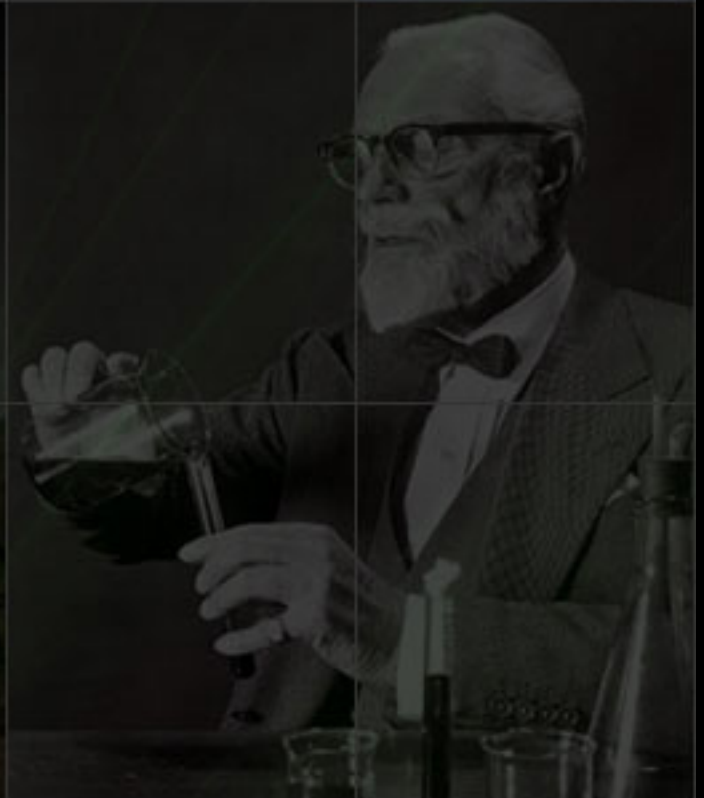
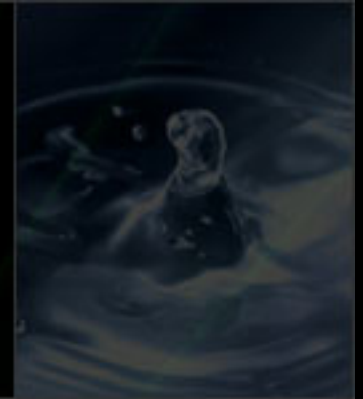
U.S. dehydrators annually emit  
393,000 tons of methane (*18.6 billion cubic feet*)

- EPA



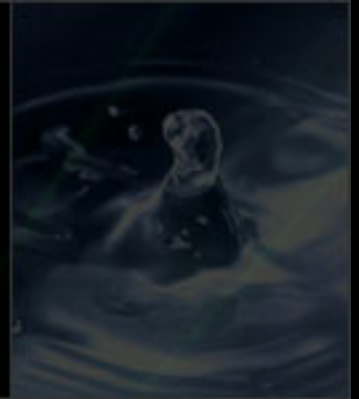
U.S. dehydrators annually emit  
60,000 tons of Hazardous  
Air Pollutants (*HAPs*)

- *EPA*



U.S. dehydrators annually emit  
142,000 tons of Volatile Organic  
Compounds (VOCs)

- EPA



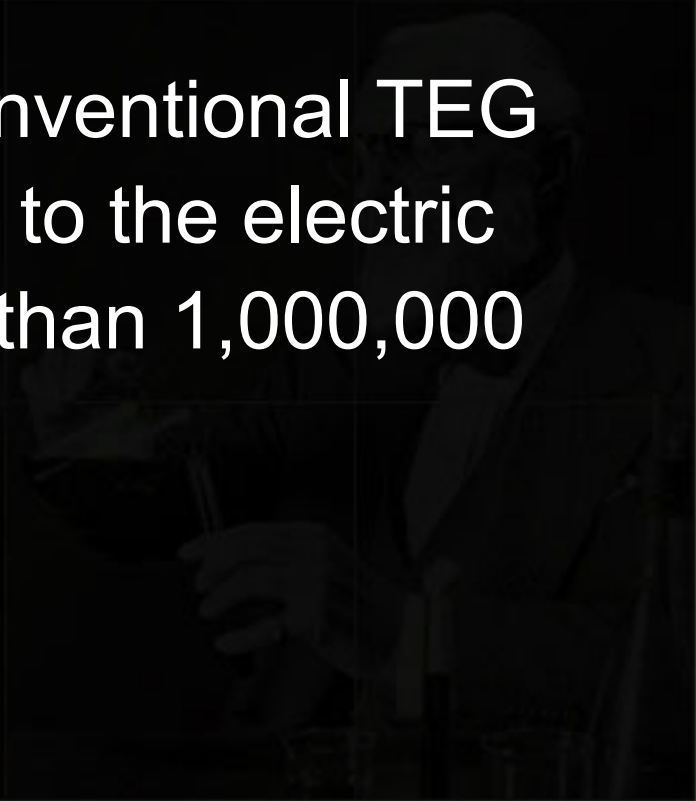


Conventional TEG dehydrators annually waste the equivalent of:

- 300,000,000 gallons of gasoline
- Enough to fuel 690,000 autos for 1 year



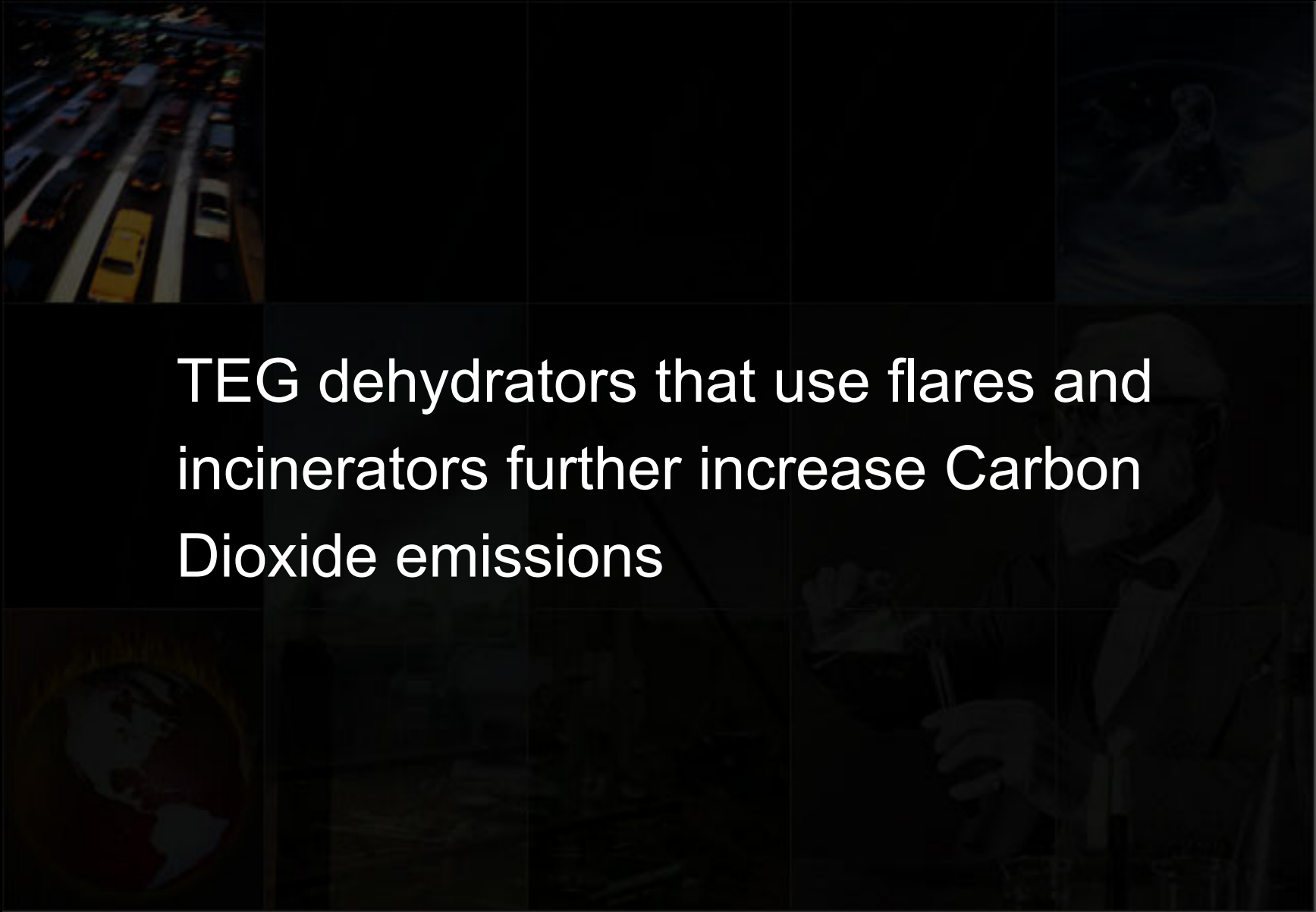
Wasted emissions from conventional TEG dehydrators are equivalent to the electric power consumed by more than 1,000,000 homes per year





The global warming effect of 393,000 tons of methane emitted by TEG dehydrators equals

- 23 million tons of Carbon Dioxide
- The emissions of 5.6 million automobiles



TEG dehydrators that use flares and incinerators further increase Carbon Dioxide emissions

## What is the QLT Process?

First TEG dehydration process specifically designed to

- capture and convert virtually all hydrocarbon emissions to revenue
- reduce total operating expenses



## What is the QLT Process?

First TEG dehydration process specifically designed to

- reduce maintenance
- improve operating safety
- be used in any climate



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**QLT is verified by  
the EPA to eliminate**

- more than 99.74%  
of HAPs
- virtually all VOCs  
and Methane



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## The QLT Process

- Field tested for over three years in two pilot plants



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## The QLT Process

- Verification tested by the Greenhouse Gas Technology Center, Southern Research Institute in cooperation with the EPA
  - *Testing completed in 2003*
  - *Report issued in September 2003*

# The Environmental Technology Verification Test

QLT designed to dehydrate  
28 mmscf of natural gas  
per day



# The Environmental Technology Verification Test

7 days operational performance monitoring

1 day environmental performance testing



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## Test results:

- Average NOX emissions **0.0817 lb/h**
- Carbon Monoxide emissions **0.0005 lb/h**
- VOC emissions **0.0003 lb/h**
- Carbon Dioxide emissions **111 lb/h**

**HAPs, VOCs and Methane  
stack emissions  
- too low to be detected**

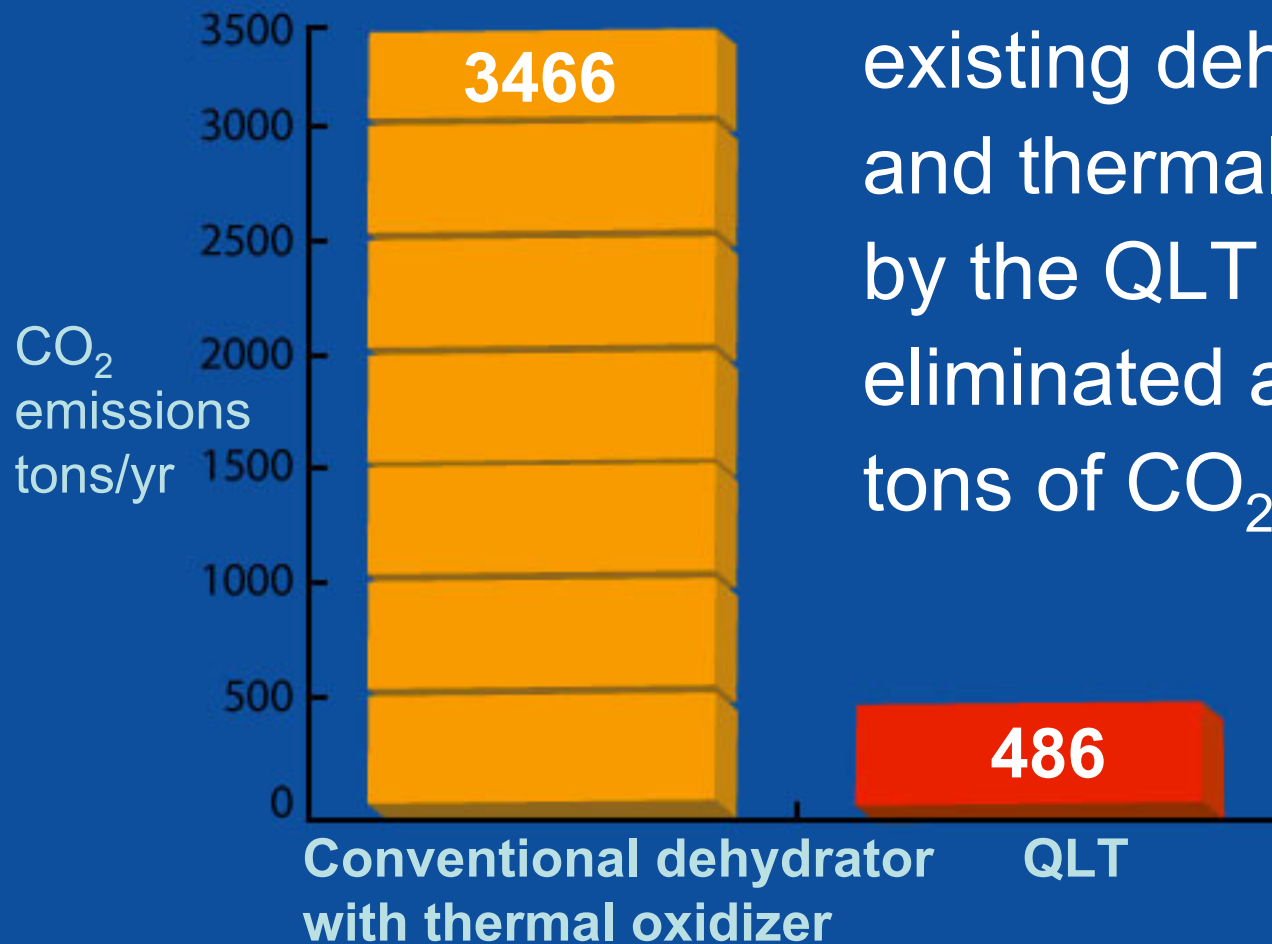


## **HAP destruction efficiency verified greater than 99.74%**

- All the HAPs emitted (0.0220 lb/h) were dissolved in the wastewater
- Wastewater production 6.3 gallons per hour







Replacement of the existing dehydrator and thermal oxidizer by the QLT process eliminated about 3000 tons of CO<sub>2</sub> per year

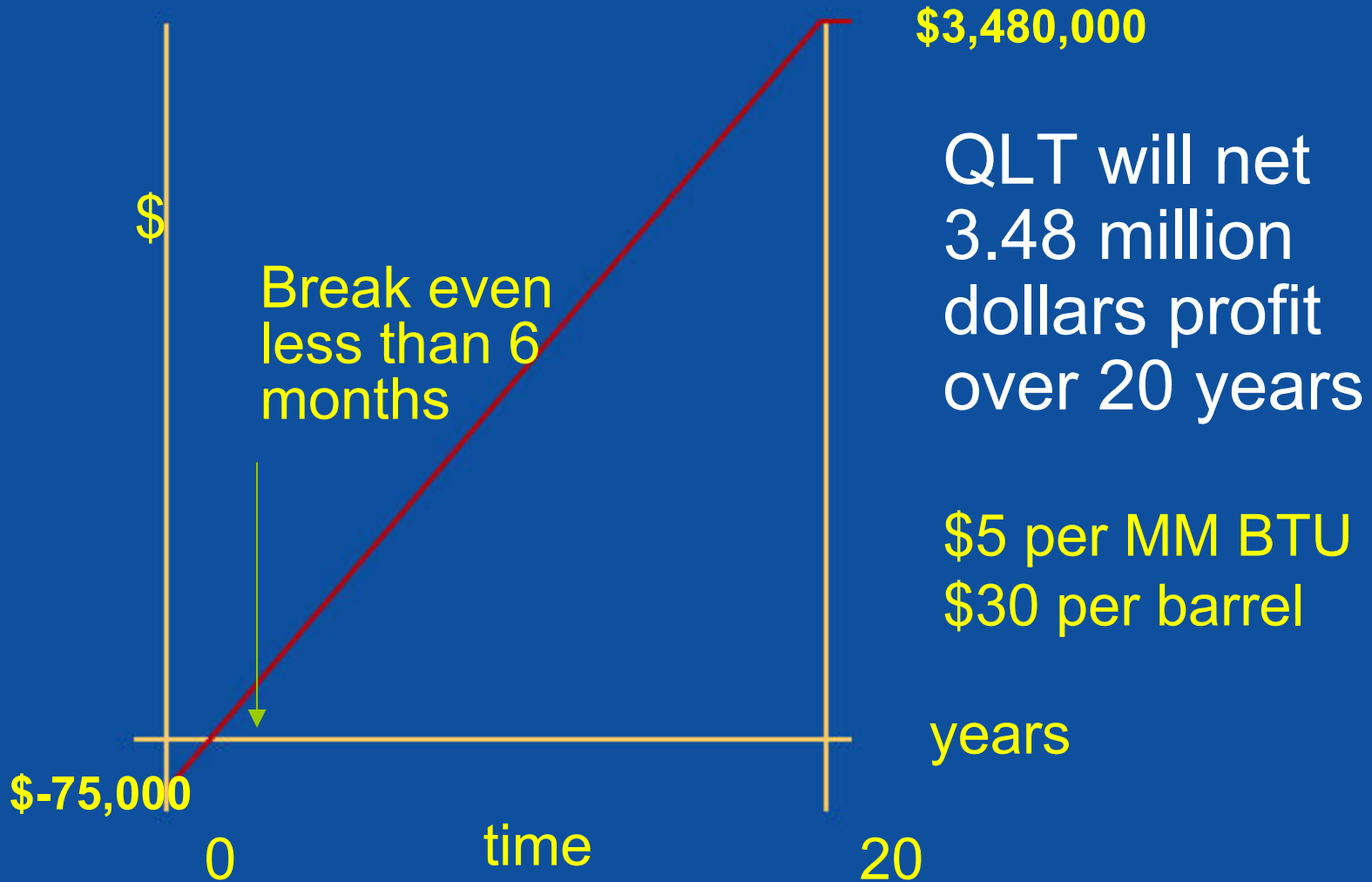
QLT recovered 2.88 gallons per hour of saleable condensate

-over 600 barrels per year



QLT returned \$174,000 in operating cost reductions and product sales annually







Payback for QLT typically  
ranges between  
6 months and 2 years

QLT is easy to operate and is applicable to any dehydration facility in any climate



## **The QLT System is Highly Reliable**

- 99.5% on-line from April 2003  
to August 2004

QLT can be retrofitted to existing dehydration equipment or incorporated into new equipment designs



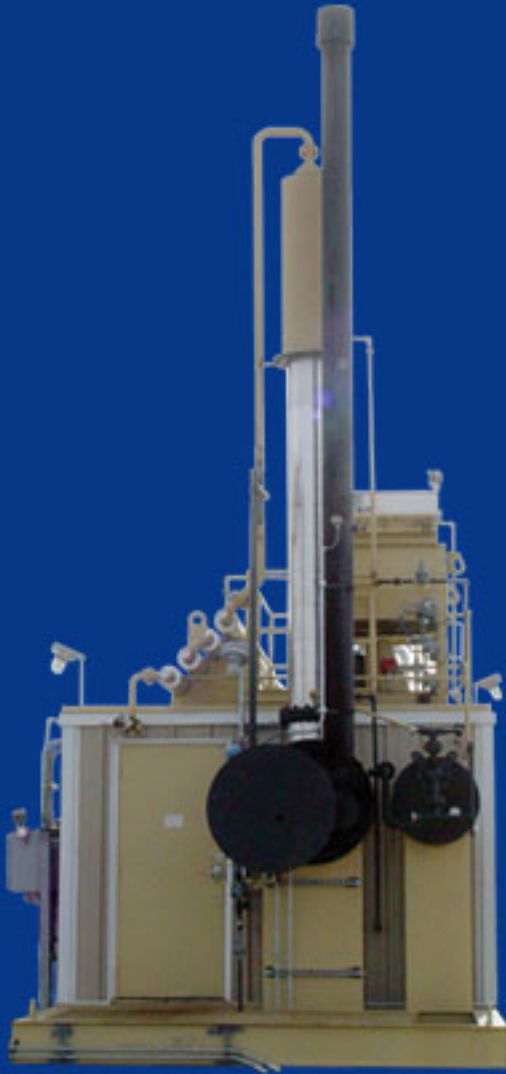
- is scalable to any size



QLT can be retrofitted to existing dehydration equipment or incorporated into new equipment designs



- comparable to current dehydration technology in size, weight and level of complexity



## **QLT is safer than conventional dehydration equipment**

- flammable and poisonous emissions are captured
- risk of fire or explosion is reduced by capturing “free floating” combustible vapors

**QLT can operate at pressures as low as 20 psig**

Pipeline companies can re-evaluate operating methods for gathering systems under 100 psig



## QLT eliminates water condensation problems in low pressure gathering systems

- reduced pipeline capacity
- increased horsepower requirements



## QLT eliminates water condensation problems in low pressure gathering systems

- water slugging problems in equipment
- frozen pipelines
- premature pipeline failure due to corrosion



## What are the benefits of QLT?

- substantial long-term financial rewards
- eliminates virtually all pollutants associated with natural gas dehydration

## What are the benefits of QLT?

- operating advantages in low pressure gathering systems
- increases revenues, improves safety, and reduces maintenance

