

# Aboveground Storage Tank Enhanced Vapor Recovery

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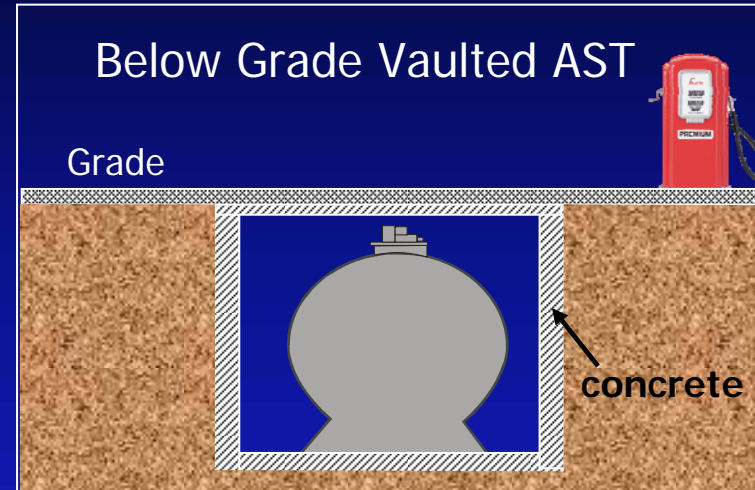
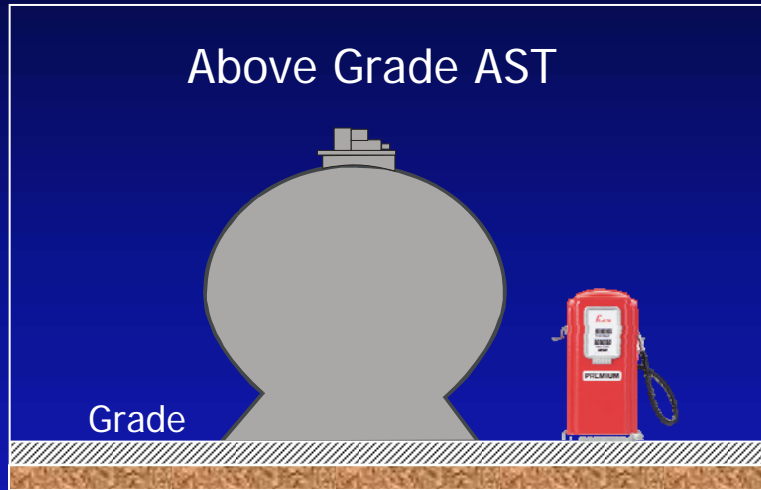
Board Hearing  
June 21-22, 2007

# Outline

- Background
- Objectives
- ARB and District Roles
- Field Study
- Technical Proposal
- Environmental Impacts
- Economic Impacts
- Public Outreach
- Conclusion and Recommendations

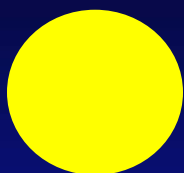
## Background

# Aboveground Storage Tanks



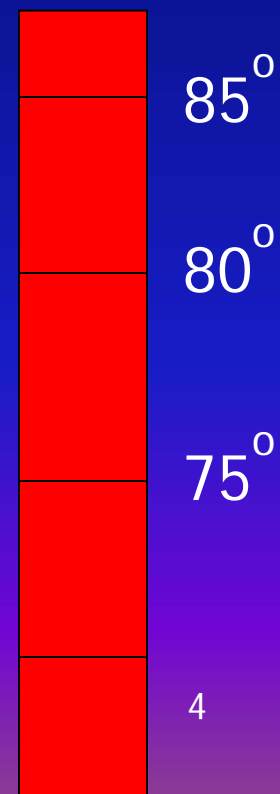
Background

# Standing Loss Emissions



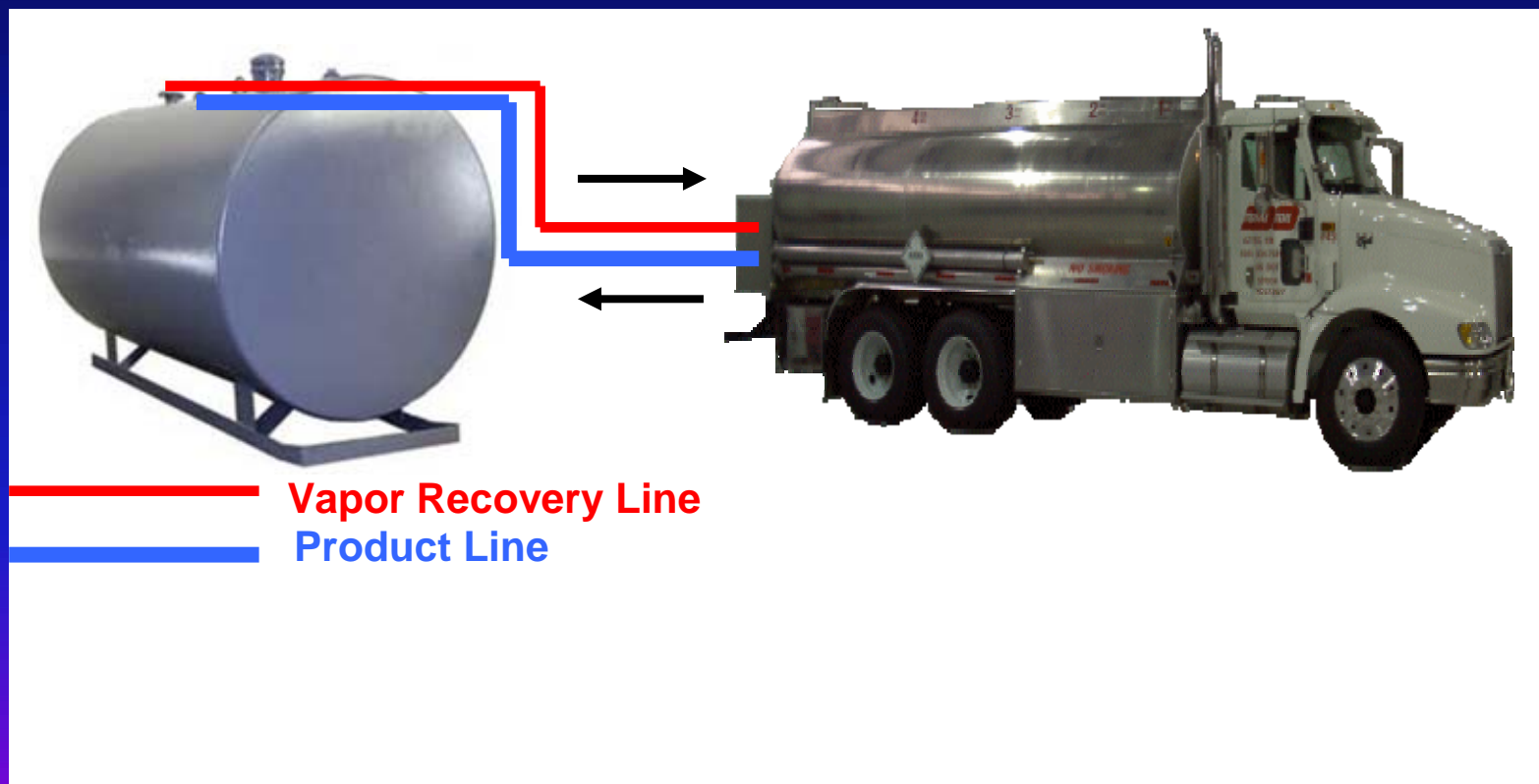
Vent Pipe Emissions

Tank Temp.



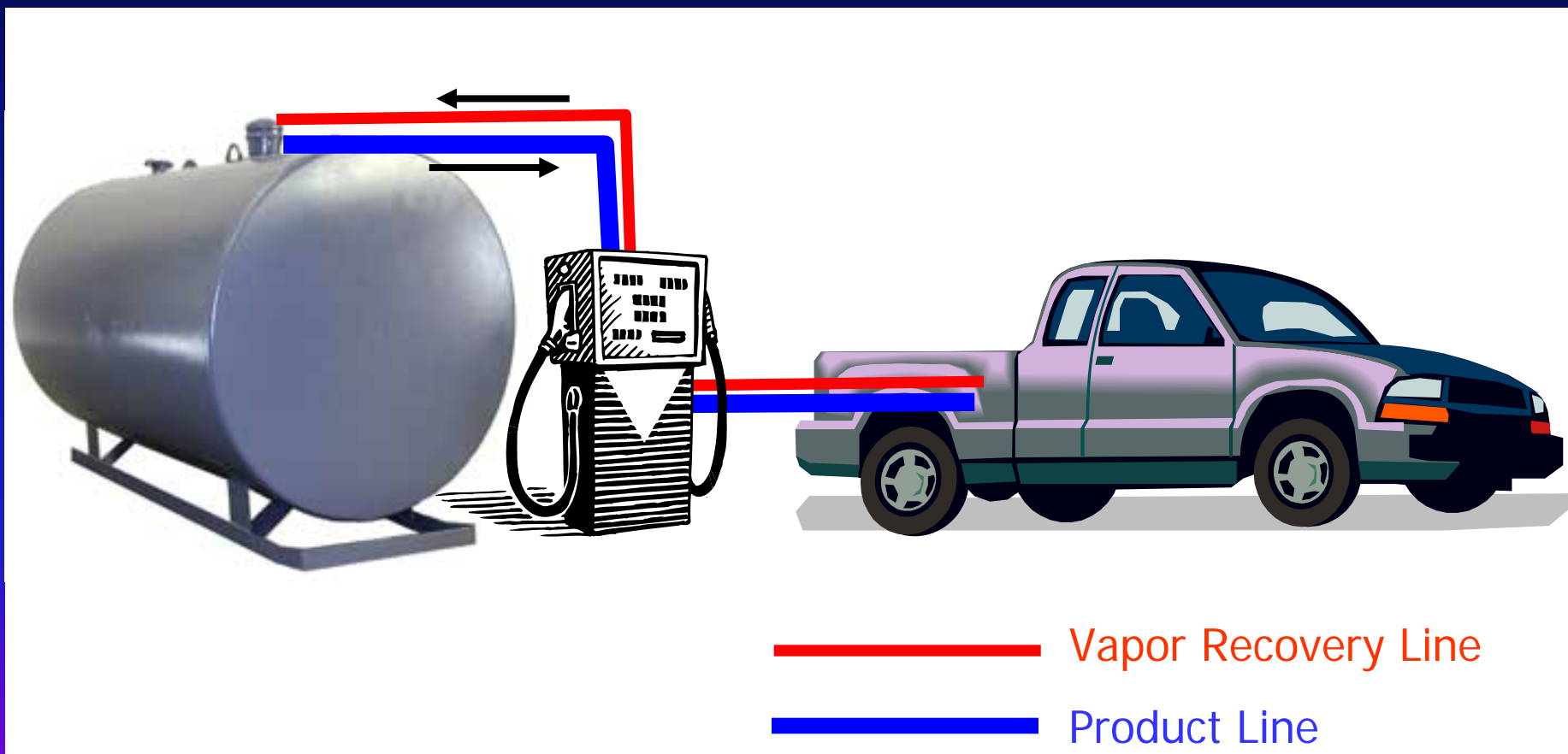
## Background

# Phase I Transfer



Background

# Phase II Transfer



## Background

# AST Population

- 9,600 Aboveground Storage Tanks (AST)
  - 67 Percent Agricultural Operations
  - 33 Percent Marinas, Fleet Operations, Municipalities, and Service Stations
- AST Size and Classification
  - 250 to 12,000 gallon storage capacities
  - Single Wall
  - Protected Tanks

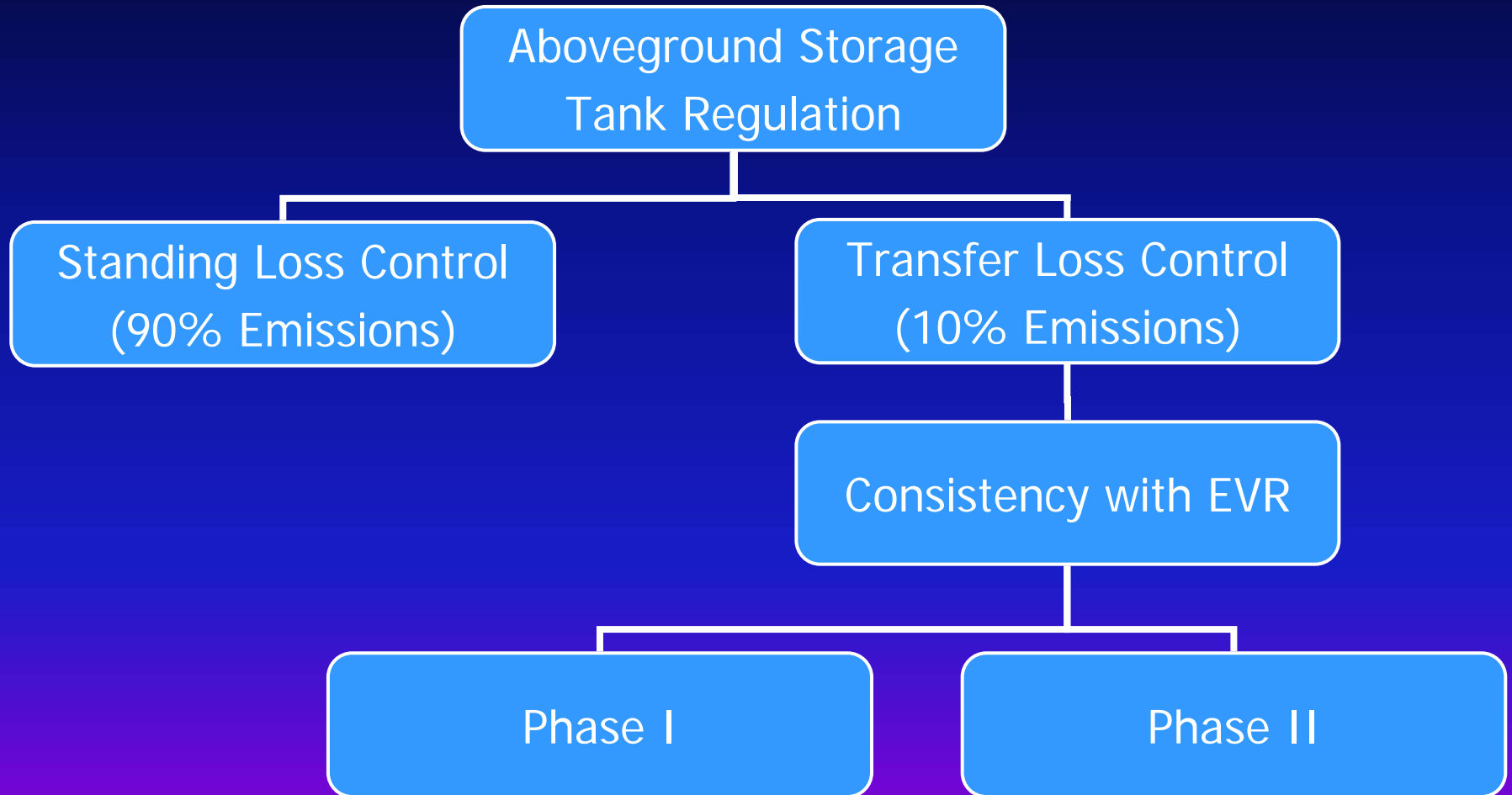
## Background

# Emissions

- 3.31 tons per day of Reactive Organic Gas (ROG) Emissions from 9600 ASTs
  - 2.95 tons per day ROG (Standing losses)
  - 0.36 tons per day ROG (Transfer losses)



# Objectives



# ARB and District Roles

- Air Resources Board
  - Adopt Certification and Testing Procedures for Vapor Recovery Systems
  - Establish Performance Standards and Specifications
  - Certify Vapor Recovery Systems

# ARB and District Roles

- Districts
  - Regulate emissions from stationary sources
  - Adopt rules for gasoline storage/transfer
    - ARB certified vapor recovery systems
    - Compliance testing to ARB adopted performance standards
  - May adopt rules to include standing loss controls

Field Study

# Standing Loss Emissions



Field Study

# Carbon Canister Processor





Field Study

# Shade



Field Study

## White Paint



Field Study

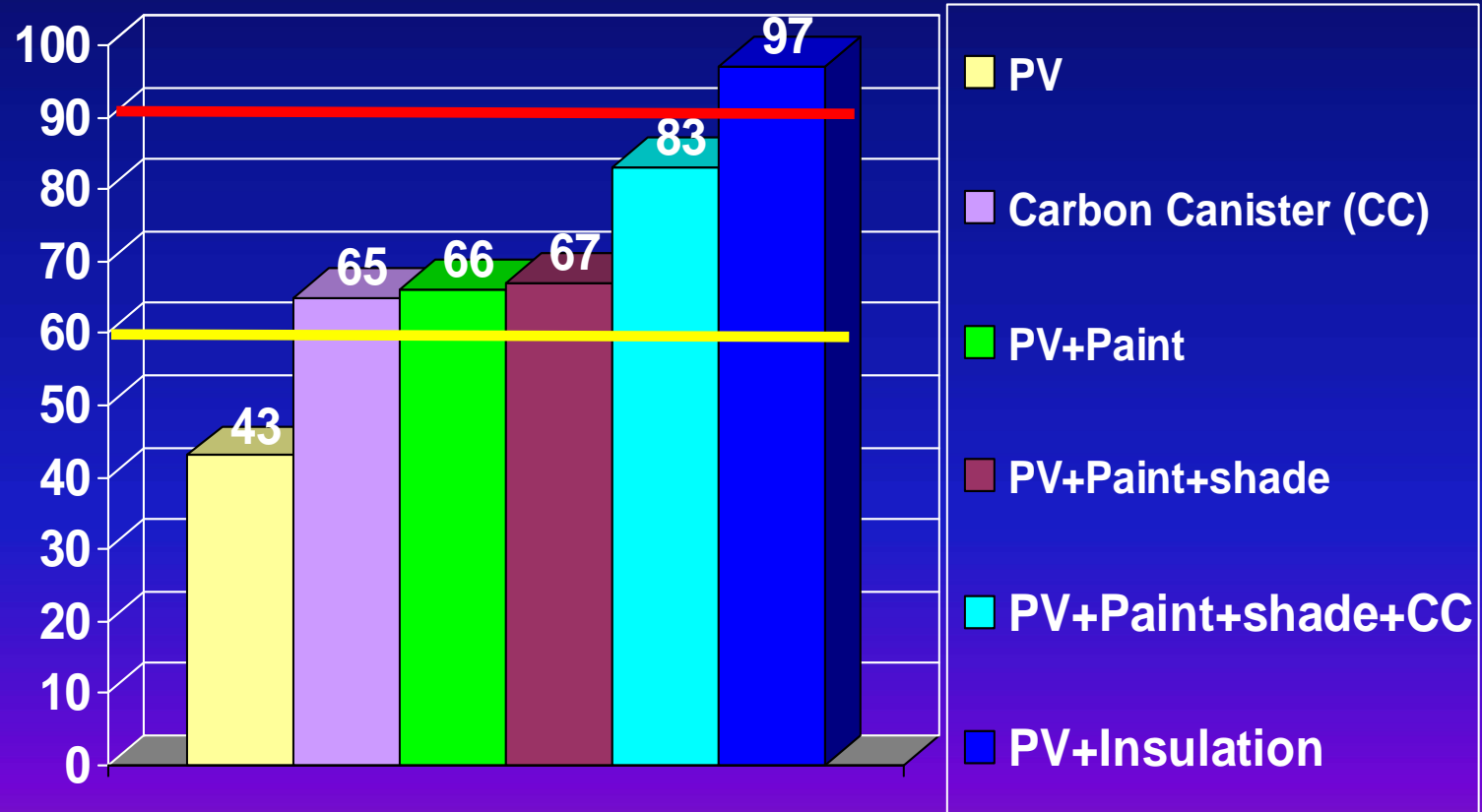
# Spray-on Polyurethane Foam Insulation





## Field Study

# Control Technology Effectiveness



## Technical Proposal

# Standing Loss Control – Performance Standards

AST	Performance Standard (lbs./1,000 gallon ullage/day)	Emission Reduction (%)
New tanks and Major Modifications	0.57	90
Existing Tanks	2.26	60

## Technical Proposal

# Example retrofit to 60 Percent



## Technical Proposal

# Standing Loss Control Option

- Optional Performance Standard for Existing ASTs
  - 76 percent emission reduction
  - 90 percent emission reduction
- Benefits
  - Opportunity for Emission Credits by certifying to a higher performance level
  - Fuel savings

## Technical Proposal

# Phase I Transfers

- Transfer from Cargo Tank Truck to AST
- Performance Standard
  - Current: 90 percent efficiency
  - EVR Proposal: 98 percent efficiency

## Technical Proposal

# Phase II Transfers

- Transfer from AST to Motor Vehicle
- Performance Standard
  - Current: 90 percent efficiency
  - EVR Proposal: 95 percent efficiency

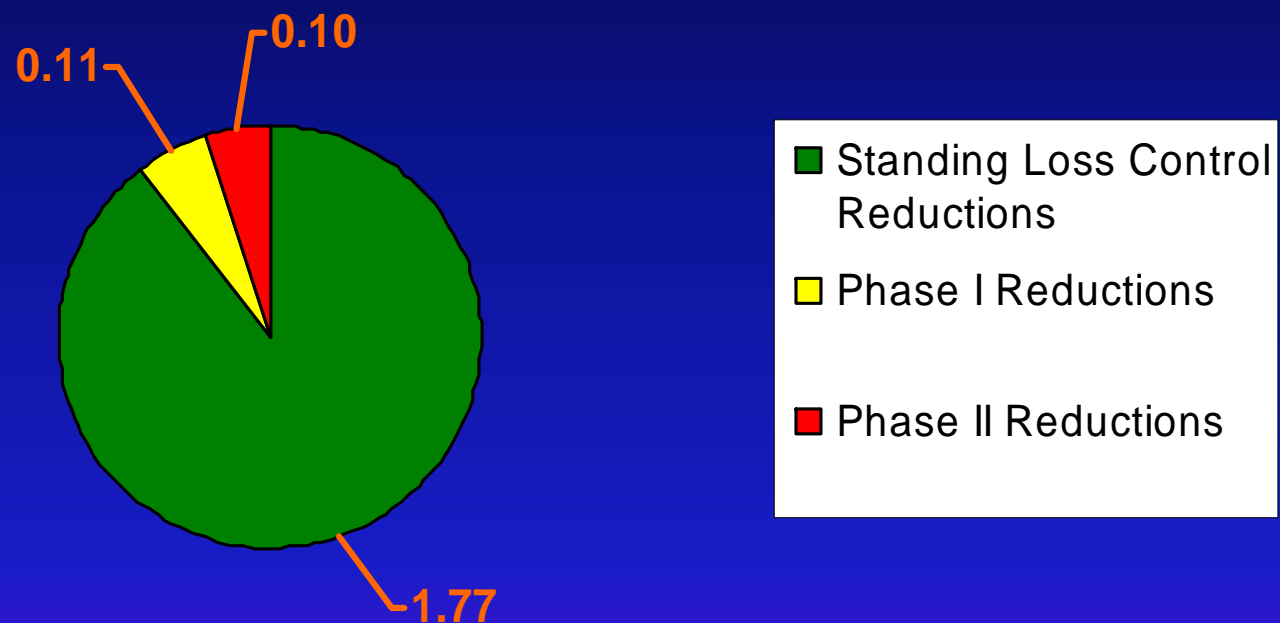
## Technical Proposal

# Effective Dates

- New Tanks: January 1, 2009
- Existing tanks: January 1, 2013

# Environmental Impacts

## Annual Emission Reductions (tons per day)





## Economic Impacts

# Cost Analysis - Retrofits

Tanks	Proposed Configuration	% of Tanks Affected	Incremental Cost per Tank (\$)
Protected	Standing Loss Control (SLC) only	3	\$0
	SLC + Phase I EVR	4	\$40
	SLC + Phase I EVR + Phase II EVR	14	\$161
Single Wall	SLC only	60	\$433
	SLC + Phase I EVR	17	\$473
	SLC + Phase I EVR + Phase II EVR	2	\$594
		100	

## Economic Impacts

# Cost Effectiveness

Cost Eff.: \$2.17/pound emission reductions

Savings.: \$0.40/pound emission reductions

Net Eff.: **\$1.77/pound emission  
reductions**

# Public Outreach

- Public Workshops
- District Workgroups
- Agricultural Groups and Associations
- Industry Stakeholders
- Vapor Recovery Websites
- Vapor Recovery List serve
- Direct Mailings

# Conclusion and Recommendation

- Developed with Extensive Outreach
- Significant Emission Reductions
  - 2.0 tons per day
- Cost Effective
  - \$1.77 per pound ROG
- Contributes to Ozone Attainment Goals
  - Reduces hydrocarbon precursors