



# Update on Estimating Gas Volumes from Gas Images

EPA Gas Star Program  
Transmission and  
Distribution

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# Taking Gas Imaging to the Next Level

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**Last year, we presented the basic plan to pursue estimating gas volumes from gas imaging. This presentation will update that work.**

**The pipeline group saw the potential of the technology and purchased our first camera late 2005. To date, we have 8 cameras and numerous other advanced gas detection tools dispersed in the field.**



# Background and Comments/Opinions

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1. Research has shown the largest contributors to fugitive gas are vented components.
2. Therefore: No more research is needed to find where the opportunities are!
3. Applying gas imaging and laser technology will help us to “reach out” and sense for the presence of gas in areas formerly unobtainable.

Clearly, the opportunity to “view” fugitive gas is very powerful.



# Review

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- Created a video gas library using a calibrated custody transfer measuring device.
- A series of known flow rates were run thru various pipe sizes and recorded.
- Field video measurement is taken and compared to a video library of similar pipe size.
- Order of magnitude is determined by comparing the plume size to the video library.



# Examples: GasFindIR Camera

■ Typical vent pipe

■ Same vent pipe seen thru FLIR GasFindIR camera



# Order of Magnitude Estimation of Flow – Image Library



# Order of Magnitude Estimation

The following images show a flow rate in different diameters of pipe.

2" Vent Stack



4" Vent Stack



6" Vent Stack



# Field Results

## Total of 51 Readings on 2 & 3" Vents

Volume Range	0 - 2 cfm	3 - 6 cfm	7+ cfm
Total Readings	39	7	5
Above margin of error	3 leaks or 8 %	1 leak or 14 %	0 leaks or 0 %
(+/-) 10 percent margin of error	30 leaks or 77%	5 leaks or 71%	3 leaks or 60%
Below margin of error	6 leaks or 15%	1 leak or 14%	2 leaks or 40%





# Field Results

## Total of 116 Readings on 4 & 6" Vents

Volume Range	0 - 2 cfm	3 - 6 cfm	7+ cfm
Total Readings	64	22	30
Above margin of error	4 leaks or 6 %	1 leak or 5 %	0 leaks or 0 %
(+/-) 10 percent margin of error	46 leaks or 72%	19 leaks or 86%	28 leaks or 93%
Below margin of error	14 leaks or 22%	2 leak or 9%	2 leaks or 7%



# Field Results

## Total of 12 Readings on 8" Vents and Larger

Volume Range	0 - 2 cfm	3 - 6 cfm	7+ cfm
Total Readings	2	2	8
Above margin of error	0 leaks or 0 %	0 leak or 0 %	0 leaks or 0 %
(+/-) 10 percent margin of error	2 leaks or 100%	2 leaks or 100%	7 leaks or 88%
Below margin of error	0 leaks or 0%	0 leaks or 0%	1 leaks or 12%



# Review of Environmental Factors

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# Environmental Factors Influencing a Video Reading - Wind

The 3 major atmospheric conditions that affect the quality of a video are:  
Wind, Clouds and Background Temperature.

## Wind

Plume dissipation will occur during high wind conditions. Higher winds will shear the plume at the end of a vent pipe making the evaluation of a plume difficult.



# Environmental Factors Influencing a Video Reading

## Reading - Wind



# Environmental Factors Influencing a Video Reading - Clouds

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The 3 major atmospheric conditions that affect the quality of a video are:  
Wind, Clouds and Background Temperature.

## Clouds

When using the sky as a background, optimum conditions is a clear blue sky. Clouds tend to distort the image quality. The moisture in heavy clouds provides a dark background and contrasts with the gas image which is typically also dark.



# Environmental Factors Influencing a Video Reading - Clouds



# Environmental Factors Influencing a Video Reading – Background Temperature

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The 3 major atmospheric conditions that affect the quality of a video are:  
Wind, Clouds and Background Temperature.

## Background Temperature

The background should be as much a contrasting temperature relative to the gas. A hot background tends to white out an infrared camera.





# Environmental Factors Influencing a Video Reading – Background Temperature



# Why Are We Pursuing this Technique

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It is important to get an order of magnitude of the fugitive source.

Arranging for man lifts to access vented components and obtain measurements is costly and risks injury

Obtaining a guesstimated volume increased communication and prioritizes the largest sources to be repaired ASAP

The video heightens awareness of individuals working around the equipment.



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# Questions

