

# STATUS OF HRVOC FLARE DATA REQUEST

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# OVERVIEW

BACKGROUND

STATUS

SURVEY RESPONSES AND ISSUES

TIMING



# BACKGROUND

- August 2011: Mailed surveys to 82 accounts, accounting for about 200 HRVOC flares
- Requested flare operating details
  - Assist type (steam, air, or none) and assist rate
  - Hourly, speciated vent gas composition for 2006 episodes and 2009 (entire year)
- December 2011 delivery date (extensions, on request)



# STATUS

- Currently processing 67 accounts / 176 point sources received by January 1, 2012
- Two contractors entering post-January 1 responses and checking all files for missing information
- All files to be included in the study



# STATUS, CONTINUED

Work is in progress.

- The first product of the study will be a 2009 emissions inventory.
- There are issues to be resolved and some yet to be identified.
- The process is going to take several months.



# SURVEY RESPONSES AND ISSUES

Millions of records to review/process

- 8,760 records for each flare
- Operating conditions and composition for each hour

Multiple data formats



# Survey Response Example

Date	One-Hour Block Average Vent Gas Exit Velocity (feet/second)	One-Hour Block Average Vent Gas Net Heating Value (Btu/standard cubic foot)	Vent Gas Compositon, vol%		
			1,3-Butadiene	Methane	Acetylene
1/1/2009 0:00	1.9	613	0.00	65.11	0.00
1/1/2009 1:00	1.9	613	0.00	65.09	0.00
1/1/2009 2:00	2.0	615	0.00	65.28	0.00
12/31/09 6:00 AM	10.3	460	0.00	27.78	0.00
12/31/09 7:00 AM	10.5	460	0.00	27.73	0.00
12/31/09 8:00 AM	10.4	466	0.00	26.77	0.00
12/31/09 9:00 AM	10.2	465	0.00	27.68	0.00



# Example 2

TANK 105 TIP AREA = 0.299 SQ FT				
	FLARE TIP EXIT VELOCITY	NET HEATING VALUE		
DATE / HOUR	FT/SEC	BTU/SCF	Molecular Weight	SCFM
1/1/09 0:00	0.02	2689.00	28.18	0.39
1/1/09 1:00	0.02	2689.00	28.18	0.35
1/1/09 2:00	0.00	2689.00	28.19	0.05
1/1/09 3:00	0.00	#DIV/0!	28.20	0.00
1/1/09 4:00	0.00	#DIV/0!	28.19	0.00
1/1/09 5:00	0.00	#DIV/0!	28.20	0.00
1/1/09 6:00	0.00	#DIV/0!	28.20	0.00
1/1/09 7:00	0.00	#DIV/0!	28.19	0.00
1/1/09 8:00	0.00	#DIV/0!	28.19	0.00
1/1/09 9:00	0.00	#DIV/0!	28.17	0.00
1/1/09 10:00	0.07	2689.00	28.14	1.20
1/1/09 11:00	0.13	2689.00	28.12	2.38
1/1/09 12:00	0.17	2689.00	28.13	3.07





# Example 3

Start Time: 1/1/09 1:00

note 1: Mass flow includes inerts, such as Nitrogen and CO2

End Time: 1/1/10 0:00

$$\text{Mass flow (lb/hr)} = Q \text{ (scfm)} \times 60 \text{ (min/hr)} / 387 \text{ (scf/mole)} \times \sum (\text{mole}\%, \times \text{Mw}_i) / 100$$

Timestamp	Q - Calculated Volumetric Flow Rate to Flare Tip (scfm)	item 2	item 3	item 4		item 5	item 6	Measured CO2 Mole %
		Net Heating Value Corrected for Moisture (Btu/scf)	Mass Flow Rate (lb/hr) (note 1)	Measured Steam Control Valve % Open	Estimated Steam Rate to Mon 2 Flare (lb/hr)	Steam-to-Flare Gas Ratio (note 2)	Measured Nitrogen Mole %	
1/1/09 1:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 2:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 3:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 4:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 5:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 6:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 7:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 8:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 9:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 10:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 11:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00
1/1/09 12:00	8.33	350.00	30.21	0.00	2,962	98.04	61.50	0.00



# Example 4

DateTime	CO Mol %	ETHYLENE Mol %	ETHANE Mol %	HYDROGEN Mol %	O2 Mol %
01/01/2009 00	0.270000003	0.007125	0.793250002	0	0
01/01/2009 01	0.282499999	0.007875	0.843624987	0	0
01/01/2009 02	0.296250004	0.007875	0.897124998	0	0
01/01/2009 03	0.305555562	0.008777778	0.940000004	0	0
01/01/2009 04	0.316249996	0.010375	1.009124979	0	0.00275
01/01/2009 05	0.331250012	0.012375	1.087250009	0	0.00825
01/01/2009 06	0.342500001	0.014375	1.164999992	0	0.011
01/01/2009 07	0.352499995	0.01625	1.254624993	0	0.011
01/01/2009 08	0.370000005	0.021666666	1.428111103	0	0.011111111
01/01/2009 09	0.36500001	0.02875	1.637749985	0	0.012
01/01/2009 10	0.352500003	0.034375	1.80675	0	0.012
01/01/2009 11	0.300000001	0.044749999	2.025624976	0	0.012125
01/01/2009 12	0.280000001	0.048374999	2.080125004	0	0.012375
01/01/2009 13	0.261249997	0.048125	2.055500001	0	0.012875
01/01/2009 14	0.225555552	0.045555555	1.94133332	0	0.014
01/01/2009 15	0.171250002	0.041375	1.758125007	0	0.015
01/01/2009 16	0.155000001	0.04025	1.694125012	0	0.014
01/01/2009 17	0.150000006	0.04	1.671625018	0	0.014



# Convert Tables to Standard Format

NOTES:

RN =	RN100225085	EPN =	VS-202	EXIT GAS VELOCITY (FPS) [=]	FPS	HEATING VALUE (BTU/SCF) [=]
CONTAM CODES					43203	43205
<b>BEGIN</b>	<b>END</b>	<b>VENT GAS VELOCITY</b>	<b>VENT GAS HEATING VALUE</b>	<b>ASSIST RATE (PPH, CFM)</b>	<b>ETHYLENE</b>	<b>PROPYLENE</b>
9010100	9010101	4.02	381.97	432.60	0.00	0.00
9010101	9010102	3.98	381.32	432.45	0.00	0.00
9010102	9010103	4.03	381.98	421.17	0.00	0.00
9010103	9010104	4.04	381.67	420.06	0.00	0.00
9010104	9010105	4.11	381.25	425.55	0.00	0.00
9010105	9010106	4.12	381.77	426.78	0.00	0.00
9010106	9010107	4.09	381.75	434.95	0.00	0.00
9010107	9010108	4.05	380.42	432.35	0.00	0.00
9010108	9010109	4.18	380.65	442.47	0.00	0.00
9010109	9010110	4.34	380.14	433.10	0.00	0.00



# FILE CONVERSION

## Why?

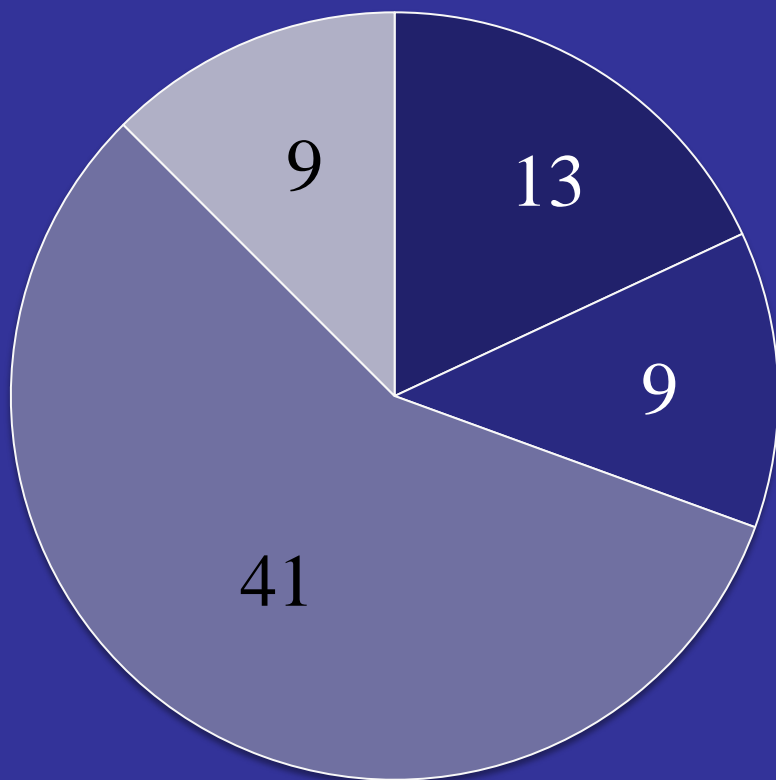
- Systematic inspection of survey results (QC)
- Computerized conversion to point source emission records

## Status

- Completed 72 (of approximately 200) 2009 emission files
- Identified missing, inconsistent data



# SURVEY RESULTS



- Complete
- Shutdown
- Missing Assist
- No Composition



# PATH FORWARD

Process remaining survey data.

- Approximately 1/3 completed.

Request missing data.

- Need flare data and assist rates to estimate combustion efficiency.

Inquire about inconsistent, erroneous data.



# PATH, CONTINUED

TCEQ will need to resolve data gaps:

- Check other data sources – STARS
- Make estimates based on best engineering practices and/or other survey results

Prepare 2009 hourly emission records for model



# CONTACT INFORMATION

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