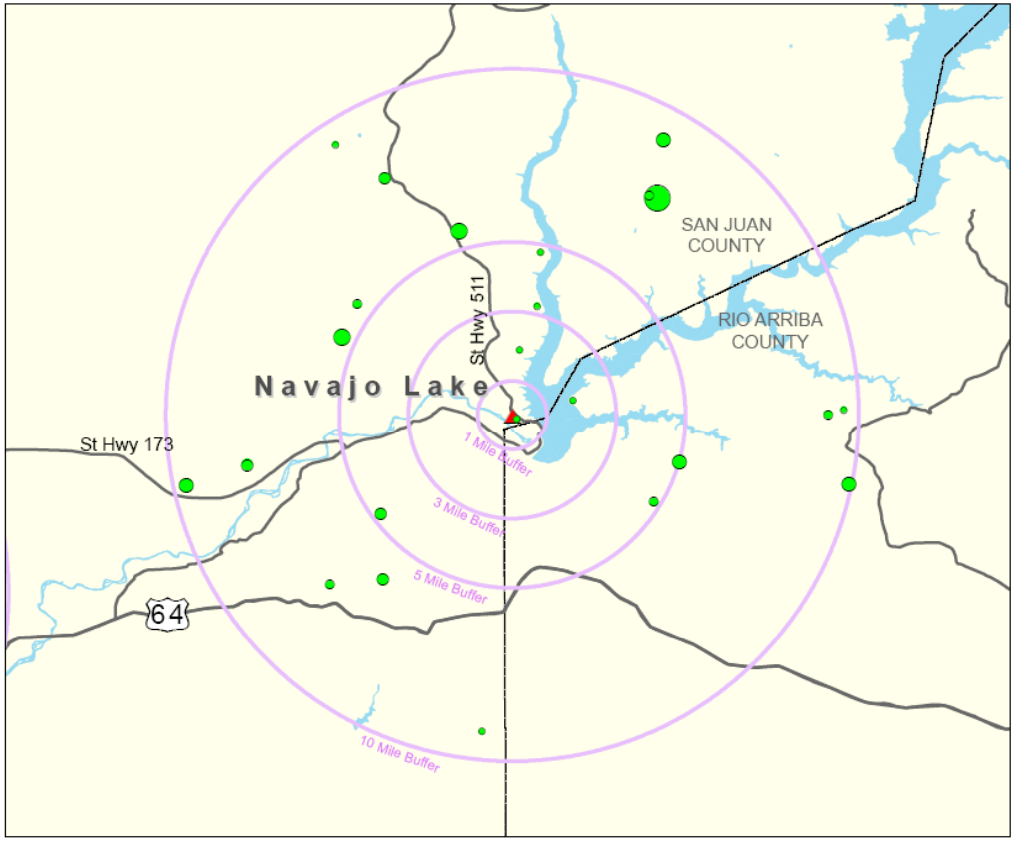
VOC Baseline Monitoring in San Juan Co., NM

- **Area Oil and Gas Industry has significantly expanded in the early 2000's**
- **Under review are plans for drilling 10,000 gas wells in the area over the next 20 years**
- **2 baseline VOC sites sampled in the summer of 2004: Bloomfield (5-8 AM) and Navajo Lake (4-7 PM)**
- **Bloomfield – fresh mobile source/industrial VOC emissions**
- **Navajo Lake – fresh and aged VOC emissions from oil and gas fields plus biogenics (if present in significant quantities)**

Four Corners Monitors and VOC Stationary Sources
--Navajo Lake Monitor--



Navajo Lake VOC Monitor

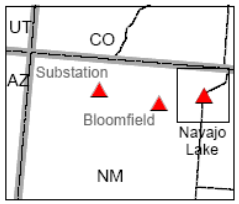
VOC Stationary Emission Source (t/y) 1999

- 0.90 - 29.99 t/y
- 30.00 - 59.99 t/y
- 60.00 - 89.99 t/y
- 90.00 - 119.99 t/y
- 120.00 - 149.99 t/y
- 150.00 - 179.99 t/y
- 180.00 - 209.99 t/y
- 210.00 - 239.99 t/y

Major Highway
1, 3, 5, 10 Mile Buffer
City/Town
County Boundary
State Boundary

0 1.25 2.5 5
Miles

Map Index



N

Sources:
EPA Region 6 PD,
EPA Houston Lab,
EPA AQS Database, NMED,
EPA 1999 National Emission Inventory.

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GIS Support Team
May 10, 2005
20050510ML03

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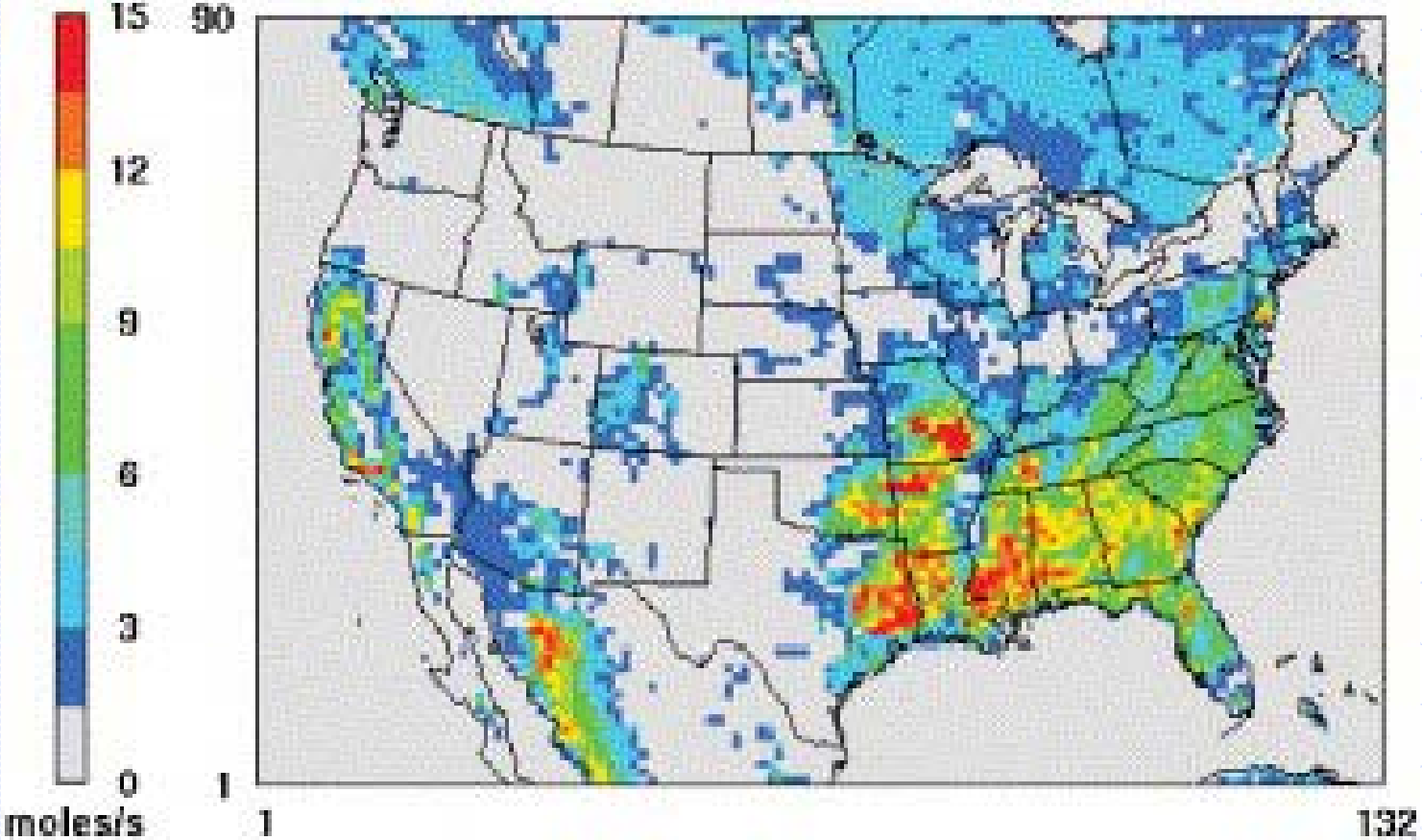
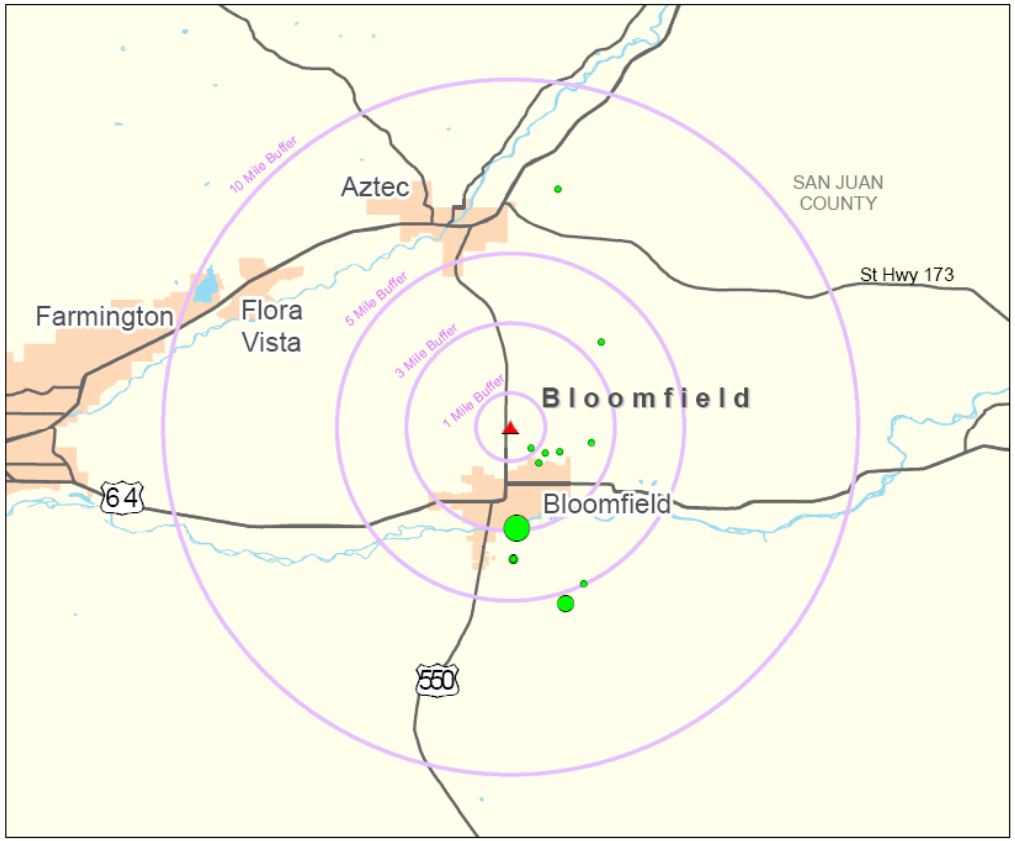
weekday

	Navajo Lake (3-6 PM LST) mean values	*Baton Rouge Pride (3-6 PM LST) mean values*	*Baton Rouge Plaquemine (3-6 PM LST) mean values*
	July-Sept. 2004 (1/6)	*June-Aug. 2003 (1/3)*	*June-Aug. 2003 (1/3)*
VOC Species	25 miles northeast of Bloomfield	20 miles northeast of downtown Baton Rouge	20 miles southwest of downtown Baton Rouge
isoprene	0 ppbC	17 ppbC	11 ppbC
propane	11 ppbC	3 ppbC	4 ppbC
n-butane	4 ppbC	2 ppbC	2 ppbC
isobutane	3 ppbC	2 ppbC	2 ppbC
n-pentane	2 ppbC	2 ppbC	2 ppbC
isopentane	2 ppbC	2 ppbC	2 ppbC

July emissions of isoprene in the U.S. from BEIS3
(Mauzerall et al., Atmospheric Environment 5/05)



Four Corners Monitors and VOC Stationary Sources
--Bloomfield Monitor--



Bloomfield Monitor

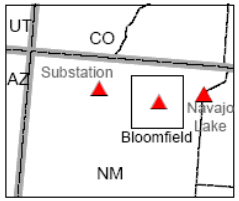
VOC Stationary Emission Source (t/y) 1999

- 0.40 - 99.99 t/y
- 100.00 - 199.99 t/y
- 200.00 - 299.99 t/y
- 300.00 - 399.99 t/y
- 400.00 - 499.99 t/y
- 500.00 - 599.99 t/y
- 600.00 - 699.99 t/y
- 700.00 - 800.00 t/y

Major Highway
1, 3, 5, 10 Mile Buffer
City/Town
County Boundary
State Boundary

0 1.25 2.5 5
Miles

Map Index



Sources:
EPA Region 6 PD,
EPA Houston Lab,
EPA AQS Database, NMED,
EPA 1999 National Emission Inventory.

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May 10, 2005
20050510ML02

N

weekday

	Bloomfield (4-7 AM LST) mean values	*Beaumont (5-8 AM LST) mean values*
	July-Sept 2004 (1/6)	Aug.-Oct 2003
VOC Species	Canister 3-hour data	Auto gas chromatograph 1-hour data
isoprene	0 ppbC	1 ppbC
propane	123 ppbC	95 ppbC
n-butane	49 ppbC	75 ppbC
isobutane	33 ppbC	58 ppbC
n-pentane	23 ppbC	36 ppbC
isopentane	37 ppbC	50 ppbC
toluene	48 ppbC	7 ppbC
m/p xylene	14 ppbC	4 ppbC

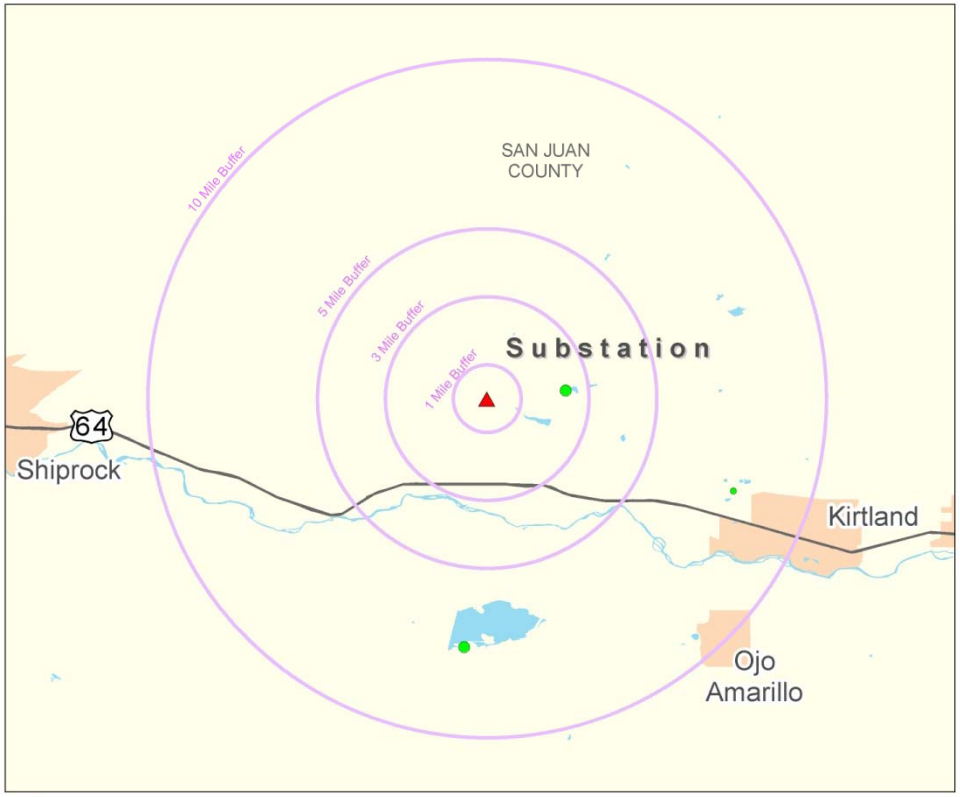
2004 VOC baseline data results

- **1. Alkanes dominated, especially propane.**
- **2. The biogenic compound isoprene and the HRVOC propylene not present in significant quantities.**
- **3. High toluene and m/p xylene at Bloomfield site due to nearby painting operations and oil/solvent storage tanks.**

2005 VOC baseline monitoring

- PAMS-like canister monitoring done once every 6 days from 6/15-9/15, 2005 at Substation and Navajo Lake sites.
- Ethane, ethylene, and acetylene measured in addition to other compounds measured in 2004.
- Substation – fresh VOC emissions from power plant + aged VOC emissions from cities, other industrial sources and oil and gas fields.
- Navajo Lake – fresh and aged VOC emissions from oil and gas fields.

Four Corners Monitors and VOC Stationary Sources
--Substation Monitor--



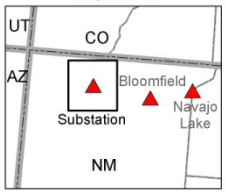
Substation Monitor

VOC Stationary Emission Source (t/y) 1999

- 0.40 - 99.99 t/y
- 100.00 - 199.99 t/y
- 200.00 - 299.99 t/y
- 300.00 - 399.99 t/y
- 400.00 - 499.99 t/y
- 500.00 - 599.99 t/y
- 600.00 - 699.99 t/y
- 700.00 - 800.00 t/y
- Major Highway
- 1, 3, 5, 10 Mile Buffer
- City/Town
- County Boundary
- State Boundary

0 1.25 2.5 5
Miles

Map Index



Sources:
EPA Region 6 PD,
EPA Houston Lab,
EPA AQS Database, NMED,
EPA 1999 National Emission Inventory.

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May 10, 2005
20050510ML01

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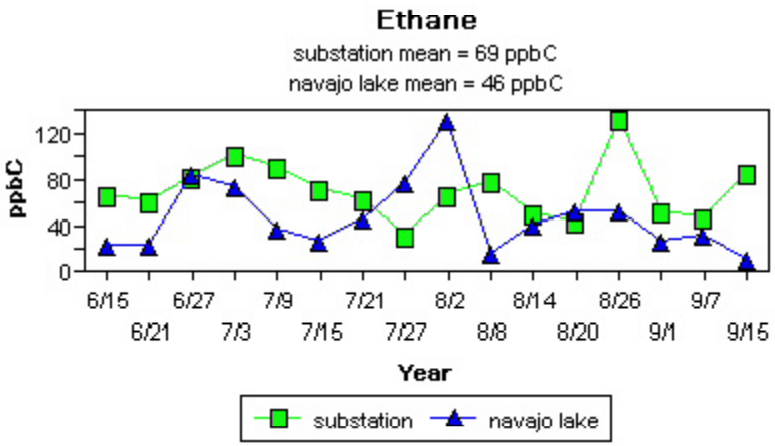
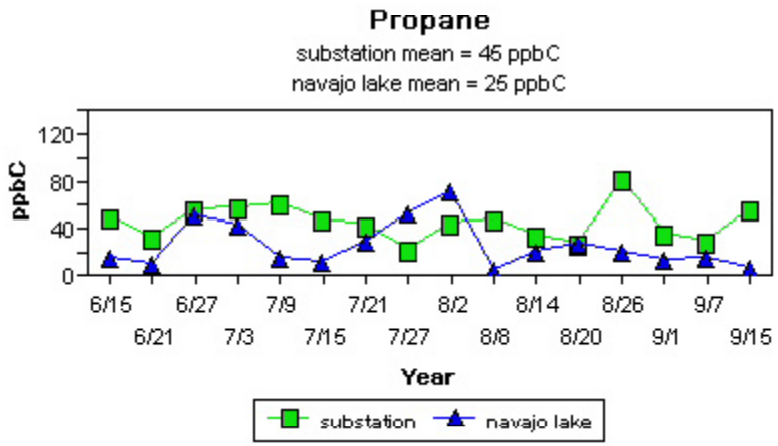
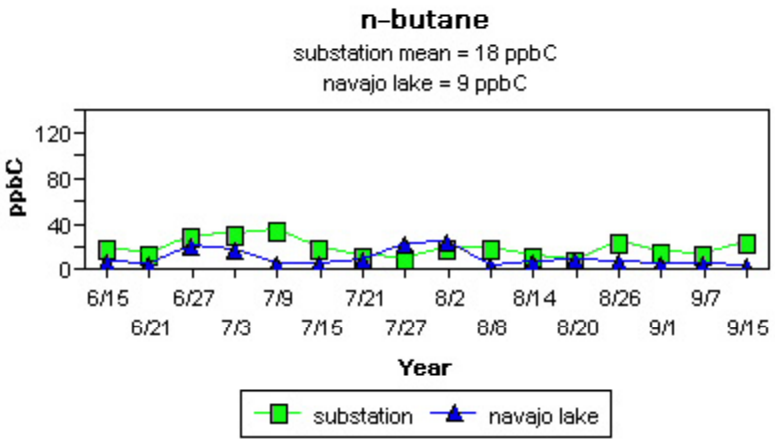
2005 every 6 day from 6/15-9/13 (9/15 for NM sites); 6-9 AM LST; arithmetic means in ppbC				
compound	substation	navajo lake	baton rouge capitol	houston deer park
ethane	69	46	23	33
propane	45	25	21	34
n-butane	18	9	17	19
isobutane	9	6	10	18
n-pentane	8	6	12	11
isopentane	9	9	28	20
n-hexane	4	3	14	8
toluene	4	7	12	9
24-hour canisters every 6 days; 14 samples; invalid canisters at substation on 6/15 and 8/20				
compound	substation	beaumont-port arthur	houston channelview	
ethane	33	33	29	
propane	22	43	37	
n-butane	9	32	23	
isobutane	5	29	19	
n-pentane	4	18	7	
isopentane	8	30	17	
n-hexane	2	4	3	
toluene	4	4	7	

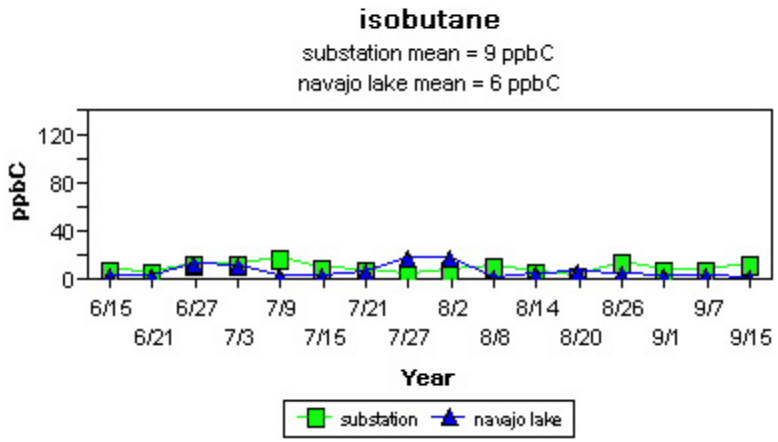
San Juan County, New Mexico VOC Time Series

June-September Morning (6-9 AM LST), 2005









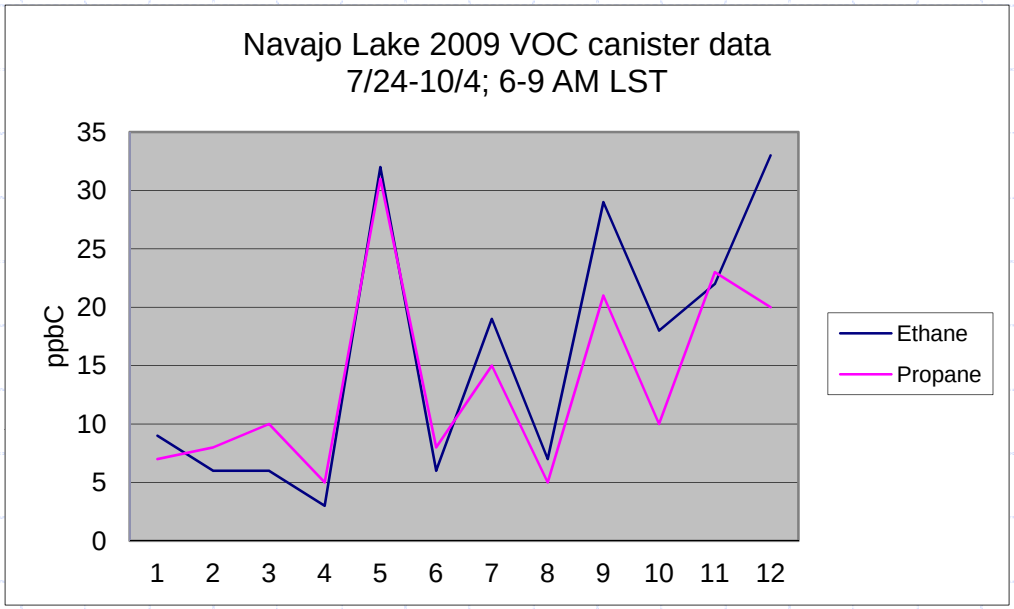
2005 VOC baseline data results

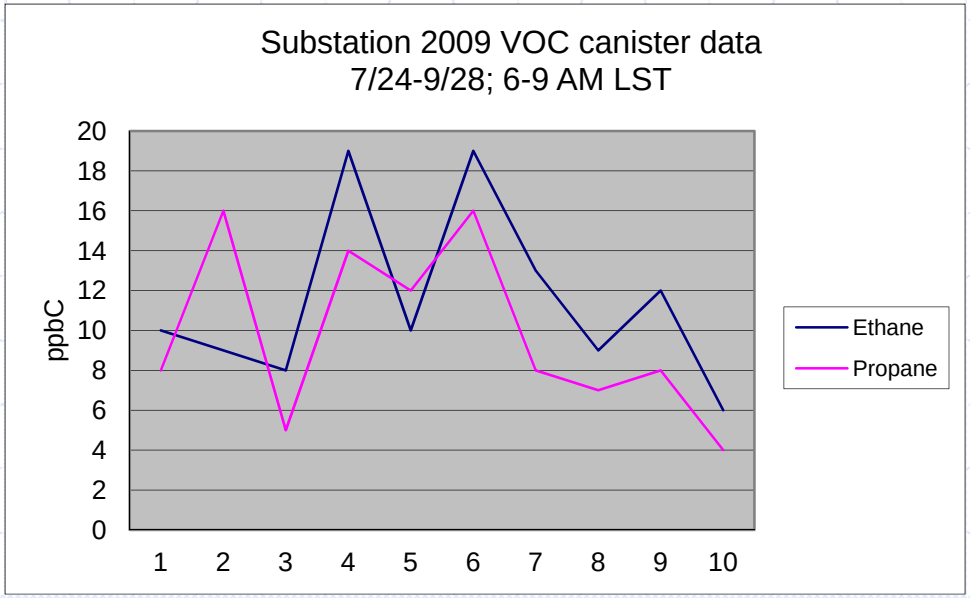
- 1. Alkanes dominated again, especially ethane and propane.
- 2. The biogenic compound isoprene and the HRVOC compounds ethylene and propylene **not** present in significant quantities.
- 3. Morning ethane and propane concentrations similar or higher than sites in Baton Rouge and Houston.

2009 VOC monitoring

- PAMS-like canister monitoring done again once every 6 days from 7/24-10/4, 2009 at Substation and Navajo Lake sites.
- Only 3-hour canisters taken from 6-9 AM LST.

2009 every 6 day from 7/24-10/4; 6-9 AM LST; arithmetic means in ppbC				
compound	substation	navajo lake	baton rouge capitol	houston deer park
ethane	12	16	11	18
propane	10	14	14	17
n-butane	4	6	8	11
isobutane	2	4	5	7
n-pentane	2	3	5	8
isopentane	2	4	9	15
n-hexane	U	0	2	5
toluene	2	1	4	5
U=Undetected				


Navajo Lake 2009 VOC canister data
7/24-10/4; 6-9 AM LST
ppbC
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
Ethane
Propane


Substation 2009 VOC canister data
7/24-9/28; 6-9 AM LST
ppbC
20
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
6
7
8
9
10
Ethane
Propane

2009 VOC monitoring data results

- 1. Alkanes dominated again, especially ethane and propane.
- 2. Morning ethane and propane concentrations similar or lower than sites in Baton Rouge and Houston.
- 3. Alkane concentrations, including ethane and propane, notably decreased from 2005 to 2009.