



Summary of Mobile Monitoring Activities relating to the Barnett Shale

Revised 10/23/09

The TCEQ is in the process of studying the emissions from gas production and their impacts in the Barnett Shale area (Attachment 1). In an effort to gather information, the Mobile Monitoring Team has conducted two trips to monitor emissions in this area. Phase I of the study was conducted August 26-27 and Phase II occurred October 9-16, 2009. These trips included surveying the area using infrared (IR) imagery, total vapor analyzers (TVA), hydrogen sulfide monitors, monitoring for nitrogen oxides (NOx) and collecting volatile organic compound (VOC) samples. Over sixty locations were monitored in the five county area of Tarrant, Parker, Wise, Denton, and Johnson Counties (Attachment 2).

Phase I

The first phase of the study looked at 12 sites that were identified through odor complaints received in the region. Emission sources were identified at 11 of the 12 sites. Images were also taken at various locations throughout the area and identified storage tanks, compressor stations, wells, and associated equipment with significant hydrocarbon emissions. Also monitored during the trip were associated businesses such as water disposal facilities. A GasFindIR camera along with a TVA were used to identify VOC emission sources. At several sites, canister samples were taken to characterize the plumes detected (Attachment 3).

Phase II

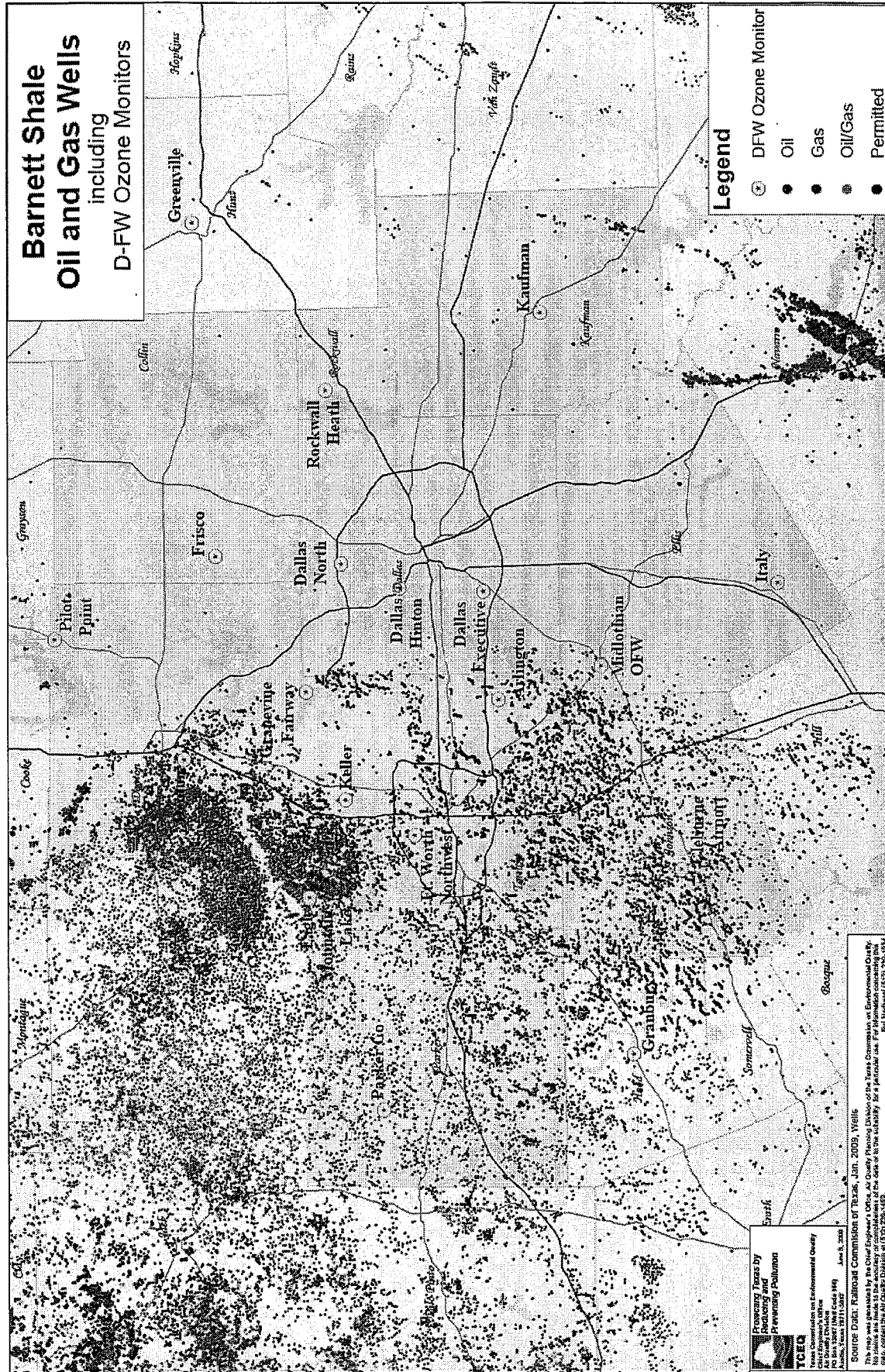
The second phase included returning to many of the sites identified in the first phase to conduct a more comprehensive evaluation of the emissions. Data on VOC emissions was collected using real time gas chromatographs along with IR imaging and canister sampling to more thoroughly characterize the emissions. In addition, monitoring for NOx was conducted to provide information on the impact these types of facilities have on local concentrations of this ozone precursor.

Preliminary results indicate that some elevated emission levels were detected. A maximum benzene concentration of 1000 parts per billion by volume (ppbv) and hourly average of 540 ppbv was detected west of DISH at the Targa facility (Site 8). The short term Effects Screening Level for benzene is 180 ppbv. Elevated NOx levels of 40-70 ppbv (Site 2) and 85 ppbv (Site 4) were detected downwind of compressor stations at these sites.

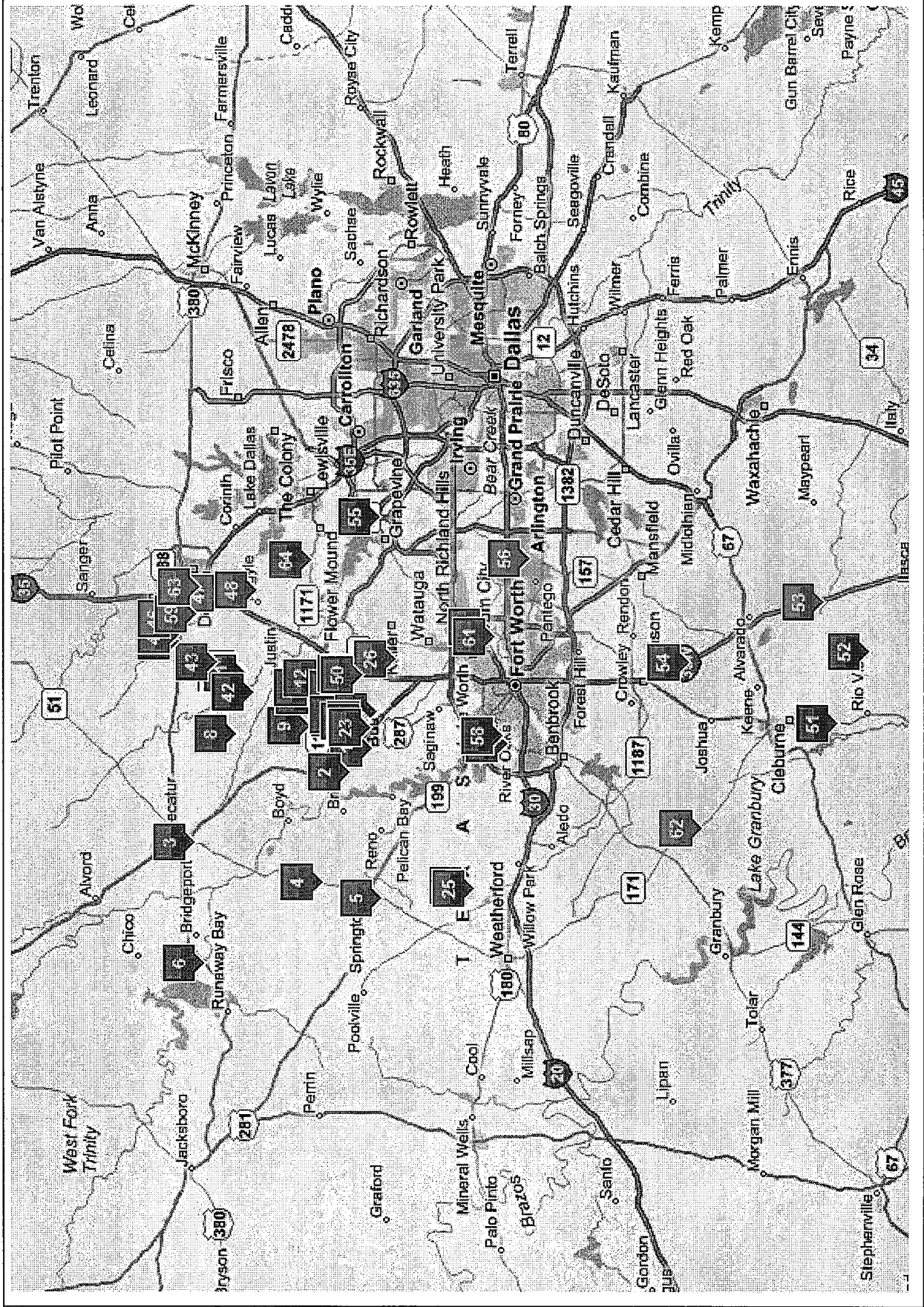
Future Plans

Future plans for monitoring in this area include a third phase to monitor for sulfide related compounds, such as carbon disulfide, which were indicated to be present in reports commissioned by the City of DISH and a private citizen, Ms. Deborah Rogers. This trip is planned for November. A fourth phase will occur in conjunction with a proposed study funded by the Chief Engineers Office and will include determining emission rates and characteristics of emissions at sources along with off site impacts of the emissions. The fourth phase is tentatively planned to occur during the spring of 2010.

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Attachment 2



Attachment 3

Sample Number	BSF0908-01				BSF0908-02				BSF0908-16				BSF0908-17			
Sample Date	8/25/09				08/25/09				08/26/09				08/25/09			
Sample Time	18:08				17:50				17:00				20:47			
Sample Site	Site 16 HWY 171 Between Covington and Cleburne				Site 16				Site 8 5 to 10 miles west of Dish Taken at wellhead				Site 2 NE of Weatherford			
Compound	Short-term ESL	SDL	(ppbv)	Flags	SDL	(ppbv)	Flags	SDL	(ppbv)	Flags	SDL	(ppbv)	Flags	SDL	(ppbv)	Flags
ethane	10000	1.0	7.4	D1	10.00	2000	D2	200000	45000000	D3	100	12000	D4			
ethylene	1200	1.0	0.41	J,D1	10.00	ND	D2	200000	ND	D3	100	28	J,D4			
acetylene	25000	1.0	ND	D1	10.00	ND	D2	200000	ND	D3	100	ND	D4			
propane	10000	1.0	0.72	J,D1	10.00	350	D2	200000	15000000	D3	100	3900	D4			
propylene	68000	1.0	0.21	J,D1	10.00	ND	D2	200000	ND	D3	100	ND	D4			
dichlorodifluoromethane	10000	0.40	0.52	L,D1	4.00	0.50	J,D2	80000	2700	J,D3	40	1.9	J,D4			
methyl chloride	500	0.40	0.68	L,D1	4.00	0.74	J,D2	80000	12000	J,D3	40	9.7	J,D4			
isobutane	2000	0.46	0.09	J,D1	4.6	73	D2	92000	3900000	D3	46	680	D4			
vinyl chloride	50	0.34	ND	D1	3.4	ND	D2	68000	ND	D3	34	1.8	J,D4			
1-butene	360	0.40	0.21	J,D1	4.00	1.0	J,D2	80000	23000	J,D3	40	15	J,D4			
1,3-butadiene	50	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	ND	D4			
n-butane	8000	0.40	0.14	J,D1	4.00	76	D2	80000	4000000	D3	40	1000	D4			
t-2-butene	2100	0.36	ND	D1	3.6	ND	D2	72000	ND	D3	36	ND	D4			
bromomethane	30	0.54	0.01	J,D1	5.4	ND	D2	110000	ND	D3	54	2.7	J,D4,A1			
c-2-butene	2100	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	1.4	J,D4			
3-methyl-1-butene	250	0.46	ND	D1	4.6	ND	D2	92000	ND	D3	46	ND	D4			
isopentane	1200	0.54	0.05	J,D1	5.4	26	D2	110000	1500000	D3	54	330	D4			
trichlorofluoromethane	5000	0.58	0.26	J,D1	5.8	ND	D2	120000	ND	D3	58	2.6	J,D4			
1-pentene	100	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	ND	D4			
n-pentane	1200	0.54	ND	D1	5.4	15	L,D2	110000	880000	D3	54	280	D4			
isoprene	5	0.54	2.0	D1	5.4	1.4	J,D2	110000	ND	D3	54	2.1	J,D4			
t-2-pentene	2600	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	2.1	J,D4			
1,1-dichloroethylene	180	0.36	ND	D1	3.6	ND	D2	72000	ND	D3	36	2.9	J,D4			
c-2-pentene	2600	0.50	ND	D1	5	ND	D2	100000	ND	D3	50	1.8	J,D4			
methylene chloride	75	0.28	0.04	J,D1	2.8	ND	D2	56000	6400	J,D3	28	2.3	J,D4			
2-methyl-2-butene	250	0.46	ND	D1	4.6	ND	D2	92000	ND	D3	46	ND	D4			
2,2-dimethylbutane	1000	0.42	ND	D1	4.2	1.2	J,D2	84000	65000	J,D3	42	8.1	J,D4			

cyclopentene	2900	0.40	ND	D1	4.00	ND	D2	80000	ND	D3	40	1.8	J,D4
4-methyl-1-pentene	20	0.44	ND	D1	4.4	ND	D2	88000	ND	D3	44	1.8	J,D4
1,1-dichloroethane	1000	0.38	ND	D1	3.8	ND	D2	76000	ND	D3	38	1.3	J,D4
cyclopentane	1200	0.54	ND	D1	5.4	0.30	J,D2	110000	10000	J,D3	54	5.9	J,D4
2,3-dimethylbutane	1000	0.56	ND	D1	5.6	0.87	J,D2	110000	46000	J,D3	56	9.0	J,D4
2-methylpentane	83	0.54	ND	D1	5.4	5.3	J,D2	110000	310000	D3	54	78	L,D4
3-methylpentane	1000	0.46	ND	D1	4.6	3.5	J,D2	92000	190000	L,D3	46	47	L,D4
2-methyl-1-pentene + 1-hexene	20	0.40	ND	D1	4.00	ND	D2	80000	ND	D3	40	ND	D4
n-hexane	1500	0.40	ND	D1	4.00	5.7	L,D2	80000	310000	D3	40	110	L,D4
chloroform	20	0.42	0.01	J,D1	4.2	ND	D2	84000	ND	D3	42	ND	D4
t-2-hexene	20	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	ND	D4
c-2-hexene	20	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	1.0	J,D4
1,2-dichloroethane	40	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	1.7	J,D4
methylcyclopentane	750	0.54	ND	D1	5.4	0.57	J,D2	110000	26000	J,D3	54	21	J,D4
2,4-dimethylpentane	910	0.54	ND	D1	5.4	ND	D2	110000	16000	J,D3	54	4.6	J,D4
1,1,1-trichloroethane	2000	0.52	0.01	J,D1	5.2	ND	D2	100000	ND	D3	52	ND	D4
benzene	180	0.54	0.07	J,D1	5.4	0.64	J,D2	110000	15000	J,D3	54	24	J,D4
carbon tetrachloride	20	0.54	0.1	J,D1	5.4	0.10	J,D2	110000	ND	D3	54	1.0	J,D4
cyclohexane	420	0.48	ND	D1	4.8	ND	D2	96000	70000	J,D3	48	39	J,D4
2-methylhexane	750	0.54	ND	D1	5.4	1.9	J,D2	110000	120000.00	L,D3	54	37	J,D4
2,3-dimethylpentane	910	0.52	ND	D1	5.2	ND	D2	100000	20000	J,D3	52	7.5	J,D4
3-methylhexane	750	0.40	ND	D1	4.00	1.4	J,D2	80000	87000	L,D3	40	35	J,D4
1,2-dichloropropane	250	0.34	ND	D1,A5	3.4	ND	D2,A5	68000	ND	D3,A5	34	ND	D4,A2
trichloroethylene	250	0.58	ND	D1	5.8	ND	D2	120000	ND	D3	58	1.1	J,D4
2,2,4-trimethylpentane	750	0.48	ND	D1	4.8	ND	D2	96000	1400	J,D3	48	ND	D4
2-chloropentane	190	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	1.1	J,D4
n-heptane	850	0.50	ND	D1	5	1.30	J,D2	100000	72000	J,D3	50	50	J,D4
c-1,3-dichloropropylene	10	0.40	ND	D1	4.00	ND	D2	80000	ND	D3	40	1.2	J,D4
methylcyclohexane	4000	0.52	ND	D1	5.2	ND	D2	100000	41000	J,D3	52	42	J,D4
t-1,3-dichloropropylene	10	0.40	ND	D1	4.00	ND	D2	80000	ND	D3	40	1.5	J,D4
1,1,2-trichloroethane	100	0.42	ND	D1	4.2	ND	D2	84000	ND	D3	42	ND	D4
2,3,4-trimethylpentane	750	0.48	ND	D1	4.8	ND	D2	96000	ND	D3	48	ND	D4
toluene	170	0.54	0.06	J,D1	5.4	0.97	J,D2	110000	21000.00	J,D3	54	120	L,D4
2-methylheptane	750	0.40	ND	D1	4.00	0.27	J,D2	80000	16000	J,D3	40	19	J,D4
3-methylheptane	750	0.46	ND	D1	4.60	0.27	J,D2	92000.00	12000	J,D3	46	14	J,D4
1,2-dibromoethane	0.5	0.40	ND	D1	4.00	ND	D2	80000	ND	D3	40	0.92	J,D4
n-octane	750	0.38	ND	D1	3.8	0.29	J,D2	76000	17000	J,D3	38	25	J,D4
tetrachloroethylene	770	0.48	ND	D1	4.8	ND	D2	96000	ND	D3	48	ND	D4

chlorobenzene	100	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	ND	D4
ethylbenzene	460	0.54	0.02	J,D1	5.4	0.40	J,D2	110000	7400	J,D3	54	10	J,D4
m & p-xylene	480	0.54	0.06	J,D1	5.4	1.1	J,D2	110000	20000	J,D3	54	93	L,D4
styrene	25	0.54	ND	D1	5.4	ND	D2	110000	18000	J,D3	54	4.2	J,D4
1,1,2,2-tetrachloroethane	10	0.40	ND	D1	4.00	ND	D2	80000	ND	D3	40	1.4	J,D4,A3
o-xylene	1000	0.54	ND	D1	5.4	0.40	J,D2	110000	ND	D3	54	18	J,D4
n-nonane	2000	0.44	ND	D1	4.4	ND	D2	88000	14000	J,D3	44	14	J,D4
isopropylbenzene	100	0.48	ND	D1	4.8	ND	D2	96000	ND	D3	48	3.3	J,D4
n-propylbenzene	250	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	1.9	J,D4
m-ethyltoluene	250	0.22	ND	D1	2.2	0.64	J,D2	44000	ND	D3	22	3.1	J,D4
p-ethyltoluene	250	0.32	ND	D1	3.2	0.26	J,D2	64000	ND	D3	32	1.8	J,D4
1,3,5-trimethylbenzene	250	0.5	ND	D1	5	0.29	J,D2	100000	ND	D3	50	3.0	J,D4
o-ethyltoluene	250	0.26	ND	D1	2.6	0.27	J,D2	52000	ND	D3	26	1.6	J,D4
1,2,4-trimethylbenzene	250	0.54	0.04	J,D1	5.4	1.3	J,D2	110000	ND	D3	54	5.3	J,D4
n-decane	1800	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	8.7	J,D4
1,2,3-trimethylbenzene	250	0.54	ND	D1	5.4	0.38	J,D2	110000	4500	J,D3	54	2.5	J,D4
m-diethylbenzene	460	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	ND	D4
p-diethylbenzene	460	0.54	ND	D1	5.4	ND	D2	110000	ND	D3	54	ND	D4
n-undecane	200	0.54	0.03	J,D1	5.4	ND	D2	110000	10000	J,D3	54	7.3	J,D4

Sample Number	BSF0908-24				BSF0908-25			
Sample Date	08/26/09				08/26/09			
Sample Time	12:50				13:10			
Sample Site	Site 5 South of Springtown Parker County taken onsite at Salty's Disposal well				Site 5 taken onsite at Salty's Disposal well			
Compound	Short-term ESL	SDL	(ppbv)	Flags	SDL	(ppbv)	Flags	
ethane	10000	0.50	34		25	580	D5	
ethylene	1200	0.50	ND	J	25	9.8	J,D5	
acetylene	25000	0.50	ND		25	ND	D5	
propane	10000	0.50	10		25	48	L,D5	
propylene	68000	0.50	0.07	J	25	ND	D5	
dichlorodifluoromethane	10000	0.20	0.51	L	10	1.8	J,D5	
methyl chloride	500	0.20	0.69		10	2.7	J,D5	
isobutane	2000	0.23	2.4		12	13	L,D5	
vinyl chloride	50	0.17	ND		8.5	3.5	J,D5	
1-butene	360	0.20	0.29	L	10	5.8	J,D5	
1,3-butadiene	50	0.27	ND		14	2.6	J,D5	
n-butane	8000	0.20	4.7		10	26	L,D5	
t-2-butene	2100	0.18	ND		9	0.75	J,D5	
bromomethane	30	0.27	0.02	J,A1	14	ND	D5,A1	
c-2-butene	2100	0.27	0.02	J	14	0.90	J,D5	
3-methyl-1-butene	250	0.23	0.01	J	12	0.56	J,D5	
isopentane	1200	0.27	3.7		14	23	L,D5	
trichlorofluoromethane	5000	0.29	0.23	J	15	1.2	J,D5	
1-pentene	100	0.27	ND		14	ND	D5	
n-pentane	1200	0.27	4.1		14	24	L,D5	
isoprene	5	0.27	1.3		14	3.2	J,D5	
t-2-pentene	2600	0.27	ND		14	0.29	J,D5	
1,1-dichloroethylene	180	0.18	0.01	J	9	1.4	J,D5	
c-2-pentene	2600	0.25	0.01	J	13	ND	D5	
methylene chloride	75	0.14	0.04	J	7	2.7	J,D5	
2-methyl-2-butene	250	0.23	0.02	J	12	0.41	J,D5	

2,2-dimethylbutane	1000	0.21	0.21	L	11	1.7	J,D5
cyclopentene	2900	0.20	ND		10	ND	D5
4-methyl-1-pentene	20	0.22	ND		11	0.78	J,D5
1,1-dichloroethane	1000	0.19	ND		9.5	ND	D5
cyclopentane	1200	0.27	0.21	J	14	1.8	J,D5
2,3-dimethylbutane	1000	0.28	0.28	L	14	2.8	J,D5
2-methylpentane	83	0.27	2.5		14	18	L,D5
3-methylpentane	1000	0.23	1.8		12	12	L,D5
2-methyl-1-pentene + 1-hexene	20	0.20	ND		10	ND	D5
n-hexane	1500	0.20	4.4		10	32	D5
chloroform	20	0.21	ND		11	ND	D5
t-2-hexene	20	0.27	ND		14	ND	D5
c-2-hexene	20	0.27	0.01	J	14	ND	D5
1,2-dichloroethane	40	0.27	ND		14	18	L,D5
methylcyclopentane	750	0.27	0.99		14	6.1	J,D5
2,4-dimethylpentane	910	0.27	0.27	L	14	2.1	J,D5
1,1,1-trichloroethane	2000	0.26	ND		13	0.25	J,D5
benzene	180	0.27	3.2		14	93	D5
carbon tetrachloride	20	0.27	0.09	J	14	0.48	J,D5
cyclohexane	420	0.24	2.0		12	17	L,D5
2-methylhexane	750	0.27	3.1		14	22	L,D5
2,3-dimethylpentane	910	0.26	0.57	L	13	4.2	J,D5
3-methylhexane	750	0.20	3.2		10	21	L,D5
1,2-dichloropropane	250	0.17	ND	A2	8.5	ND	D5,A2
trichloroethylene	250	0.29	ND		15	0.28	J,D5
2,2,4-trimethylpentane	750	0.24	ND		12	ND	D5
2-chloropentane	190	0.27	0.02	J	14	0.35	J,D5
n-heptane	850	0.25	5.4		13	32	D5
c-1,3-dichloropropylene	10	0.20	ND		10	ND	D5
methylcyclohexane	4000	0.26	5.1		13	30	L,D5
t-1,3-dichloropropylene	10	0.20	ND		10	0.24	J,D5
1,1,2-trichloroethane	100	0.21	ND		11	ND	D5
2,3,4-trimethylpentane	750	0.24	0.04	J	12	0.57	J,D5
toluene	170	0.27	5.70		14	120	D5
2-methylheptane	750	0.20	2.8		10	20	L,D5
3-methylheptane	750	0.23	2.2		12	17	L,D5

1,2-dibromoethane	0.5	0.20	0.02	J	10	ND	D5
n-octane	750	0.19	3.8		9.5	29	L,D5
tetrachloroethylene	770	0.24	ND		12	0.23	J,D5
chlorobenzene	100	0.27	0.15	J	14	ND	D5
ethylbenzene	460	0.27	0.40	L	14	29	L,D5
m & p-xylene	480	0.27	5.7		14	130	D5
styrene	25	0.27	ND		14	42	D5
1,1,2,2-tetrachloroethane	10	0.20	0.02	J,A3	10	ND	D5,A3
o-xylene	1000	0.27	1.3		14	39	D5
n-nonane	2000	0.22	5.1		11	57	D5
isopropylbenzene	100	0.24	0.10	J	12	29	D5
n-propylbenzene	250	0.27	0.28	L	14	2.3	J,D5
m-ethyltoluene	250	0.11	0.90		5.5	9.1	L,D5
p-ethyltoluene	250	0.16	0.29	L	8.0	2.9	J,D5
1,3,5-trimethylbenzene	250	0.25	1.6		13	17	L,D5
o-ethyltoluene	250	0.13	0.49	L	6.5	3.9	J,D5
1,2,4-trimethylbenzene	250	0.27	3.2		14	28	L,D5
n-decane	1800	0.27	9.4	D6	14	89	D5
1,2,3-trimethylbenzene	250	0.27	1.8		14	9.7	J,D5
m-diethylbenzene	460	0.27	ND		14	ND	D5
p-diethylbenzene	460	0.27	2.4		14	12	J,D5
n-undecane	200	0.27	20	D6	14	110	D5