CHEROKEE NATION

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Chad "Corntassel" Smith
Principal Chief

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Deputy Principal Chief

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GPD-S SECTION
EPA DALLAS, TX

February 22, 2008

Aunjanee Gautreaux, 6PD-Q
Air Quality Analysis Section
U. S. EPA, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: CHEROKEE NATION COMMUNITY AIR TOXICS PROJECT SIXTH QUARTER TECHNICAL REPORT

Dear Ms. Gautreaux:

Enclosed is the Sixth Quarter Technical Report (September, October, November, 2007) for the Cherokee Nation's Community Air Toxics Project (Cooperative Agreement number XA-96619701-0). The sixth quarter financial report and MBE/WBE will be provided by the Cherokee Nation Accounting Department and by our financial staff, respectively.

If you have any questions regarding these matters, please call Ryan Callison at 918-453-5093 or Kent Curtis at 918-453-5095.

Sincerely,

Tom Elkins
Acting Administrator for Environmental Programs

Enclosure

cc: File

Looks good! AZC

QUARTERLY TECHNICAL REPORT
for
CHEROKEE NATION ENVIRONMENTAL PROGRAMS (CNEP)
COMMUNITY AIR TOXICS PROJECT
(XA-96619701-0)

SIXTH QUARTER FY2007
(SEPTEMBER, OCTOBER, NOVEMBER, 2007)

OVERVIEW OF PROJECT ORIGIN AND PURPOSE

The origin and purpose of this project are described in the first quarterly technical report for this project. In summary, the Cherokee Nation is currently conducting this 18-month VOC sampling project at its Cherokee Heights (aka, Pryor) site (**Figure 1**), collecting samples in vacuum canisters for analyses via EPA Test Method TO-15. Over 90 samples will be collected using a 1-in-6 day sampling interval. The 18-month project will document seasonal variations in VOC concentrations and will focus on hazardous air pollutants (VOC HAPs) identified as "drivers" in the 1999 NATA, as well as on VOC HAPs detected in the Cherokee Nation's screening project from the winter of 2005. Project data will be shared with the EPA, the state of Oklahoma (ODEQ), the Cherokee Nation, and the general public via AQS, XML flat file, and other means, as appropriate.

SIXTH QUARTER GOALS, OBJECTIVES, AND ACCOMPLISHMENTS

1. Continue sample collection in accordance with the Proposed Sampling Schedule for this project. Sample collection began as scheduled on September 26, 2006. Sixty-six samples (plus six duplicates) were collected as of November 26, 2007. Summary information for these 72 samples is shown on the first four pages of the Proposed Sampling Schedule for this project, which is included as **Appendix A** of this quarterly technical report. Seven samples – collected on December 1st, December 25th, April 18th, June 29th, and October 3rd – were invalid (unuseable) because the sample canisters had internal pressures of zero at the end of sample collection or because a leak from the canisters was suspected or because the sample period was too long. Duplicate samples scheduled for October 9th could not be collected because no sample canisters were available on that date. A further explanation of problems encountered with sample collection and analysis is included in the "Problems Encountered" section of this quarterly technical report.

2. Perform NATTS Certification and flow verification check on backup RM910A sampler. The CNEP sent its backup sampler to ERG for an EPA Compendium Method TO-15 "canister sampling system certification" (aka, NATTS Certification) in February, 2007. ERG performed this certification on February 5 and the sampler passed the certification. ERG returned the sampler to the CNEP in February, but the CNEP has not yet performed a flow verification check on it.

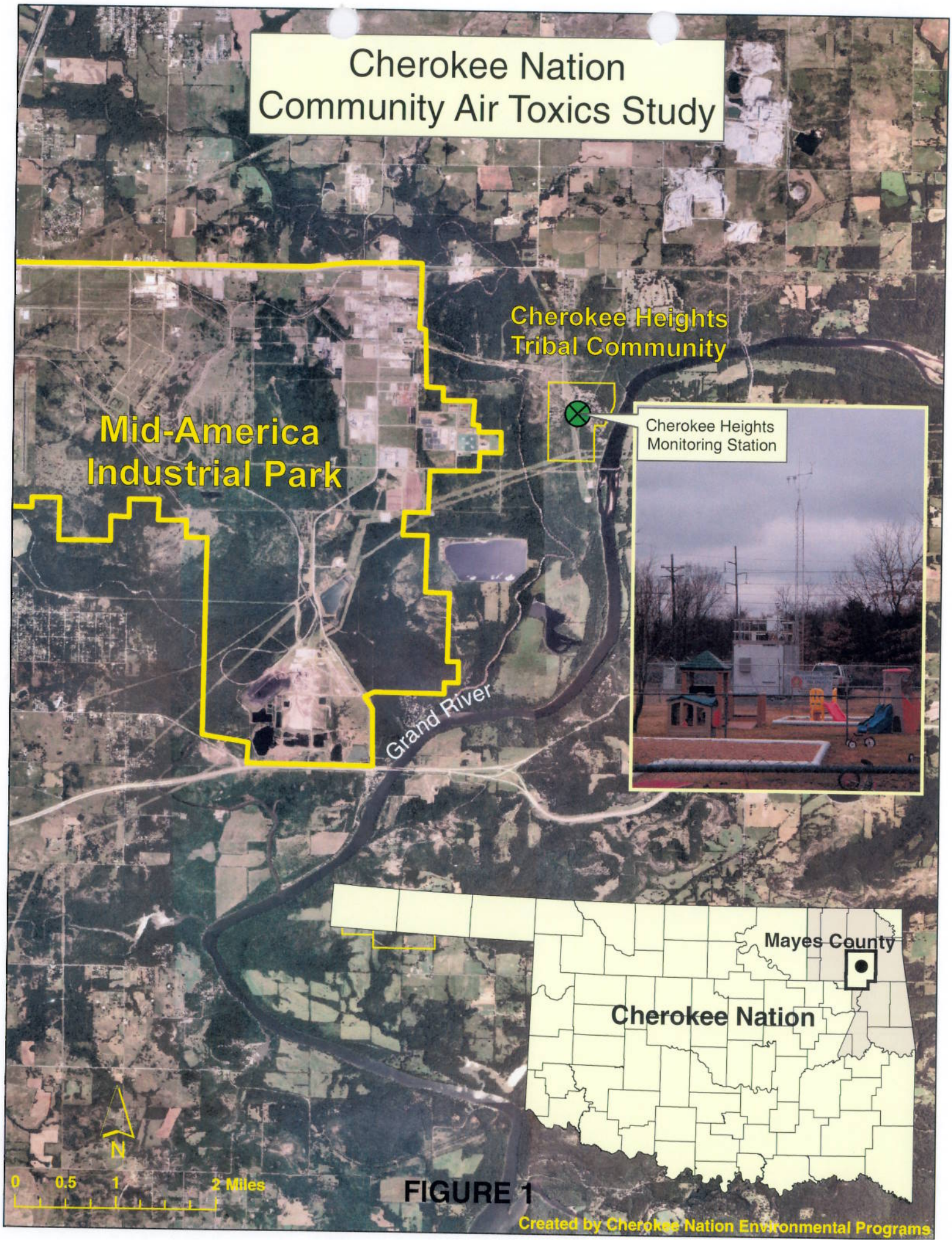

Cherokee Nation
Community Air Toxics Study
Cherokee Heights
Tribal Community
Mid-America
Industrial Park
Cherokee Heights
Monitoring Station
Grand River
Mayes County
Cherokee Nation
N
0 0.5 1 2 Miles
Created by Cherokee Nation Environmental Programs

FIGURE 1

3. ERG will begin reporting sample data to the CNEP within 45 days after the completion of the first month of sample collection. The CNEP received lab data for its first seven samples – collected from September 26th through October 26th – from ERG in December, 2006. Subsequently, the CNEP received data for samples collected from November, 2006 through October, 2007. The CNEP has analyzed this data. The CNEP's Data Summary reports are included in **Appendix B** of this quarterly technical report, along with CNEP tables of all the data. The data tables were compiled to facilitate the discovery and analysis of any seasonal trends in the data. ERG posted the data for July 5th through September 27th, 2007 to the AQS website in January, 2008.

4. One or more CNEP staff members will attend the EPA National Environmental Justice and Air Workshop. April Hathcoat attended the EPA National Environmental Justice and Air Workshop in San Francisco on September 6-7 and gave a presentation about CNEP air quality monitoring projects, including the VOC monitoring project.

5. The CNEP will begin revising its *Quality Assurance Project Plan and Work Plan* for this VOC monitoring project. Revision of the *Quality Assurance Project Plan and Work Plan* for this project was delayed because of Kent Curtis' medical leave of absence. Aunjanee Gautreaux of the EPA office in Dallas extended the approval of the existing QAPP through January 26, 2008. The CNEP completed revision of the QAPP on December 12, 2007 and submitted it to Aunjanee Gautreaux for approval. It was approved by the EPA on January 17, 2008.

Summary of Sixth Quarter Goals, Objectives, and Accomplishments. The goals and objectives of this project, including overall goals, have not changed from the original CNEP application for funding. Sixth quarter goals and objectives for this project were to continue sample collection, analyze sample data, obtain NATTS certification for the CNEP's backup RM910A sampler, send CNEP staff to technical conferences and trainings pertaining to air toxics monitoring, and begin revision of the project QAPP. These goals and objectives have been met. No significant difficulties or delays were encountered in meeting these sixth quarter goals and objectives. Approval of the existing QAPP was extended to January, 2008, and the revised QAPP was approved on January 17, 2008. In summary, work for this project is on schedule.

Project Timeline and Milestones. The following list shows the timeline and milestones for the entire two-year duration of this project. *Milestones that have been met are shown in italics.*

(1) Cherokee Nation will receive EPA approval of its QAPP for this project by June 1, 2006, or by the end of the second month of the project. *The original QAPP/Work Plan for this project was approved by the EPA in February, 2006. The CNEP revised this original QAPP in September, 2006, and the revised QAPP was approved by EPA on October 26, 2006. A second revision of the QAPP was submitted to EPA for approval in December, 2007, and it was approved on January 17, 2008.*

(2) Cherokee Nation will solicit bids from labs for sample analysis during the first month of the project and will select the winning bid and award the contract by the beginning of the third month of the project. *ERG was selected (August, 2006) to analyze project samples and perform data reporting for the project.*

(3) Cherokee Nation will begin sample collection by the beginning of the third month (September, 2006) of the project, or by the date of project QAPP approval by EPA, whichever is later. *Sample collection for this project began on September 26, 2006. As of November 26, 2007, sixty-six samples (plus six duplicate samples) had been collected for this project.*

(4) Cherokee Nation will begin data analysis as soon as the first data is received from lab. Data analysis will continue to the end of the project on May 31, 2008. *The CNEP began receiving lab data from ERG in December, 2006. As of December, 2007, the CNEP had analyzed ERG data for the first sixty-seven samples – collected from September 26, 2006 through October 27, 2007. Data analysis will be an ongoing activity until the end of this project in May, 2008.*

(5) Cherokee Nation will complete sample collection by the end of 18 months of sampling (March, 2008).

(6) ERG will submit sample data to CNEP within 45 days after the end of each month of sample collection. ERG will submit statistical analyses of data and quality assurance reports to CNEP at the end of each year of the project. *ERG began submitting sample data to the CNEP in December, 2006 (see Project Timeline and Milestone item 4 above).*

(7) ERG, under the terms of its contract with CNEP, will post project data to AQS within 90 days of the end of each calendar quarter. Posting of project data to AQS will begin as early as the 9th month (March, 2007) of the project. ERG will complete final posting of project data to AQS within 90 days after the conclusion of the project on May 31, 2008. *ERG posted project data for September, 2006 through June, 2007 to the AQS website in March, June, and September, 2007. ERG posted project data for July, 2007 through September, 2007 to the AQS website in January, 2008. Submission of data to AQS will be an ongoing activity until the end of this project.*

(8) Cherokee Nation will host public meeting to present results of project to residents of Cherokee Heights no later than the final month of the project (May, 2008).

(9) Cherokee Nation will submit final project report to EPA within 90 days after the conclusion of the project on May 31, 2008. Quarterly technical reports will be submitted to EPA within 30 days after the end of each three-month quarter of each fiscal year.

CHANGES IN KEY PERSONNEL INVOLVED IN PROJECT

The following seven persons in the CNEP air quality monitoring program are working on this project:

Ryan Callison, Project Manager
Kent Curtis, Project QA/QC Manager
April Hathcoat, Environmental Specialist II
Jacque Adam, Environmental Specialist I
Jeremy Freise, Environmental Specialist I
Danielle Keese, Environmental Specialist I
Larry Scrapper, Environmental Specialist I

Ryan has overall responsibility for the project. Kent is responsible for project planning, project oversight, and QA/QC management. Kent and April are responsible for project data management. April, Jacque, Jeremy, Danielle, and Larry have primary responsibility for sample collection and equipment maintenance, while Kent and Ryan may also assist with such tasks.

ERG is the laboratory responsible for sample analyses and data reporting for the project. Key contacts at ERG are Julie Swift (project oversight), Ray Merrill (QA oversight), Dave Dayton (Method TO-15 canister sampling system certification), and Rodney Williams (canister sample shipping and receiving).

Figure 2 is an organizational chart showing all parties involved in this project. Those personnel named in the preceding paragraphs are directly involved in this project while other parties shown in **Figure 2** play supporting roles in the project.

EXPENDITURES TO DATE

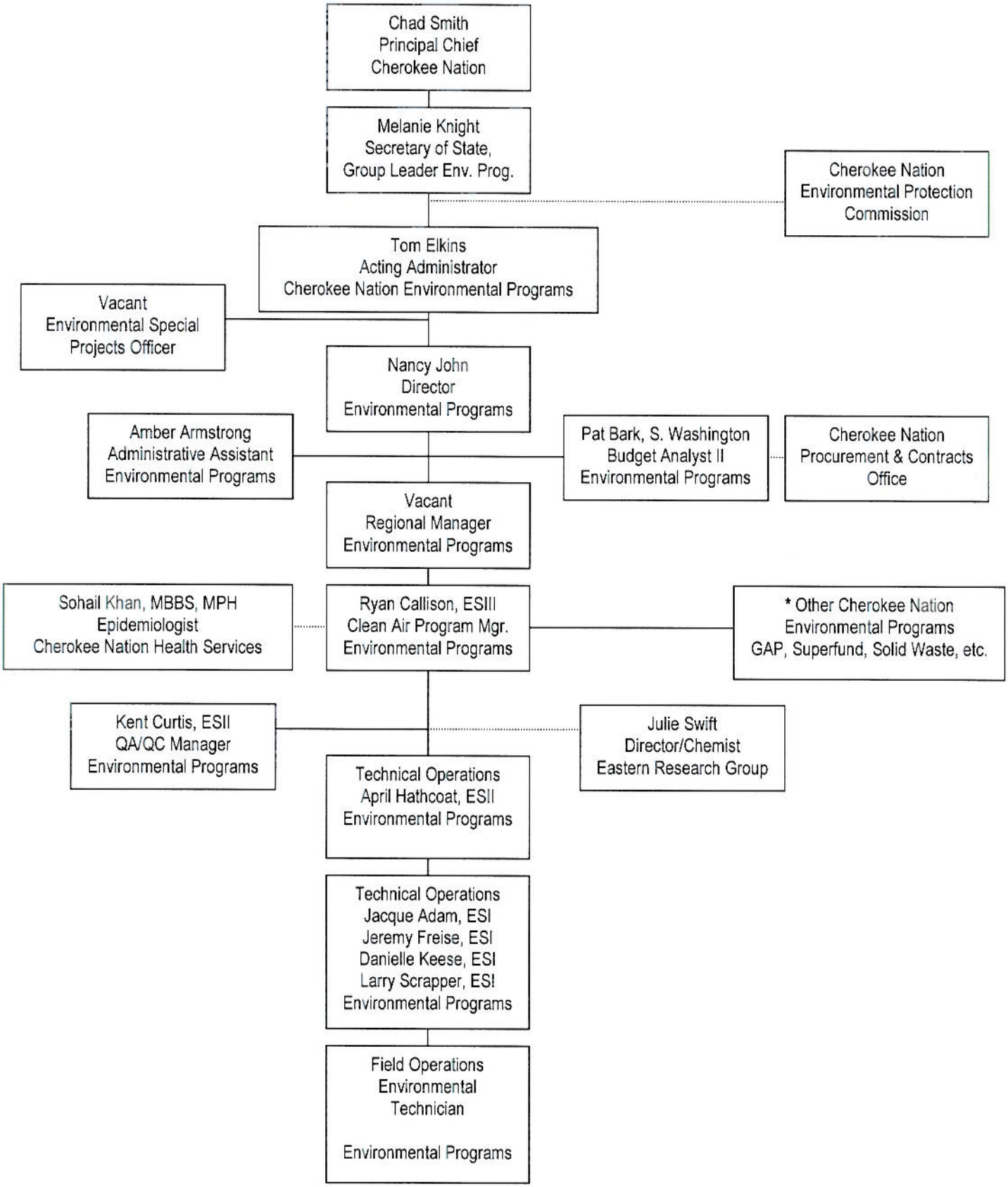
A total of $127,226.80 of the $165,000 awarded for this grant was spent or obligated by the CNEP by the end of the sixth quarter of this project. Most of the money spent or obligated was for one-time expenditures: $47,520 obligated to ERG for the performance of sample analyses and data reporting during the period from September, 2006 through August, 2008; and $4,522 obligated to RM Environmental, Inc. for a backup RM910A sampler and spare parts (seals, etc.) for the primary RM910A sampler. The remaining expenditures through the end of the sixth quarter were $19,456 for salaries, $23,426 for fringe benefits, $9,935 for travel, $2,112 for supplies (including two Restek sample canisters), $9,729 for other costs, and $10,525 for indirect costs. Thus expenditures and obligations through the end of the sixth quarter are within the overall budget for the project. In other words, expenditures for salaries, fringe benefits, indirect costs, and other expenses are not expected to exceed the total awarded for the two-year life of the grant.

COMPLIANCE WITH QUALITY ASSURANCE REQUIREMENTS

The CNEP's original QAPP/Work Plan for this project was approved by the EPA in February, 2006. A revision of this QAPP was completed by the CNEP on September 21, 2006 and was approved by the EPA on October 26, 2006. EPA approval of this QAPP has been extended to January 26, 2008. The CNEP completed a revision of this QAPP

Cherokee Nation Environmental Programs
Organizational Chart

Figure 2



Note: *Chart shows only those CNEP staff directly involved in the Community Air Toxics Project

AWARD CATEGORY/ BUDGET		EXPENDITURES	ENCUMBRANCE	COMMITMENT	TOTAL	BALANCE
Personnel	$ 31,769.00	$ 19,456.12	$ -	$ -	$ 19,456.12	$ 12,312.88
Fringe	$ 11,078.00	$ 23,426.31	$ -	$ -	$ 23,426.31	$ (12,348.31)
Travel	$ 9,011.00	$ 9,935.04	$ -	$ -	$ 9,935.04	$ (924.04)
Contractual	$ 77,000.00	$ 26,532.00	$ 20,988.00	$ -	$ 47,520.00	$ 29,480.00
Supplies	$ 3,400.00	$ 2,112.43	$ -	$ -	$ 2,112.43	$ 1,287.57
Equipment	$ 6,995.00	$ 4,522.00	$ -	$ -	$ 4,522.00	$ 2,473.00
Other	$ 13,600.00	$ 9,729.28	$ -	$ -	$ 9,729.28	$ 3,870.72
IDC	$ 12,147.00	$ 10,525.62	$ -	$ -	$ 10,525.62	$ 1,621.38
	$ 165,000.00	**$ 106,238.80**	**$ 20,988.00**	**$ -**	**$ 127,226.80**	**$ 37,773.20**

and submitted it to EPA for approval on December 12, 2007. This revision was approved by the EPA on January 17, 2008.

In addition, the CNEP is operating under a Quality Management Plan (QMP) approved by the EPA on May 9, 2007. The CNEP air quality monitoring program is also operating under several other EPA-approved QAPPs, including QAPPs for criteria pollutant monitoring (including meteorological instruments) and for PM2.5 and PM10 monitoring.

The contracted laboratory, ERG, is operating under the following EPA-approved QAPP: *Support for the EPA National Monitoring Programs (NMOC, UATMP, PAMS, HAPs, and NATTS)* for 2007/2008.

RESULTS TO DATE

Sixty-six valid samples (plus six valid duplicates) were collected from September 26, 2006 through November 26, 2007 (see first two pages of **Appendix A** in this quarterly technical report). Seven additional samples were declared invalid by the CNEP due to problems that affected data quality. ERG has submitted data for 67 valid samples – collected from September 26, 2006 through October 27, 2007 – to the CNEP and the CNEP has analyzed this data. The CNEP's Data Summary reports are included in **Appendix B** of this quarterly technical report, along with CNEP tables of all the data. The data tables were compiled to facilitate the discovery and analysis of any seasonal trends in the data. ERG posted the data for September 26th through June 23rd, 2007 to the AQS website in March, June, and September, 2007. ERG posted project data for July, 2007 through September, 2007 to the AQS website in January, 2008.

The number of VOCs detected in each of the first 67 samples ranged from 14 to 30. The concentrations of the detected VOCs were compared to the following benchmarks: EPA Region 6 Human Health Medium-Specific Screening Levels, including chronic inhalation toxicity values (non-cancer and cancer values), and including screening values for ambient air; Oklahoma Department of Environmental Quality (ODEQ) MAACs; and ATSDR Minimal Risk Levels (MRLs) for inhalation. The concentrations of 3 to 7 of the detected VOCs equaled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows: acrolein; chloromethane; 1,3-butadiene; chloroform; benzene; carbon tetrachloride; trichloroethylene; and 1,2-dichloroethane. A more detailed analysis of these results is included in **Appendix B** of this quarterly technical report.

PROBLEMS ENCOUNTERED

No serious problems were encountered during the sixth quarter of this project. Several minor problems that occurred during the sixth quarter are described here. Another problem (MDLs) that has carried over from the third quarter is also discussed.

Duplicate samples could not be collected as scheduled on October 9th because no sample canisters were available at that time. The CNEP has worked with ERG to ensure that the

lab provides CNEP with an adequate number of canisters in a timely fashion. The CNEP is being more diligent about keeping an adequate number of canisters on hand prior to each sample date.

The sample collected on October 3rd was invalid because its sample collection period was 33.06 hours instead of 24 hours. The incorrect sampling period was probably the result of operator error in programming the automatic timer for the RM910A sampler.

Kent Curtis was on medical leave of absence from August 10th through November 1st due to a serious illness. After he returned to work on November 2nd, he held a meeting with the CNEP air program staff on November 19th to discuss the problems that occurred with the samples of October 3rd and 9th. Possible causes of the problems were discussed and methods of preventing reoccurrences of such problems were implemented. These methods include increased diligence by CNEP staff, increased communication with ERG, and verification by CNEP air program management and QA/QC staff (Ryan and Kent) that sampling events are being properly performed on schedule.

Duplicate samples that were originally scheduled for April 18, 2007 and October 3, 2007 were not collected because of sample canister leakage, improper sample collection period (33 hours instead of 24 hours), or the lack of canisters (see **Appendix A** of this report). These duplicate samples were rescheduled for collection on December 26, 2007 and February 24, 2008, with the new sample dates being chosen by means of a random number table. This ensures that a total of ten duplicate samples will be collected during the life of this project. Ten duplicate samples are needed in order to meet the QA/QC requirements of this project, as specified in Section 2.1 of the project QAPP/Work Plan.

Method Detection Limits (MDLs) reported by ERG for samples collected in 2007 are higher than the MDLs reported for samples collected for this project in 2006. Fourteen of these higher MDLs are higher than the EPA Region 6 Human Health Screening Levels to which project data are being compared. If possible, the MDLs for all VOCs included in this project should be *lower* than the Screening Levels. If MDLs are *higher* than these Screening Levels, then it is likely that false negatives will be reported for VOCs of particular concern in this project. That is, data may falsely show that a particular VOC is not present at a concentration higher than a Screening Level when, in fact, that VOC may actually be present at a concentration higher than the Screening Level but lower than the MDL achieved by the lab. [See Data Summary in **Appendix B** for further discussion of this problem.] The CNEP conferred with ERG to determine the cause of the higher MDLs reported for the samples collected in 2007. ERG explained that it recalculates its MDLs at the beginning of each calendar year. The new MDLs are then used for the next twelve months. These new MDLs may be higher, lower, or the same for any given VOC as the MDLs used during the previous year. Thus the new MDLs must be used, even if they are higher than a Screening Level of concern. This limits the usefulness of some project data and forces the CNEP to accept the possibility of false negatives for some VOCs of concern, including 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene.

Of the first 79 samples collected (including six duplicates) from September 26, 2006 through November 26, 2007, 72 samples yielded valid (useable) data. Duplicate samples scheduled for October 9th could not be collected because no sample canisters were available at that time. Thus the data completion rate for the first fourteen months of sample collection (79 collected samples plus 2 missed samples) is 88.9%. This meets the desired data completion rate of 85%, which is specified in Section 2.5 of the Revised QAPP/Work Plan for this project.

ACTIVITIES PLANNED FOR SEVENTH QUARTER OF THIS PROJECT

1. Continue sample collection in accordance with the Proposed Sampling Schedule for this project (see **Appendix A** of this quarterly technical report).

2. The CNEP will revise its *Quality Assurance Project Plan and Work* Plan for this VOC monitoring project.

3. The CNEP will perform a flow verification check on its NATTS-certified backup RM910A sampler.

4. ERG will continue reporting sample data to the CNEP at monthly intervals. ERG, under the terms of its contract with CNEP, will continue posting project data to AQS within 90 days of the end of each calendar quarter.

5. ERG will provide the CNEP with a statistical analysis of the project data for calendar year 2007.

PUBLICATIONS ARISING FROM THIS PROJECT

The CNEP will present the results of this project at one or more regional or national conferences as project data become available. Such presentations will occur in 2007 and 2008. Kent Curtis attended the Air and Waste Management Association's Symposium on Air Quality Measurement Methods and Technology in San Francisco on April 30-May 2, 2007. He gave a brief presentation on the CNEP's Community Air Toxics Project, including a summary of sample data collected as of February, 2007. This presentation will be published in the proceedings of the symposium. There are no plans at this time to publish the final results of this project.

The CNEP will share data from this project with the Cherokee Nation's Health Services department. The CNEP and the CN Health Services may jointly host a public meeting to present results of this project to residents of Cherokee Heights no later than the final month of the project (May, 2008).

APPENDIX A

PROPOSED SAMPLING SCHEDULE FOR THIS PROJECT

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
1	2280	2280	September	26	2006	Tue		
2A	2275	2275	October	2	2006	Mon		
2B	2272	2272	October	2	2006	Mon	Yes	
3	2276	2276	October	10	2006	Tue		Make-up for sample that didn't run on 10/8
4	2284	2284	October	18	2006	Wed		Make-up for sample that didn't run on 10/14
5	3357	3357	October	20	2006	Fri		Graseby canister
6	3359	3359	October	26	2006	Thur		Graseby canister; shelter temp 130 on 10/24
7	2275	2275	November	1	2006	Wed		
8A	2272	2272	November	7	2006	Tue		
8B	2280	2280	November	7	2006	Tue	Yes	
9	2276	2276	November	13	2006	Mon		
10	2284	2284	November	19	2006	Sun		
11	3357	3357	November	25	2006	Sat		Graseby canister
12	3359	3359	December	1	2006	Fri		Graseby canister, +2 final canister pressure at Pryor, 0 at ERG; INVALID SAMPLE
13	2275	2275	December	7	2006	Thur		
14	2272	2272	December	13	2006	Wed		
15	2280	2280	December	19	2006	Tue		
16	3627	3627	December	25	2006	Mon		0 final canister press.; INVALID SAMPLE
17	3628	3628	December	31	2006	Sun		New Year's Eve
18	2275	2275	January	6	2007	Sat		
19A	2284	2284	January	12	2007	Fri		
19B	2272	2272	January	12	2007	Fri	Yes	
20	2276	2276	January	18	2007	Thur		
21	2280	2280	January	24	2007	Wed		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
22	3627	3627	January	30	2007	Tue		
23	3628	3628	February	5	2007	Mon		
24	2272	2272	February	11	2007	Sun		
25	2284	2284	February	17	2007	Sat		
26	2276	2276	February	23	2007	Fri		
27	2280	2280	March	1	2007	Thur		
28	3627	3627	March	7	2007	Wed		
29	2284	2284	March	13	2007	Tue		
30	2272	2272	March	19	2007	Mon		
31	3628	3628	March	25	2007	Sun		
32	2276	2276	March	31	2007	Sat		
33	2280	2280	April	6	2007	Fri		
34	2284	2284	April	12	2007	Thur		
35A	3627	3627	April	18	2007	Wed		+2 final can press, INVALID SAMPLE
35B	2275	2275	April	18	2007	Wed	Yes	+2 final can pr; suspected leak, INVALID
36	3628	3628	April	24	2007	Tue		
37A	2275	2275	April	30	2007	Mon		
37B	3627	3627	April	30	2007	Mon	Yes	
38	2272	2272	May	6	2007	Sun		
39	2276	2276	May	12	2007	Sat		
40	2280	2280	May	18	2007	Fri		
41	2284	2284	May	24	2007	Thur		
42	3627	3627	May	30	2007	Wed		
43	3628	3628	June	5	2007	Tue		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
44	2275	2275	June	11	2007	Mon		
45	2272	2272	June	17	2007	Sun		
46	3627	3627	June	23	2007	Sat		Dup. can couldn't run, 0 initial pressure
47A	2276	2276	June	29	2007	Fri		Sample ran for 110.04 hrs, INVALID
47B	2280	2280	June	29	2007	Fri	Yes	Sample ran for 110.04 hrs, INVALID
48	3628	3628	July	5	2007	Thur		
49A	2275	2275	July	11	2007	Wed		Make-up duplicate for June 29
49B	2272	2272	July	11	2007	Wed	Yes	Make-up duplicate for June 29
50	3359	3359	July	17	2007	Tue		Graseby canister
51	3627	3627	July	23	2007	Mon		
52	2280	2280	July	29	2007	Sun		
53A	2272	2272	August	4	2007	Sat		
53B	2275	2275	August	4	2007	Sat	Yes	
54	3628	3628	August	10	2007	Fri		
55	2280	2280	August	16	2007	Thur		
56	2276	2276	August	22	2007	Wed		
57	3627	3627	August	28	2007	Tue		
58	2275	2275	September	3	2007	Mon		Labor Day
59	3359	3359	September	9	2007	Sun		Graseby canister
60	3628	3628	September	15	2007	Sat		
61	2280	2280	September	21	2007	Fri		
62	2276	2276	September	27	2007	Thur		
63	2272	2272	October	3	2007	Wed		Sample ran for 33.06 hrs, INVALID
64A	-	-	October	9	2007	Tue		No sample, no canister available
64B	-	-	October	9	2007	Tue	Yes	No sample, no canister available

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
65	3627	3627	October	15	2007	Mon		
66	2280	2280	October	21	2007	Sun		
67	2272	2272	October	27	2007	Sat		
68	3628	3628	November	2	2007	Fri		
69	2276	2276	November	8	2007	Thur		
70	3627	3627	November	14	2007	Wed		
71	2280	2280	November	20	2007	Tue		
72	2284	2284	November	26	2007	Mon		
73	2275	2275	December	2	2007	Sun		
74	3628	3628	December	8	2007	Sat		
75	2272	2272	December	14	2007	Fri		
76	2280	2280	December	20	2007	Thur		
77A	2284	2284	December	26	2007	Wed		0 final can pressure, INVALID
77B	2276	2276	December	26	2007	Wed	Yes	0 final can pressure, INVALID
78	3627	3627	January	1	2008	Tue		NY Day
79	2275	2275	January	7	2008	Mon		
80	3628	3628	January	13	2008	Sun		
81A	2276	2276	January	19	2008	Sat		
81B	2284	2284	January	19	2008	Sat	Yes	
82	2280	2280	January	25	2008	Fri		
83	3627	3627	January	31	2008	Thur		
84	2272	2272	February	6	2008	Wed		
85	2276	2276	February	12	2008	Tue		
86	2284	2284	February	18	2008	Mon		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
87A			February	24	2008	Sun		
87B			February	24	2008	Sun	Yes	
88			March	1	2008	Sat		
89			March	7	2008	Fri		
90A			March	13	2008	Thur		
90B			March	13	2008	Thur	Yes	
91			March	19	2008	Wed		
92			March	25	2008	Tue		

APPENDIX B

CNEP DATA SUMMARY REPORTS AND DATA TABLES FOR SAMPLES COLLECTED FROM SEPTEMBER 26, 2006 THROUGH OCTOBER 27, 2007

DATA SUMMARY
FOR VOC SAMPLES COLLECTED AT CHEROKEE NATION'S PRYOR SITE FROM JULY 5 THROUGH SEPTEMBER 27, 2007

I have analyzed the data for our seventeen valid VOC samples of the summer season, which were collected from July 5 through September 27, 2007. The following is a summary of my analyses.

All 17 samples are valid samples, as the canisters had final pressures that were less than zero or more than zero. Data completeness (17 valid samples out of 17 total samples) = 100%. This exceeds the desired data completion rate of 85%.

ERG analyzed each of the 17 valid samples for 60 VOCs.

The number of VOCs detected in each sample ranged from 17 (July 5, July 17, August 22) to 27 (July 11). The average number of VOCs detected in each sample was 21.6, which was higher than the average of 18.9 VOCs detected in the 16 valid samples collected during the winter of 2007 but lower than the average of 26.1 VOCs detected in the 17 valid samples collected during the autumn of 2006.

The lab (ERG) reported the same MDLs for samples collected in July, August, and September as for the samples collected in February through June. 12 of these MDLs achieved for VOCs in samples collected in February through September were higher than one of the EPA Region 6 Human Health Medium-Specific Screening Levels of concern. [These screening levels are described in the following paragraph.] **MDLs in excess of a screening level are of concern because they include the MDLs for 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene – four of the VOCs that exceeded a screening level in one or more samples collected in the autumn of 2006, and in the winter, spring, and summer of 2007. These higher MDLs make it more likely that false negatives will be reported for VOCs of particular concern. The probability of false negatives must be reduced in future sample analyses.**

I compared the concentrations of detected VOCs in the July, August, and September samples to the following benchmarks:

EPA Region 6 Human Health Medium-Specific Screening Levels
- Chronic inhalation toxicity values (non-cancer and cancer values)
- Region 6 Screening values for ambient air

Oklahoma Department of Environmental Quality (ODEQ) MAACs
ATSDR Minimal Risk Levels (MRLs) for inhalation

3 to 5 detected VOCs equalled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows:

Acrolein, exceeding a benchmark in all 17 valid samples, with a concentration range in these seventeen samples of 0.18 to 2.48 ug/m3.

Chloromethane, exceeding a benchmark in 14 samples, with a concentration range in those fourteen samples of 1.13 to 1.53 ug/m3.

Chloroform, exceeding a benchmark in 4 samples, with a concentration range in those four samples of 0.10 to 0.19 ug/m3.

Benzene, exceeding a benchmark in all 17 valid samples, with a concentration range in these seventeen samples of 0.17 to 0.58 ug/m3.

Carbon tetrachloride, exceeding a benchmark in all 17 valid samples, with a concentration range in these seventeen samples of 0.21 to 0.91 ug/m3.

Chloromethane and chloroform exceeded only screening levels.

Benzene and carbon tetrachloride exceeded both screening levels and cancer benchmarks.

Acrolein exceeded both screening levels and a non-cancer benchmark. In addition, acrolein was the only VOC to exceed an ODEQ MAAC and an ATSDR MRL.

Results for the four duplicate samples collected on July 11 and August 4 were good. Only 2 or 3 of the 22 to 27 detected VOCs had a relative percent difference (RPD) greater than 25%.

The benzene/toluene ratios in sixteen of the valid samples ranged from 0.47 to 1.45, while the ratio in the valid sample collected on September 27th was 0.02. These ratios are NOT characteristic of vehicular (gasoline engine) emissions.

The concentrations of carbon tetrachloride and chlorofluorocarbons [Dichlorodifluoromethane (freon 12), Dichlorotetrafluoroethane (freon 114), Trichlorofluoromethane (freon 11), and Trichlorotrifluoroethane] detected in the seventeen samples were relatively stable. The concentration ranges of each of these VOCs in the seventeen samples were as follows: carbon tetrachloride (0.21 to 0.91 ug/m3); Freon 12 (0.73 to 3.02 ug/m3); Freon 114 (0.02U to 0.16 ug/m3); Freon 11 (0.36 to 1.64 ug/m3); and trichlorotrifluoroethane (0.18 to 0.91 ug/m3). This is consistent with the fact that such VOCs have stable global background concentrations in the USA.

With two exceptions, there were no exceedances of NAAQS standards (24-hour or 8-hour standard, as applicable) for NO2, SO2, PM10, PM2.5, and ozone at the Pryor station on any of the fifteen VOC sample days. The mean of 39.4 ug/m3 for PM2.5 exceeded the 24-hour NAAQS standard on August 16. The mean of 35.7 ug/m3 for PM2.5 exceeded the 24-hour NAAQS standard on September 21.

Finally, the wind direction was predominantly from the south on July 17, on all five sample dates in August, and on September 21. The wind was from all directions except the northwest on July 5 and July 23. The wind was from the north, northeast, east, southeast, and west on July 11, and it was from the northwest, north, northeast, east, and southeast on July 29. The wind was from the north, northeast, and east on September 9; from the northeast, east, southeast, and south on September 15; and from all directions except the west and northwest on September 3. There was no wind direction data for September 27. Wind speeds varied from 0 to 10 mph on the fifteen sample days. The Cherokee Heights tribal housing complex and the city of Locust Grove lie to the east and southeast of the Pryor monitoring station; U. S. highway 412 lies south of the station; Mid-America Industrial Park lies to the west, southwest, and northwest of the station; and other industry lies to the northeast of the station. There was no rainfall on fourteen of the fifteen valid sample dates, while 0.15 inches of rain fell on July 5. Ambient air temperatures ranged from a low of 57 degrees F on September 15 to a high of 99 degrees F on August 16.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS

Analysis of the 64 valid samples collected from September 26, 2006 to September 27, 2007 revealed no obvious seasonal trends in occurrences or concentrations of VOCs (see attached Tables of seasonal trends data), although the data has not been subjected to statistical analysis. The decline in the average number of VOCs detected in the 2007 samples was an artifact of the higher MDLs achieved by the lab for those samples (see discussion of MDLs above). Otherwise, particular VOCs did not appear or disappear with the changing seasons, and the concentrations of detected VOCs did not show a tendency to rise or fall with the changing seasons. The concentrations of detected VOCs remained steady, fluctuating within a narrow range of concentrations that showed little or no change with the seasons. The concentrations of some VOCs remained remarkably constant, perhaps because they were present only at concentrations that were very close to the method detection limits that the lab (ERG) could achieve.

Of the eight VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of the 64 valid samples, only acrolein showed a very slight tendency to change in concentration with the seasons. Acrolein was present at its highest concentrations in September and early October, 2006, then declined very slightly in concentration after mid-October. Six of the other seven VOCs showed no tendency to rise or fall in concentration with the changing seasons, while the remaining VOC (1,2-dichloroethane) was detected in only one sample (November 25). Meanwhile, the concentrations of carbon tetrachloride leveled off at the low end of their range during the months of January and February, 2007.

For some unknown reason, toluene, ethylbenzene, m,p-xylene, and o-xylene were present in the sample collected on September 27th at their highest concentrations of the entire twelve month sampling period. Toluene was present in this sample at a concentration (21.90 ug/m3), which is more than an order of magnitude higher than its previous highest concentration in a sample.

ERG analyzed each of the 17 valid samples collected in July, August, and September, 2007 for a suite of 60 VOCs (see attached Table of seasonal trends data). 11 VOCs were detected in all 17 valid samples, while 10 other VOCs were detected in 13 to 16 samples. Of the five VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of these 17 valid samples, acrolein, chloromethane, benzene, and carbon tetrachloride were detected in all 17 samples, while chloroform was detected in 5 samples.

Conversely, 32 VOCs were undetected in all 17 samples, while the 7 remaining VOCs were detected in 1 to 8 samples.

There are relatively stable global background concentrations of carbon tetrachloride and chlorofluorocarbons (such as freons) in the atmosphere. Therefore, it was no surprise that carbon tetrachloride and three of the other four chlorofluorocarbons included in sample analyses for this project were detected in all 17 valid samples collected in July, August, and September at concentrations that showed no tendency to vary with the changing seasons.

VOC concentrations in the five samples collected on a Saturday or Sunday did not appear to differ significantly from VOC concentrations in samples collected on week days. Thus there are few, if any, noticeable changes in VOC concentrations on weekends, when industrial activity at Mid-America Industrial Park and other nearby industries might be expected to decline.

In summary, twelve months of VOC data have been collected so far, and, as yet, no seasonal trends have become apparent in the occurrences and concentrations of VOCs.

DATA SUMMARY
FOR VOC SAMPLES COLLECTED AT CHEROKEE NATION'S PRYOR SITE FROM OCTOBER 3 THROUGH OCTOBER 27, 2007

I have analyzed the data for our first three valid VOC samples of the autumn season, which were collected from October 15 through October 27, 2007. The following is a summary of my analyses.

Three of the four samples collected in October were valid samples, as the canisters had final pressures that were less than zero or more than zero. The fourth sample was invalid because it was collected over a period of 33.06 hours on October 3rd and 4th. Duplicate samples were not collected as scheduled on October 9th because no sample canisters were available. Data completeness (3 valid samples out of 6 scheduled samples) = 50%. This is less than the desired data completion rate of 85%.

ERG analyzed each of the 3 valid samples for 60 VOCs.

The number of VOCs detected in each sample ranged from 17 (October 27) to 22 (October 15). The average number of VOCs detected in each sample was 19, which was just higher than the average of 18.9 VOCs detected in the 16 valid samples collected during the winter of 2007 but lower than the average of 26.1 VOCs detected in the 17 valid samples collected during the autumn of 2006, and lower than the average of 21.6 VOCs detected in the 17 valid samples collected during the summer of 2007.

The lab (ERG) reported the same MDLs for samples collected in October as for the samples collected in February through September. 12 of these MDLs achieved for VOCs in samples collected in February through October were higher than one of the EPA Region 6 Human Health Medium-Specific Screening Levels of concern. [These screening levels are described in the following paragraph.] **MDLs in excess of a screening level are of concern because they include the MDLs for 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene – four of the VOCs that exceeded a screening level in one or more samples collected in the autumn of 2006, and in the winter, spring, and summer of 2007. These higher MDLs make it more likely that false negatives will be reported for VOCs of particular concern. The probability of false negatives must be reduced in future sample analyses.**

I compared the concentrations of detected VOCs in the October samples to the following benchmarks:

EPA Region 6 Human Health Medium-Specific Screening Levels
- Chronic inhalation toxicity values (non-cancer and cancer values)
- Region 6 Screening values for ambient air

Oklahoma Department of Environmental Quality (ODEQ) MAACs
ATSDR Minimal Risk Levels (MRLs) for inhalation

3 to 5 detected VOCs equalled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows:

Acrolein, exceeding a benchmark in all 3 valid samples, with a concentration range in these three samples of 0.85 to 1.77 ug/m3.

Chloromethane, exceeding a benchmark in 1 sample, with a concentration in that sample of 1.19 ug/m3.

Chloroform, exceeding a benchmark in 2 samples, with a concentration of 0.09 ug/m3 in each of those two samples.

Benzene, exceeding a benchmark in all 3 valid samples, with a concentration range in these three samples of 0.38 to 0.41 ug/m3.

Carbon tetrachloride, exceeding a benchmark in all 3 valid samples, with a concentration range in these three samples of 0.54 to 0.65 ug/m3.

Chloromethane and chloroform exceeded only screening levels.

Benzene and carbon tetrachloride exceeded both screening levels and cancer benchmarks.

Acrolein exceeded both screening levels and a non-cancer benchmark. In addition, acrolein was the only VOC to exceed an ATSDR MRL.

The duplicate samples scheduled for October 9th could not be collected because no sample canisters were available at that time.

The benzene/toluene ratios in the three valid samples ranged from 0.6 to 1.09. These ratios are NOT characteristic of vehicular (gasoline engine) emissions.

The concentrations of carbon tetrachloride and chlorofluorocarbons [Dichlorodifluoromethane (freon 12), Dichlorotetrafluoroethane (freon 114), Trichlorofluoromethane (freon 11), and Trichlorotrifluoroethane] detected in the three samples were relatively stable. The concentration ranges of each of these VOCs in the three samples were as follows: carbon tetrachloride (0.54 to 0.65 ug/m3); Freon 12 (2.19 to 2.83 ug/m3); Freon 114 (0.09U to 0.13U ug/m3); Freon 11 (1.29 to 1.44 ug/m3, and being undetected in one sample); and trichlorotrifluoroethane (0.61 to 0.88 ug/m3). This is consistent with the fact that such VOCs have stable global background concentrations in the USA.

There were no exceedances of NAAQS standards (24-hour or 8-hour standard, as applicable) for NO2, SO2, PM2.5, and ozone at the Pryor station on any of the three valid VOC sample days.

Finally, the wind direction was predominantly from the south-southwest or south-southeast at 1 to 14 mph on October 15 and 21. The wind was calm on October 27. Wind direction data for these three sample dates were obtained from the University of Oklahoma Mesonet station near Pryor because the wind direction indicator at the Cherokee Nation's Pryor site was not in service on those dates. The OU Mesonet station is 9.75 miles north of the Cherokee Nation's Pryor site. The Cherokee Heights tribal housing complex and the city of Locust Grove lie to the east and southeast of the Pryor monitoring station; U. S. highway 412 lies south of the station; Mid-America Industrial Park lies to the west, southwest, and northwest of the station; and other industry lies to the northeast of the station. There was no rainfall on two of the three valid sample dates, while 0.13 inches of rain fell on October 15. Ambient air temperatures ranged from a low of 40 degrees F on October 27 to a high of 81 degrees F on October 21.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS

Analysis of the 67 valid samples collected from September 26, 2006 to October 27, 2007 revealed no obvious seasonal trends in occurrences or concentrations of VOCs (see attached Tables of seasonal trends data), although the data has not been subjected to statistical analysis. The decline in the average number of VOCs detected in the 2007 samples was an artifact of the

higher MDLs achieved by the lab for those samples (see discussion of MDLs above). Otherwise, particular VOCs did not appear or disappear with the changing seasons, and the concentrations of detected VOCs did not show a tendency to rise or fall with the changing seasons. The concentrations of detected VOCs remained steady, fluctuating within a narrow range of concentrations that showed little or no change with the seasons. The concentrations of some VOCs remained remarkably constant, perhaps because they were present only at concentrations that were very close to the method detection limits that the lab (ERG) could achieve.

Of the eight VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of the 67 valid samples, only acrolein showed a very slight tendency to change in concentration with the seasons. Acrolein was present at its highest concentrations in September and early October, 2006, then declined very slightly in concentration after mid-October. Six of the other seven VOCs showed no tendency to rise or fall in concentration with the changing seasons, while the remaining VOC (1,2-dichloroethane) was detected in only one sample (November 25, 2006). Meanwhile, the concentrations of carbon tetrachloride leveled off at the low end of their range during the months of January and February, 2007.

ERG analyzed each of the 3 valid samples collected in October, 2007 for a suite of 60 VOCs (see attached Table of seasonal trends data). 13 VOCs were detected in all 3 valid samples, while 8 other VOCs were detected in 2 samples. Of the five VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of these 3 valid samples, all five (acrolein, chloromethane, chloroform, benzene, and carbon tetrachloride) were detected in all 3 samples.

Conversely, 37 VOCs were undetected in all 3 samples, while the 2 remaining VOCs were detected in 1 sample.

There are relatively stable global background concentrations of carbon tetrachloride and chlorofluorocarbons (such as freons) in the atmosphere. Therefore, it was no surprise that carbon tetrachloride and three of the other four chlorofluorocarbons included in sample analyses for this project were detected in 2 or 3 valid samples collected in October at concentrations that showed no tendency to vary with the changing seasons.

VOC concentrations in the two samples collected on a Saturday or Sunday did not appear to differ significantly from VOC concentrations in samples collected on week days during July through October. Thus there are few, if any, noticeable changes in VOC concentrations on weekends, when industrial activity at Mid-America Industrial Park and other nearby industries might be expected to decline.

In summary, thirteen months of VOC data have been collected so far, and, as yet, no seasonal trends have become apparent in the occurrences and concentrations of VOCs.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS
5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Acetylene	0.32	0.31 0.29	0.14	0.78	0.38	0.27 0.28	0.36	0.26	0.14	0.31	0.63	0.26	0.25	0.32	0.92
Propylene	0.24	0.33 0.52	0.20	0.41	0.37	0.51 0.36	0.94	0.30	0.27	0.70	0.38	0.14	0.86	0.37	0.40
Dichlorodifluoromethane (Freon 12)	0.73	2.85 2.82	2.39	2.99	3.02	2.59 2.72	2.48	2.53	2.55	2.60	2.70	2.86	2.50	2.35	2.90
Chloromethane	0.39	**1.36** **1.34**	**1.23**	**1.35**	**1.50**	**1.24** **1.30**	**1.53**	**1.18**	**1.13**	1.09	**1.21**	**1.33**	1.03	**1.21**	**1.29**
Dichlorotetrafluoroethane (Freon 114)	0.02U	0.15 0.16	0.11U	0.13U	0.06U	0.11U 0.12U	0.11U	0.11U	0.06U	0.12U	0.11U	0.13U	0.11U	0.11U	0.13U
Vinyl Chloride	ND	0.02U 0.02U	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	0.02U	0.01U	ND	0.02U
1,3-Butadiene	ND	0.03U 0.03U	0.01U	0.02U	0.03U	0.02U 0.02U	0.02U	ND	ND	0.02U	ND	0.03U	0.02U	0.02U	0.03U
Bromomethane	ND	0.08U 0.08U	0.05U	0.07U	0.07U	0.07U 0.06U	0.05U	0.08U	0.06U	0.07U	0.06U	0.06U	0.04U	0.07U	0.06U

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in this sample. U = Under detection limit.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Chloroethane	ND	0.08 0.09	0.08	0.07	0.10	0.07 0.08	0.10	0.08	0.08	0.09	0.09	0.06	0.06	0.06	0.05
Acetonitrile	ND	0.27 0.27	0.27	0.28	0.35	0.36 0.39	0.37	0.54	0.34	0.54	0.45	0.33	0.24	0.37	0.55
Acrolein	**0.20**	**1.42** **1.59**	**0.25**	**1.45**	**1.51**	**1.89** **1.84**	**1.55**	**1.51**	**1.31**	**2.13**	**1.72**	**0.18**	**1.62**	**2.48**	**0.74**
Trichlorofluoromethane (Freon 11)	0.36	1.58 1.51	1.31	1.57	1.63	1.42 1.51	1.24	1.48	1.42	1.54	1.64	1.64	1.33	1.25	1.60
Acrylonitrile	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichloromethane (Methylene Chloride)	0.03U	0.26 0.24	0.13	0.22	0.16	0.20 0.23	0.12	0.13	0.15	0.18	0.46	0.12	0.14	0.17	0.32
Carbon Disulfide	0.06U	0.11 0.12	0.10	0.12	0.09	0.08 0.07	0.11	ND	0.08	0.08	0.07	ND	0.07	0.04U	0.13

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in sample. U = Under detection limit.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Trichlorotrifluoroethane	0.18	0.72 0.75	0.75	0.75	0.75	0.63 0.68	0.53	0.81	0.66	0.68	0.84	0.91	0.64	0.79	0.71
Trans-1,2-Dichloroethylene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert-Butyl Ether	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Ethyl Ketone	0.69	3.52 6.06	0.98	5.23	2.63	5.91 4.17	5.56	1.94	3.01	8.07	3.07	0.64	6.03	3.34	1.92
Chloroprene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in sample. U = Under detection limit.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS
5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Chloroform	ND	ND ND	0.06U	**0.12**	0.08U	ND ND	0.06U	0.08	0.06U	**0.10**	ND	**0.11**	0.08U	ND	**0.19**
Ethyl tert-Butyl Ether	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.03U	0.11 0.12	0.06U	0.10	0.09	0.09U 0.09U	0.07U	0.07U	0.08U	0.08U	0.10	0.10	0.08U	0.09	0.09
Benzene	**0.17**	**0.41** **0.47**	**0.33**	**0.46**	**0.45**	**0.56** **0.51**	**0.43**	**0.40**	**0.45**	**0.43**	**0.58**	**0.31**	**0.34**	**0.45**	**0.52**
Carbon Tetrachloride	**0.21**	**0.82** **0.84**	**0.57**	**0.91**	**0.88**	**0.66** **0.71**	**0.76**	**0.57**	**0.63**	**0.64**	**0.67**	**0.69**	**0.65**	**0.50**	**0.76**
tert-Amyl Methyl Ether	ND	0.02U ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in sample. U = Under detection limit.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS
5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	**Valid Sample Dates ****														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Ethyl Acrylate	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene (TCE)	ND	0.10 0.06U	ND	0.07U	ND	ND ND	ND	ND	ND	0.08U	ND	ND	ND	ND	ND
Methyl Methacrylate	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Isobutyl Ketone	0.10	0.33 0.48	0.12	0.46	0.21	0.45 0.38	0.60	0.10	0.21	0.44	0.24	ND	0.59	0.24	0.13
trans-1,3-Dichloropropene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

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SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS
5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Toluene	0.20	0.88 0.94	0.27	0.48	0.48	0.63 0.65	0.57	0.40	0.31	0.49	1.08	0.32	0.71	0.71	21.90
Dibromochloromethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Octane	0.05	0.06 0.07	0.03	0.04	0.07	0.06 0.05	0.08	0.07	0.05	0.05	ND	ND	0.07	0.08	0.31
Tetrachloroethylene	ND	0.07 0.07U	0.03U	0.05U	0.04U	0.04U 0.05U	ND	0.03U	ND	ND	ND	ND	0.03U	0.06U	0.10
Chlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	0.02U	0.01U	ND	ND	ND	ND	ND
Ethylbenzene	0.06	0.14 0.15	0.04U	0.07	0.08	0.12 0.12	0.10	0.07	0.05U	0.09	0.18	0.06	0.08	0.07	0.84
m,p-Xylene	0.03U	0.36 0.41	0.08U	0.13	0.18	0.19 0.18	0.21	0.12	0.02U	0.17	0.34	0.11	0.19	0.17	2.90

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Bromoform	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	0.08	0.09 0.09	0.03U	0.05U	0.05U	0.09 0.05U	0.08	ND	0.04U	0.07	ND	ND	0.08	0.02U	0.07
1,1,2,2-Tetrachloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	0.06	0.16 0.19	0.04U	0.07	0.09	0.09 0.10	0.09	0.07	0.04U	0.08	0.15	0.05	0.08	0.07	0.74
1,3,5-Trimethylbenzene	0.04U	0.06 0.07	0.01U	0.02U	0.03U	0.09 0.08	0.03U	0.02U	0.02U	0.02U	0.04U	0.02U	0.03U	0.01U	0.04U
1,2,4-Trimethylbenzene	0.07	0.15 0.19	0.04U	0.05	0.12	0.19 0.17	0.11	0.06	0.04U	0.09	0.11	0.07	0.11	0.03U	0.12
m-Dichlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethylbenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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p-Dichlorobenzene	ND	0.04U 0.05U	ND	0.02U	ND	ND 0.02U	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Dichlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachloro-1,3-Butadiene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

15 October to 26 December, 2007

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VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Wed 10/3	Tues 10/9	Mon 10/15	**Sun 10/21**	**Sat 10/27**	Fri 11/2	Thurs 11/8	Wed 11/14	Tues 11/20	Mon 11/26	**Sun 12/2**	**Sat 12/8**	Fri 12/14	Thurs 12/20	Wed 12/26
Acetylene			0.30	0.26	0.73										
Propylene			0.37	0.21	0.26										
Dichlorodifluoromethane (Freon 12)			2.83	2.53	2.19										
Chloromethane			**1.19**	1.06	0.54										
Dichlorotetrafluoroethane (Freon 114)			0.13U	0.12U	0.09U										
Vinyl Chloride			ND	ND	ND										
1,3-Butadiene			ND	ND	0.02U										
Bromomethane			0.04U	0.05U	0.02U										

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Chloroethane			0.04U	0.06	0.03U										
Acetonitrile			0.26	0.24	ND										
Acrolein			**1.77**	**1.74**	**0.85**										
Trichlorofluoromethane (Freon 11)			1.44	1.29	ND										
Acrylonitrile			ND	ND	ND										
1,1-Dichloroethene			ND	ND	ND										
Dichloromethane (Methylene Chloride)			0.22	0.16	0.15										
Carbon Disulfide			0.05U	ND	0.03U										

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Trichlorotrifluoroethane			0.88	0.81	0.61										
Trans-1,2-Dichloroethylene			ND	ND	ND										
1,1-Dichloroethane			ND	ND	ND										
Methyl tert-Butyl Ether			ND	ND	ND										
Methyl Ethyl Ketone			4.85	2.56	ND										
Chloroprene			ND	ND	ND										
cis-1,2-Dichloroethylene			ND	ND	ND										
Bromochloromethane			ND	ND	ND										

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Chloroform			**0.09**	0.08	**0.09**										
Ethyl tert-Butyl Ether			ND	ND	ND										
1,2-Dichloroethane			ND	0.06U	ND										
1,1,1-Trichloroethane			0.11	0.10	0.09										
Benzene			**0.39**	**0.38**	**0.41**										
Carbon Tetrachloride			**0.64**	**0.65**	**0.54**										
tert-Amyl Methyl Ether			ND	ND	ND										
1,2-Dichloropropane			ND	ND	ND										

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Ethyl Acrylate			ND	ND	ND										
Bromodichloromethane			ND	ND	ND										
Trichloroethylene (TCE)			ND	ND	ND										
Methyl Methacrylate			ND	ND	ND										
cis-1,3-Dichloropropene			ND	ND	ND										
Methyl Isobutyl Ketone			0.37	0.14	0.15										
trans-1,3-Dichloropropene			ND	ND	ND										
1,1,2-Trichloroethane			ND	ND	ND										

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Toluene			0.65	0.35	0.59										
Dibromochloromethane			ND	ND	ND										
1,2-Dibromoethane			ND	ND	ND										
n-Octane			0.07	0.04	ND										
Tetrachloroethylene			0.05U	ND	ND										
Chlorobenzene			ND	ND	ND										
Ethylbenzene			0.08	0.04U	0.12										
m,p-Xylene			0.18	0.07U	0.31										

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Bromoform			ND	ND	ND										
Styrene			0.12	ND	0.05U										
1,1,2,2-Tetrachloroethane			ND	ND	ND										
o-Xylene			0.08	0.03U	0.13										
1,3,5-Trimethylbenzene			0.02U	ND	0.02U										
1,2,4-Trimethylbenzene			0.07	0.02U	0.06										
m-Dichlorobenzene			ND	ND	ND										
Chloromethylbenzene			ND	ND	ND										

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p-Dichlorobenzene			ND	ND	ND										
o-Dichlorobenzene			ND	ND	ND										
1,2,4-Trichlorobenzene			ND	ND	ND										
Hexachloro-1,3-Butadiene			ND	ND	ND										

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