Document Readers

SF-424
Application for Federal Assistance
Title: Anchorage Benzene Monitoring Phase 2

Document Status

Document Phase:	Draft	**Last Modified:**	05/10/2011
Current Editor:	Mike Jones		
Delegate:	Dennis Finney		

IGMS Information

Competition Close Date:			
AAShip:			
Approving Region:	HQ		
Project Officer:	Mike Jones	**PO Phone:**	
Awarding Region:	HQ		
Grant Coordinator:			

Solicitation Information

Opportunity ID:	EPA-OAR-OAQPS-11-05	**Competition ID:**	
Opportunity Title:	Community-Scale Air Toxics Ambient Monitoring	**Competition Title:**	
Opening Date:	03/23/2011	**Closing Date:**	05/23/2011
Grants.Gov Tracking Number:	GRANT10866762		
Date Received by EAPPLY:	05/10/2011		

Submission Information

Submission:	Application	**Grant:**	Non-Construction
Date Submitted:	05/10/2011	**Time Submitted:**	08:19:44 PM
Type of Application:	New		

Applicant Information

	Grants.gov	IGMS
Applicant Type:	C: City or Township Government	
Applicant Name:	Municipality of Anchorage	
Applicant DUNS #:	0766670130000	
Organizational Unit:	Health and Human Services	
Sub Org Unit:	Public Health	
EIN:	92-0059987	
Address:	PO Box 196650	
City:	Anchorage	
State:	AK: Alaska	
Zip:	99519-6650	
County:		
POC Name:	Stephen Morris	
POC Phone:	907 343-6976	
POC E-Mail:		
POC FAX #:		

Project Information

Federal Agency:	EPA

CFDA:	66.034
Project Title:	This is Phase 2 of a monitoring study that will assess the effectiveness of new EPA regulations reducing the amount of benzene in gasoline on ambient concentrations of benzene and other air toxics.
Project Period Start:	10/01/2011 **Project Period End:** 09/30/2013

Congressional Districts

Applicant Cong Dist:	AK **Project Cong Dist:** All

Estimated Funding

Federal	$164,514
Applicant	$0
(For all applicants including states)	
State	$0
(For state contribution to non-state applicants)	
Local	$0
Other	$0
Program Income	$0
TOTAL	**$164,514**

Is the Application subject to review by State Executive Order 12372 Process?	No - Program Not Covered By E.O. 12372
Available for Review:	
Is the Applicant delinquent on any Federal Debt?	No

Authorized Representative

Authorized Rep:	George Vakalis
Title:	Municipal Manager **Phone:** 907 343-7110

Key Contacts

Authorized Rep:	
Title:	**Phone:**
Address:	
City:	
State:	**Zip:**
Fax:	**E-Mail:**
Payee:	
Title:	**Phone:**
Address:	
City:	
State:	**Zip:**
Fax:	**E-Mail:**
Administrative Contact:	
Title:	**Phone:**
Address:	
City:	
State:	**Zip:**
Fax:	**E-Mail:**
Project Manager:	
Title:	**Phone:**
Address:	
City:	
State:	**Zip:**

Fax: E-Mail:

Budget Summary

Section A - BUDGET SUMMARY

	Estimated Unobligated Funds		New or Revised Budget		
	Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	TOTALS
TOTALS	$0	$0	$164,514	$0	$164,514

Section B - BUDGET CATEGORIES

Object Class Categories	Summary of TOTALS
a. Personnel	$37,175
b. Fringe Benefits	$22,678
c. Travel	$1,212
d. Equipment	$0
e. Supplies	$1,200
f. Contractual	$16,900
g. Construction	$0
h. Other	$73,475
i. Total Direct Charges	$152,640
j. Indirect Charges	$11,874
k. TOTALS	$164,514
Program Income	$0

Comments:

Application Attachments

Grants.gov Application:

Notifications History

OMB Number: 4040-0004
Expiration Date: 03/31/2012

Application for Federal Assistance SF-424

* 1. Type of Submission:	* 2. Type of Application:	* If Revision, select appropriate letter(s):
☐ Preapplication	☒ New	
☒ Application	☐ Continuation	* Other (Specify):
☐ Changed/Corrected Application	☐ Revision	

* 3. Date Received:	4. Applicant Identifier:
05/10/2011	

5a. Federal Entity Identifier:	5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:	7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name:	Municipality of Anchorage
* b. Employer/Taxpayer Identification Number (EIN/TIN):	92-0059987
* c. Organizational DUNS:	0766670130000

d. Address:

* Street1:	PO Box 196650
Street2:	
* City:	Anchorage
County/Parish:	
* State:	AK: Alaska
Province:	
* Country:	USA: UNITED STATES
* Zip / Postal Code:	99519-6650

e. Organizational Unit:

Department Name:	Division Name:
Health and Human Services	Public Health

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:	Mr.	* First Name:	Stephen
Middle Name:	Sean		
* Last Name:	Morris		
Suffix:			

Title:	Air Quality Program Manager
Organizational Affiliation:	
* Telephone Number:	907 343-6976
Fax Number:	907 279-7959
* Email:	MorrisSS@muni.org

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-11-05

* Title:

Community-Scale Air Toxics Ambient Monitoring

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

This is Phase 2 of a monitoring study that will assess the effectiveness of new EPA regulations reducing the amount of benzene in gasoline on ambient concentrations of benzene and other air toxics.

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: AK

b. Program/Project: All

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 10/01/2011

* b. End Date: 09/30/2013

18. Estimated Funding ($):

* a. Federal	164,514.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	164,514.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Mr.

* First Name: George

Middle Name: J.

* Last Name: Vakalis

Suffix:

* Title: Municipal Manager

* Telephone Number: 907 343-7110

Fax Number: 907 343-7140

* Email: VakalisGJ@muni.org

* Signature of Authorized Representative: Stephen Morris

* Date Signed: 05/10/2011

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 4040-0006
Expiration Date 07/30/2010

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Community Air Toxics Anchorage Benzene Monitoring Phase 2	66.034	$	$	$ 91,039.00	$	$ 91,039.00
2. EPA In-kind Services Contract Laboratory analysis of air samples	66.034			73,475.00		73,475.00
3.						
4.						
5. Totals		$	$	$ 164,514.00	$	$ 164,514.00

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SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
	Community Air Toxics Anchorage Benzene Monitoring Phase 2	EPA In-kind Services Contract Laboratory analysis of air samples			
a. Personnel	$ 37,175.00	$	$	$	$ 37,175.00
b. Fringe Benefits	22,678.00				22,678.00
c. Travel	1,212.00				1,212.00
d. Equipment					
e. Supplies	1,200.00				1,200.00
f. Contractual	16,900.00				16,900.00
g. Construction					
h. Other		73,475.00			73,475.00
i. Total Direct Charges (sum of 6a-6h)	79,165.00	73,475.00			$ 152,640.00
j. Indirect Charges	11,874.00				$ 11,874.00
k. TOTALS (sum of 6i and 6j)	$ 91,039.00	$ 73,475.00	$	$	$ 164,514.00
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8.	$	$	$	$
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$	$	$	$

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$	$	$	$	$
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$	$	$	$	$

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16.	$	$	$	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$	$	$	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:

22. Indirect Charges:

23. Remarks:

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Assessment of the Effectiveness of New Mobile Source Air Toxics Regulations in Reducing Ambient Concentrations of Benzene and Other Air Toxics in Anchorage, Alaska – Phase 2

Submitted in response to RFP Number: EPA- OAR-OAQPS-11-05
Category: Community-scale monitoring

Municipality of Anchorage Department of Health and Human Services
Anchorage Air Quality Program
Contact: Stephen S. Morris
Tel: (907) 343-6976 Fax: (907) 249-7959, E-mail: MorrisSS@muni.org

Funding Requested and Total Project Cost: $164,514 ($91,039 + $73,475 in-kind contribution from EPA for laboratory services)
Project Period: October 1, 2011 – September 30, 2013

1 Basis and Rationale

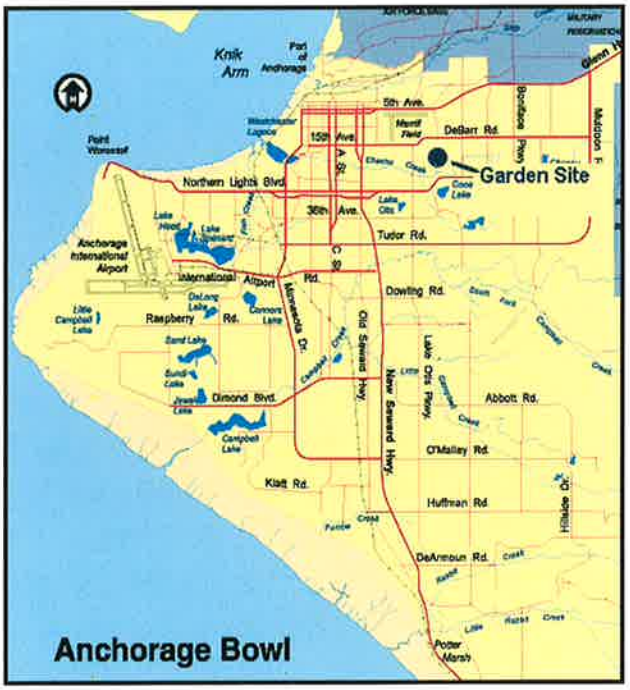
As the recipient of a prior Community Air Toxics grant, the Municipality of Anchorage Department of Health and Human Services (DHHS) conducted a one-year monitoring study between October 2008 and October 2009 to measure ambient concentrations of benzene, other volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). During this same period, gasoline sold in the Anchorage area was sampled and analyzed to determine the content of benzene and other significant fuel components. The primary purpose of this monitoring was to characterize the concentrations of benzene and other air toxics associated with gasoline prior to the implementation of a second round of mobile source air toxics regulations (MSAT2) promulgated by the EPA in February 2007. In Anchorage these regulations are expected to result in a four-fold or greater reduction in the benzene content of gasoline sold in the Anchorage area.* According to Tesoro Alaska, the primary supplier of gasoline in the Anchorage area, $70 million has been invested thus far to meet the benzene requirements and they anticipate investing a like amount prior to the 2012 EPA deadline.[1]

When DHHS submitted its proposal for the Community Air Toxics grant in 2007, we noted our intention to seek funding later for a follow-up study that would measure benzene and other gasoline-related air toxics concentrations after the implementation of MSAT2. We envisioned a two-phase study to determine how effective the rule would be in reducing ambient benzene concentrations and to determine whether the gasoline composition changes made to meet the benzene requirement might affect ambient concentrations of other VOCs and/or PAHs.

VOC, PAH and CO sampling for the 2008-09 (Phase 1) study was conducted at the Garden Street site, located in an east Anchorage residential area (Figure 1). This site has served as a SLAMS CO monitoring site since 1978 and PM-2.5 and PM-10 sampling has been conducted there for many years as well. The Garden Street site was included in VOC sampling studies conducted in 1993-94, 1994-96 and in 2002. This sampling has shown that the Garden Street site is reasonably representative of air pollutant concentrations, including VOCs, in Anchorage and that the concentrations of benzene here were high relative to most of the U.S.

* Under MSAT2, refiners are required to reduce the benzene content to 1.3% or lower by July 2012. Tesoro Alaska, the main supplier of gasoline in the Anchorage area, has told DHHS that they have already accomplished some of the refinery modifications necessary to meet the 1.3% requirement and began producing lower benzene gasoline in early 2011. DHHS has not determined whether the gasoline currently meets the 1.3% limit.

Figure 1. Garden Street Monitoring Site is located in a typical neighborhood in east Anchorage



Above: Looking south from Garden Street Site

The Phase 1 Community Air Toxics study confirmed that ambient concentrations of benzene and other VOCs associated with gasoline were higher than most of the country. When the mean annual benzene concentrations measured during Phase 1 are compared with 2008 data in the EPA AQS benzene data base, Anchorage ranks in the top 2% of the reporting monitors. Mean concentrations of toluene, ethylbenzene and o-xylene in Anchorage were similarly high relative to other monitors.[2]

Table 1. Comparison of mean ambient benzene concentrations (2008)

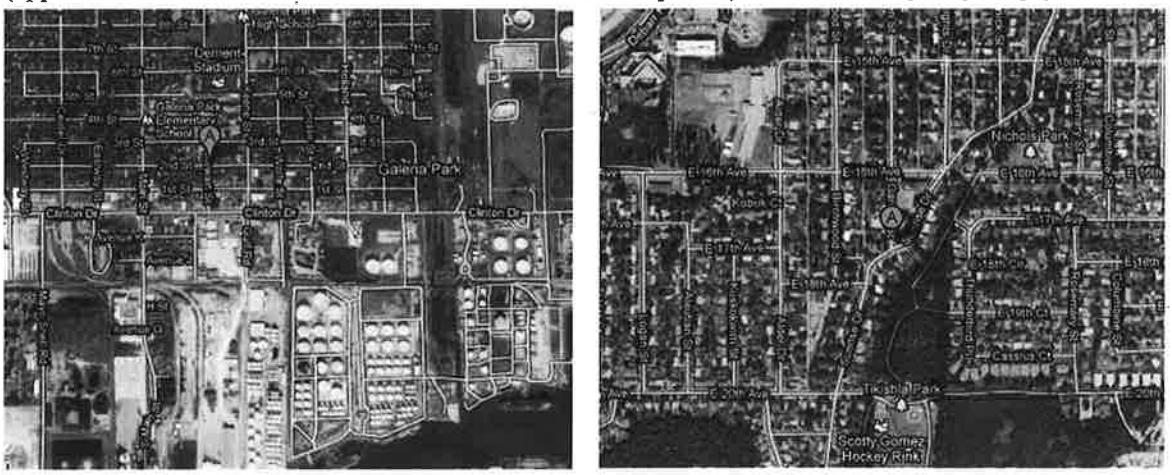
Rank	Percentile	Site Address	City/State	Annual Mean* (ppb)
1	100%	Ab Tech College	Asheville, NC	3.68
2	100%	618 Logan St.	Steubenville, OH	2.63
3	99%	520 Grand Island Blvd	Tonawanda, NY	2.59
4	99%	520 Grand Island Blvd	Tonawanda, NY	2.50
5	99%	520 Grand Island Blvd	Tonawanda, NY	2.02
6	99%	201 H.O. Mills Blvd.	Port Arthur, TX	1.88
7	98%	304 Stewart Street	Galena Park, TX	1.12
8	98%	Yorkville	Yorkville, GA	1.07
	98%	**Garden Street**	**Anchorage**	**1.06**
9	98%	Gregg Co. Airport Near Longview	Longview, TX	1.02
10	97%	1001 B Lynchburg Road	Houston, TX	0.99

* AQS reports concentrations in units of ppbC. These were converted to ppb in this table.

In contrast to the residentially-oriented Garden Street site, most of the monitors reporting benzene concentrations at or above the 98th percentile in 2008 were located in heavily industrialized locations. For example, the third ranking Tonawanda, NY monitor is located within one mile of a coking plant

that has an estimated benzene emission rate of 90.8 tons per year. Many of the other high-reporting sites were located in close proximity to refining and/or petroleum storage facilities. The cancer risk from lifetime exposure to the 1.06 ppb mean concentration measured at the Garden Street site is estimated to be between 1-in-37,000 and 1-in-131,000.

Figure 2. Aerial photos of the Galena Park, TX and Garden Street Monitors (approximate monitor locations noted as "A" in both aerial photos) ©2011 Google Maps Imagery



Galena Park, TX: mean [benzene] = 1.12 ppb

Garden Street, Anchorage: mean [benzene] = 1.06 ppb

The elevated ambient benzene concentrations measured at the Garden Street site are attributed to three primary factors: (1) strong and persistent winter temperature inversions that trap air pollutants close to the ground; (2) the high benzene content of Alaska gasoline; and (3) increased hydrocarbon exhaust emissions from motor vehicles at cold temperatures. The new air toxics rule directly addresses the last two of these three factors. In addition to substantially reducing the benzene content in Alaska gasoline the rule imposes stricter cold temperature exhaust emissions standards for passenger vehicles, to be phased-in between 2011 and 2015.

The MSAT2 rule has the potential to result in very substantial reductions in ambient benzene concentrations in Anchorage. DHHS proposes to quantify the magnitude of the reductions that can be ascribed to the rule. The next two sections will describe the technical approach and data analysis techniques that will be used to do this. These same data analysis techniques could be applied in other communities to estimate the reductions from MSAT2 in those areas.

2 Technical Approach

Because this study is envisioned as a follow-up to the earlier Phase 1 study, the technical approach that will be taken will mirror it. Five objectives were identified at the outset of Phase 1; their aim was to characterize ambient concentrations of benzene and other VOCs and PAHs prior to MSAT2 implementation. The aim of Phase 2 is to characterize these same concentrations after MSAT2 and compare them to Phase 1 to determine whether ambient concentrations have changed as a consequence of the rule. We propose to use the same five objectives used in Phase 1 adjusted to reflect that we are now in Phase 2 of the study. These objectives are listed below:

1. Re-measure ambient benzene concentrations *after* the benzene content in gasoline changes as a result of the new mobile source air toxics rule to compare with Phase 1.

2. Re-measure ambient concentrations of other VOCs besides benzene found in Anchorage gasoline to compare with Phase 1. The benzene reduction required by MSAT2 may affect key fuel attributes, necessitating a reformulation to meet fuel performance requirements. Re-measurement will help determine whether reformulation affects ambient concentrations of other air toxics besides benzene. †
3. Re-perform gasoline fuel sampling and analysis to characterize the composition of gasoline during Phase 2 for comparison with Phase 1.
4. Re-measure ambient concentrations of polycyclic aromatic hydrocarbons (PAHs). Studies show that PAHs emissions increase when vehicles operate at cold temperatures.[3] Phase 2 will help determine whether ambient PAHs are affected by changes in gasoline composition.
5. Re-measure ambient CO concentrations. CO and benzene concentrations are highly correlated. The slope of this regression relationship is likely influenced by the amount of benzene in the gasoline. Lowering the benzene content of gasoline should result in a decline in the ambient concentration of benzene relative to CO. This would provide good evidence of rule effectiveness.

2.1 Sampling and Analytical Methods

DHHS is proposing to use the same methods used in Phase 1 to measure VOCs, PAHs, and CO, and for speciation of gasoline constituents in the second phase of the study.

2.1.1 VOCs

As in Phase 1, Method TO-15 [4] will be used to measure 24-hour integrated VOCs on a one-in-six day schedule for one year. Ambient samples will be collected using MCS-1 Portable Canister Samplers, or equivalent, equipped with start/stop timers and 6-liter Summa canisters. A qualified contract laboratory‡ will perform the sample analyses by GC/MS in accordance with Method TO-15. During Phase 1, 30 VOCs were found above the laboratory reporting limit in at least one-third of the canisters collected. During Phase 2, canisters will be analyzed for a suite of compounds that include these same 30 VOCs.

Toluene	Dichlorodifluoromethane	1,2,4-Trimethylbenzene	Methyl Isobutyl Ketone
Benzene	Chloromethane	Tetrachloroethylene	Styrene
Ethylbenzene	Trichlorofluoromethane	Chloroform	1,3,5-Trimethylbenzene
M,p-Xylene	Trichlorotrifluoroethane	1,1,1-Trichloroethane	Acetonitrile
o-Xylene	Dichloromethane	Dichlorotetrafluoroethane	Carbon Disulfide
Acetylene	Methyl Ethyl Ketone	Bromomethane	n-Octane
Propylene	Dichlorodifluoromethane	Chloromethane	
1,3-Butadiene	Carbon Tetrachloride	Acrolein	

2.1.2 PAHs

In Phase 1, 24-hour gas-phase and particle-bound polyaromatic hydrocarbons were collected using a high volume sampler in accordance with Method TO-13A [5]. DHHS purchased two of these samplers for Phase 1 and we will use them again in Phase 2. A 6"diameter quartz fiber filter (QFF) is used to collect particles

† These VOCs could serve as "markers" to distinguish the effect that changes in benzene content may have on ambient concentrations from other unrelated factors. If, for example, the toluene content in gasoline remains unchanged between Phase 1 and 2, any reductions observed in ambient toluene concentrations would in theory be attributed to something other than changes in gasoline composition. Measuring ambient concentrations of other gasoline constituents like toluene may provide a means to distinguish the effect of changes resulting from lowering the gasoline benzene content from other unrelated factors that could also affect ambient concentrations.

‡ In Phase 1 the EPA agreed to have all VOC and PAH samples analyzed in the National Laboratory as an in-kind contribution to this project. We hope this can be arranged for Phase 2 as well.

prior to collection of organic vapors by a 3" thick polyurethane foam (PUF) cartridge at a flow rate up to 1.1 m^3/hour. DHHS intends to sample and analyze the same suite of PAHs as in Phase 1.

Naphthalene	9-Fluorenone	Retene	Indeno(1,2,3-cd)pyrene
Acenaphthylene	Fluoranthene	Benzo (a) pyrene	Benzo (g,h,i) perylene
Acenaphthene	Pyrene	Benzo (e) pyrene	Dibenz (a,h) anthracene
Fluorene	Cyclopenta[cd]pyrene	Perylene	Coronene
Anthracene	Chrysene	Benzo (b) fluoranthene	
Phenanthrene	Benzo (a) anthracene	Benzo (k) fluoranthene	

2.1.3 CO

As was the case in Phase 1, CO will be monitored continuously during the one-year study period. A trace level CO analyzer was purchased for Phase 1 that provides additional precision and accuracy beyond the "standard" analyzer. Monitoring will be performed in accordance with the Federal Reference Method and audited quarterly by the Alaska Department of Environmental Conservation. The Garden Street site has served as a CO monitoring station for over 30 years and is designated as a State and Local Air Monitoring Station (SLAMS).

2.1.4 Gasoline Composition

Because the composition of gasoline varies by season, DHHS plans to collect samples every two months throughout the one-year study period. Phase 1 showed that the benzene content of the gasoline sold by the various retailers in Anchorage was very similar. We propose to reduce the number of retailers included in the bimonthly sampling from 20 to 8. Phase 1 gasoline samples were analyzed by the University of Alaska Anchorage ASET laboratory in accordance with ASTM Method D6729-04. If Phase 2 proceeds, we intend to solicit the services of the ASET laboratory again.

2.2 Quality Assurance/Quality Control

DHHS prepared a detailed Quality Assurance Project Plan (QAPP) which was approved by EPA Region 10 prior to Phase 1 monitoring. DHHS will submit a revised QAPP to Region 10 prior to initiating Phase 2 sampling. The quality assurance program will include protocols for evaluating method precision, accuracy and ensuring proper record keeping, chain of custody, and data validation. Validated data will be submitted quarterly to the EPA AQS database.

3 Data Analysis

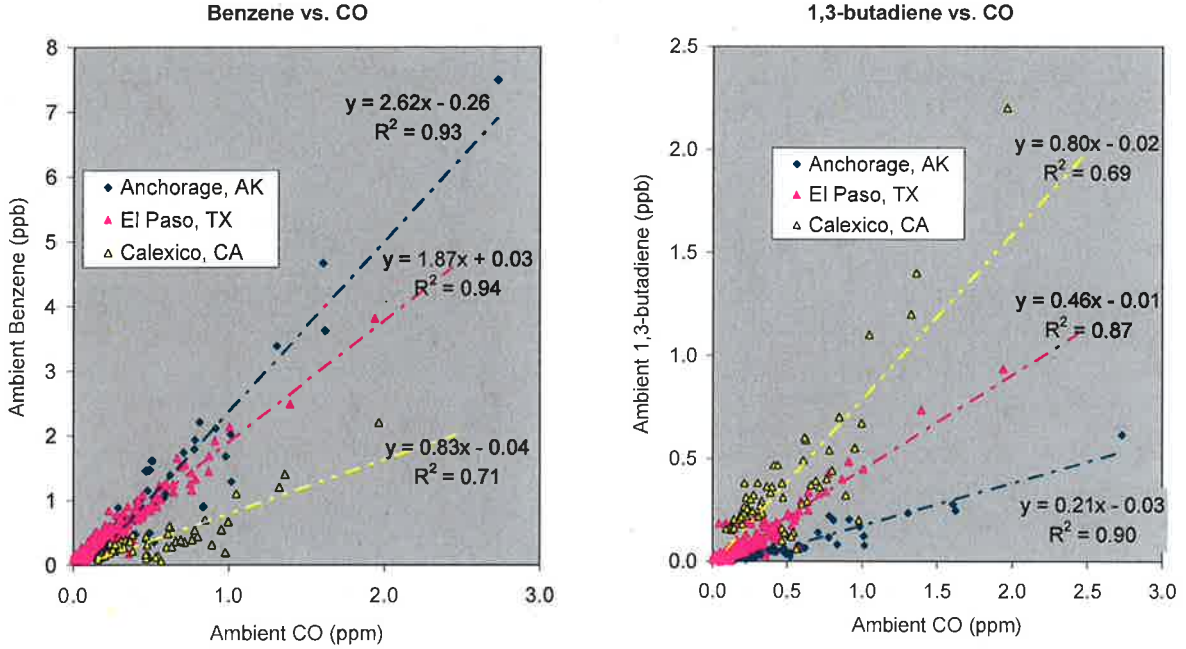
DHHS will examine and compare Phase 1 and Phase 2 concentrations of VOCs, PAHs and CO to assess whether concentrations change and whether these changes are statistically significant. In Phase 1 we found that ambient concentrations of benzene, toluene, ethylbenzene and xylene (BTEX) in air roughly mirrored their relative proportions in gasoline. This suggests that modifications in composition will likely be reflected in changes in ambient concentrations. We will examine how modifications in gasoline composition made as a consequence of MSAT2 will affect the concentrations of these same BTEX compounds in the ambient air.

In Phase 1 we found strong correlations between CO and various VOCs and some PAHs ($R^2 \geq 0.9$ for all BTEX and for 1,3-butadiene). We will re-examine the slope of the regression relationships between CO and these VOCs and PAHs in Phase 2 to determine whether they have changed as a consequence of MSAT2. We are particularly interested to see how these changes in slope might be related to reductions or increases in the content of each of these VOCs in gasoline (1,3-butadiene is a combustion product but its formation may be related to one or more gasoline components). Measuring CO also provides a method to account for changes that might be unrelated to MSAT2. If we assume that MSAT2 does not significantly influence CO emission rates, any decline in CO from Phase 1 to Phase 2 could be indicative of

improvements in the vehicle fleet, a long stretch of "benign" weather that is not conducive to elevated ambient CO or some other factor unrelated to MSAT2. Presumably these same "non-MSAT2" influences would reduce ambient concentrations of motor vehicle related VOCs and PAHs in roughly the same measure as CO. This provides a way to separate the effects of MSAT2 from unrelated factors that could also influence concentrations.

The Phase 1 report examined the relationship between CO and benzene and CO and 1,3-butadiene in El Paso, TX and Calexico, CA for comparison with Anchorage. Like Anchorage, strong correlations were found between CO and these two VOCs. However, the slopes of the regression relationships in all three communities were quite different. The slope of the benzene/CO regression line was higher in Anchorage than either El Paso or Calexico; we suspect the slopes are related to the gasoline benzene content in each community. Interestingly, the slope of the 1,3-butadiene/CO regression line was lowest in Anchorage (it is unclear why). We will re-examine these relationships to see if there is a change between Phase 1 and 2. This examination could also provide insight into factors affecting 1,3-butadiene concentrations.

Figure 3. Regression relationships between CO and benzene and CO and 1,3-butadiene.



4. Environmental Justice Impacts

Ambient data suggest that the greatest exposures to ambient benzene in Anchorage occur in higher density residential areas where homes often lack garages. The greater incidence of outdoor parking in these neighborhoods results in higher concentrations of vehicle cold-start emissions. In Anchorage these tend to be lower income areas such as older, higher density urban developments, trailer parks and apartment complexes. DHHS has shown that the average warm-up idle time for vehicles parked outside in the winter is about ten minutes. Local studies have shown that 50% or more of the CO emitted over a typical morning commute occurs during this period. Because benzene is strongly correlated with CO, evidence suggests that emissions of benzene and other motor vehicle-related VOCs emitted are also high during cold starts and warm-ups. Moreover, in Anchorage, low income neighborhoods are also more likely to be located in proximity to major traffic thoroughfares and thus are more likely to be affected by traffic-related pollutants including benzene.

5. Community Collaboration / Outreach

As a consequence of media coverage of prior local studies performed by DHHS in collaboration with the University of Alaska Anchorage, the Anchorage community has become aware of benzene as an air quality issue. In March 2011 DHHS posted the interim report on Phase 1 along with a fact sheet summarizing results on the Municipality of Anchorage web page. Local public radio (KSKA) and the local newspaper (Anchorage Daily News) followed with detailed coverage. Presentations were made to the local Air Quality Advisory Committee. DHHS plans a similar outreach effort at the conclusion of Phase 2. We expect considerable interest from the community.

6. Environmental Results: Outcomes, Outputs and Performance Measures

This project links directly to the EPA strategic plan goal of "protecting human health" and "reducing the risk from air toxics pollutants." Proposed Phase 2 of this study will provide the data necessary to determine how effective the MSAT2 regulations have been in reducing the risk of benzene, a toxic pollutant that was shown in Phase 1 to pose a cancer risk of between 1-in-37,000 and 1-in-131,000 from lifetime exposure at concentrations typical in Anchorage residential areas. Defining the relationship between CO, BTEX and 1,3 butadiene will advance the science of air toxics and enhance the understanding of the effectiveness of control strategies encompassed in the MSAT2 regulations by distinguishing the effects of gasoline reformulation from other factors unrelated to MSAT2.

6.1 Outcomes

Short- term

1. Determine magnitude of reduction of the benzene content of gasoline sold by Anchorage retailers before and after MSAT2.
2. Determine changes in other gasoline components resulting from reformulation resulting from benzene reduction.
3. Quantify the effectiveness of the MSAT2 in reducing ambient benzene concentrations in Anchorage.
4. Determine whether MSAT2-initiated changes in gasoline composition significantly affected ambient concentrations of other VOCs and/or PAHs associated with motor vehicle emissions in Anchorage.
5. Increase understanding of fuel-related factors that might affect 1,3-butadiene emissions and ambient concentrations.
6. Enhance overall community awareness and understanding of the benzene issue.

Mid- term

1. Provide information useful in assessing whether MSAT2 sufficiently reduced ambient benzene and whether additional controls are necessary.
2. Possibility of identifying new strategies for controlling 1,3-butadiene emissions.

Long-term

1. If study results indicate additional reductions are necessary, implementation of new benzene controls (could be local, state or federal) and further air quality improvements.

6.2 Outputs

1. Preparation of a final report in the form of a manuscript submitted for publication in a peer-reviewed journal.
2. Quarterly submission of VOC, PAH and CO data to AQS database.

3. Preparation of fact sheet overview of results of Phase 2 for posting on the Municipality of Anchorage web site, oriented to the general public.

6.3 Performance Measures

1. Data capture rate. Did the data meet data quality objectives identified in the QAPP? Were data excluded for failure to meet required objectives? The data capture rate determines the number of valid data points that can be used to quantify the impacts of MSAT2 on ambient air quality and gasoline composition. A low data capture rate will adversely affect the statistical confidence of these before and after MSAT2 estimates. *(Relates to short-term outcomes # 1, 2, 3, and 4.)*
2. Evidence of an increase understanding of the benzene air quality issue in Anchorage. Was a fact sheet posted on the Municipal web page? Was a news release prepared and distributed to the media? Was the story/study covered in the new media (radio, television, newspaper, and Internet blogs)? *(Relates to short-term outcome #6 and output #3.)*
3. Timely submission of data into AQS. Were the VOC, PAH and CO data submitted within 90 days of the end of each quarter as required? *(Relates to output #2)*
4. Successful final report. Was a manuscript prepared for peer-reviewed journal? Was it published? *(Relates to output #1)*

7 Programmatic Capability

All aspects of Phase 1, which was funded by a Community Air Toxics grant received in 2008, were successfully completed on time and within budget. In 2009, EPA added funding to this same grant for source apportionment of wintertime ambient carbon aerosols. Carbon-14 analysis was used to determine the relative impacts of fossil fuel and wood burning at the Garden Street site. This supplementary study was also completed successfully. Final reports for the primary and supplemental studies have been accepted by EPA Region 10. DHHS has retained most of the staff involved in Phase 1 and has a high degree of confidence that it can successfully complete Phase 2 of this study as outlined in this proposal.

DHHS has received and successfully managed annual EPA Section 105 assistance agreements for over 30 years. For most of these 30 years, DHHS has received these grants directly and has had an excellent record of meeting administrative and performance requirements of these grants. We have developed good professional relationships with our counterparts at EPA Region 10 and we believe they would attest to our good record over the years.

In 2005 the DHHS received $1.98M in congressional earmark funding for air quality projects in Anchorage, administered by EPA Region 10. Four separate projects were successfully completed with this funding. The project period ended on June 30, 2011 and administrative and performance reports were submitted within 90 days as required. EPA Region 10 closed the grant early this year.

7.1 DHHS Staff

Stephen S. Morris has served as the DHHS Air Quality Program Manager for 21 years and has 32 years experience in environmental science and monitoring. He has a BS in Environmental Science, University of California, Berkeley and a BS in Civil Engineering, University of Alaska Anchorage.

Anne Schlapia is a Project Manager with the DHHS Air Quality Program. She has 16 years experience in indoor and ambient air studies as well as air quality community outreach. She has a BA in Microbiology, Texas, State University, San Marcos and an MS in Environmental Quality Science, University of Alaska, Anchorage.

Matthew Stichick has four years experience as an Air Quality Engineer for DHHS and has a total of 11 years professional experience in environmental science, analytical chemistry and data quality management. He serves as the data quality officer for the Air Quality Program. He has a BS in Chemistry from the University of Alaska, Fairbanks.

Christopher Salerno has served as an Air Quality Specialist for DHHS for 17 years. He has a BS in Biology, University of Nebraska and a Masters of Environmental Science, University of Alaska, Anchorage. He has extensive experience in ambient air quality monitoring.

Stacey Cooper has served as an Air Quality Specialist for DHHS since 2005. Her previous experience includes work investigating the desorption kinetics of PAHs and as an environmental consultant performing field investigations related to contaminated site clean-up and redevelopment. She has an AB Geology, Princeton University (cum laude) and MS Environmental Science, Policy and Management, University of California, Berkeley.

8. Budget Information

During Phase 1 the EPA provided in-kind analytical services. VOC and PAH samples were analyzed by the EPA contract laboratory. Lease costs for VOC (Summa canister) sampling apparatus were also covered through in-kind services. The allowable, negotiated indirect cost rate for DHHS is 25.0%. The 15% rate budgeted is below the allowable.

	EPA Funding
Personnel	
(1) Project Manager @ $43.10/hr x 25 hrs/wk x 10 wks	$10,775
(2) Project Staff @ $32.00/hr x 15 hrs/wk x 55 wks	$26,400
TOTAL PERSONNEL	**$37,175**
Fringe Benefits	
(1) Fringe Benefits @ 36.54% of salary	$13,584
(2) Medical/Dental @ $17,664/2088 hrs x 1,075 hrs	$9,094
TOTAL FRINGE BENEFITS	**$22,678**
TOTAL TRAVEL (presents results at conference: Airfare $800, 2 days lodging =2 x $130 = $260, per diem 3 days @ $40/day)	**$1,212**
TOTAL EQUIPMENT (all necessary equipment purchased in Phase 1)	**$0**
TOTAL SUPPLIES (gasoline sampling bottles, replacement parts for PUF sampler and trace level CO analyzer, CO calibration gas, miscellaneous)	**$1,200**
Contractual	
(1) Gasoline sample analysis $150 x 110 samples = $19,800	**$16,500**
(2) Electricity consumption payment	**$400**
TOTAL CONTRACTUAL	**$16,900**
TOTAL OTHER	**$0**
TOTAL DIRECT CHARGES	**$79,165**
TOTAL INDIRECT (15% of direct charges)	**$11,874**
TOTAL FUNDING (without EPA in-kind)	**$91,039**

EPA in-kind contribution

This budget presumes that the EPA contract laboratory will provide the same services as in Phase 1 with an upward adjustment of 5% for inflation.

VOC analysis 67 samples x $367 per sample = $24,589	$24,589
Canister sample system and base site support = $10,517	$10,517
PAH analysis 79 samples x $380 per sample = $30,020	$30,020
Shipping and handling	$4,850
Inflation 2008 - 2011 (5%)	$3,499
TOTAL EPA IN-KIND	**$73,475**

The total grant amount requested, including the EPA in-kind contribution is $164,514.

9 Leveraging

Although no leveraged funding has been identified currently, DHHS intends to seek funding for a complementary indoor air study that will assess the impacts of MSAT2 on benzene concentrations in homes with attached garages. Phase 1 of this separately-funded indoor study has already been completed (it ran concurrently with Phase 1 of the ambient air quality study described in this proposal). DHHS hopes to provide a comprehensive picture of the effects of MSAT2 on overall benzene exposure in Anchorage, educate the public about remaining risks of both indoor and outdoor (ambient) exposure and, if necessary, implement additional strategies to reduce exposure to benzene and other VOCs.

DHHS has long committed its resources (both local and federal) to this effort and intends to continue for the foreseeable future.

10 References

[1] Personal Communication with Kip Knudson, Tesoro Alaska, April 15, 2011.

[2] Community Air Toxics Study - Interim (Phase 1) Report :Assessment of the Effectiveness of New Mobile Source Air Toxics Regulations in Reducing Ambient Concentrations of Benzene and Other Air Toxics in Anchorage, Alaska, Municipality of Anchorage Department of Health and Human Services, December 2010, http://www.muni.org/Departments/health/environment/AirQ/Documents

[3] Laurtikko J., Erlandsson L. and Abrahamsson R.: "Exhaust Emissions in Cold Ambient Conditions: Considerations for a European Test Procedure", SAE paper 950929, 1995.

[4] Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air: Method TO-15 "Determination of Volatile Organic Compounds in Air Collected In Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry, Second Edition, U. S. Environmental Protection Agency, Research Triangle Park, NC, EPA 600/625/R-96/010b, January 1999.

[5] Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air: Method TO-13A "Determination of Polycyclic Aromatic Hydrocarbons (PAHs) in Ambient Air Using Gas Chromatography/Mass Spectrometry, Second Edition, U. S. Environmental Protection Agency, Research Triangle Park, NC, EPA 600/625/R-96/010b, January 1999.