SUMMARY INFORMATION PAGE

Project title: Highway Air Toxics Impacts in the Chinatown-International District of Seattle

Applicant information: Puget Sound Clean Air Agency, 1904 3rd Ave, Suite 105, Seattle, WA 98101
Contact person: Erik Saganic, eriks@pscleanair.org, 206-689-4003, fax 206-343-7522
Funding requested: $419,252.64
Total Project Cost: $580,017.71, including an Agency cost-share of $160,765.07 in-kind
Project period: Expected to start in July of 2015 and last for 33 months (March of 2018).
DUNS number: 3634223740000

Abstract

This project will identify and more accurately define air toxics risks in a community near a major highway and a newly-established NO_2 and $PM_{2.5}$ near-road monitor, involve and educate community members about these risks, and provide broader information about how these risks apply to other near-roadway communities across the Northwest.

Seattle's Chinatown-International District and Yesler Terrace neighborhoods are unique and diverse communities facing language and many other socio-economic barriers to environmental involvement. The neighborhoods are also split by a portion of Interstate-5 (I-5) that is the most trafficked area in the Pacific Northwest. The 2005 National-Scale Air Toxics Assessment (NATA) estimated that this area has the highest risk census tract in Washington State.

This project has three major components: 1) Community Engagement and Study Design, 2) Air Toxics Sampling, and 3) Evaluation and Next Steps. We will seek community partners' input to our study design, especially any "community-directed" sampling. Our community collaboration and outreach will provide avenues for residents to learn about air toxics and their potential health risks. We will also share a full evaluation of our air toxics results with the community using appropriate forums, venues, and languages. We will then support potential near-road pollution mitigation strategies ("next steps") that can continue beyond the life of the grant.

This project will use three sampling approaches: a) fixed site air toxics sampling, b) community-directed sampling and c) mobile monitoring. The fixed site air toxics sampling will run for an entire year and include the full suite of VOC, aldehyde, PAH, and PM_{10} metals at our near-road monitor, providing values for cancer risk estimates and appropriate comparisons to other modeled and monitored data. We will also setup two additional sites sampling the most important air toxics in these census tracts as identified by the 2005 NATA (benzene, 1,3-butadiene, formaldehyde, and acetaldehyde). Community-directed sampling will consist of additional VOC sampling that will both provide a venue for meaningful community input and also provide greater spatial resolution for gradient assessments. We will conduct limited mobile monitoring using a total VOC sensor, and to add additional spatial resolution for gradient assessments. All monitoring activities will leverage existing monitors and equipment including speciation sampling and other gaseous and particle monitors that will be used in both fixed and mobile sampling. This leveraged monitoring will help data analysis, and specifically factor analysis.

Our analysis and results will help us better understand near-road pollution sources and health risk. We will better understand air toxics levels at different distances to the highway, the risk context through comparisons against national monitoring sites (including the nearby Seattle NATTS site), and the NATA model. Additionally, we will engage the community to explore potential mitigation strategies to reduce exposure to near-road air pollution beyond the time horizon of this grant.

1. BASIS AND RATIONALE

In the Puget Sound area, we estimate up to 200,000 people live within 200 meters of a highway with over 100,000 vehicles per day. Moreover, a local study also shows that our population living closest to highway traffic is disproportionately low-income, minority race, and with low English language proficiency.[1]

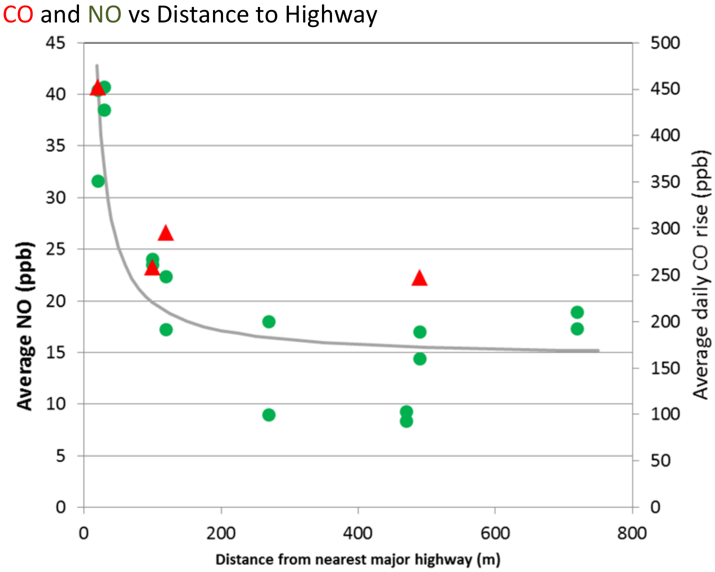
The Chinatown-International District is the center of Seattle's Asian American community. The neighborhood is multiethnic, consisting of Chinese, Japanese, Vietnamese, Filipino, and many other communities. This community is also separated by I-5 at the junction with I-90, a segment with the highest traffic area in the Pacific Northwest.[2] The neighborhood hosts the newly-established nitrogen dioxide and fine particle near-road monitor, located about 20 meters east of I-5 (10th and Weller, on Figure 1).

Neighboring Yesler Terrace is also a very diverse and low income neighborhood that is bounded by I-5 to the west and includes a number of areas where children may have potential exposures to air pollution from the interstate, including a playfield, a community farm/garden, and an elementary school. These areas are in a census tract that the 2005 NATA ranks as the highest in Washington State, with the neighboring tract ranked fourth highest.[3]

Our agency's environmental justice map, the Community Air Tool, similarly shows that the Chinatown-International District and Yesler Terrace neighborhoods rank in the top 1% most disproportionately impacted areas in our jurisdiction, with high traffic volumes, median incomes around $15K per year, 40% limited English proficiency, and more air pollution-related hospitalizations (asthma, COPD, cardiac-related) than 99% of other neighborhoods in our region.[4,5] EPA's EJVIEW also shows that in these tracts, 40% live below the federal poverty level, less than 40% have a high school degree, and up to 92% are a minority race.[6]

This proposed study will support the Monitoring in the Near-road Environment grant category and will enhance our local, regional, and national understanding of how traffic-related air toxics impact potential risks, of potential air toxics contributors, and of distance gradients. This study will build directly on a fall 2014 monitoring pilot study we conducted in the Chinatown-International District neighborhood to test small portable sensors in a near-road environment. In that study, we estimated concentration gradients to the highway for criteria pollutants (see Figure 1) including $PM_{2.5}$ (light scattering nephelometer), nitrogen dioxide (passive Ogawa badges), carbon monoxide (CairClip), and other pollutants like black carbon (microAeth). We used some of these as "markers" for air toxics, but acknowledge that air toxics (and potential cancer risk) are a data gap as we communicate results to community leaders. This study will directly address that data gap. We plan to use these criteria pollutant portable sensors alongside the air toxics monitors in this proposed study to help us characterize the near-road environment through analytical techniques, such as factor analysis.

Figure 1. 2014 Chinatown-International District Study Results: CO and NO vs Distance to Highway

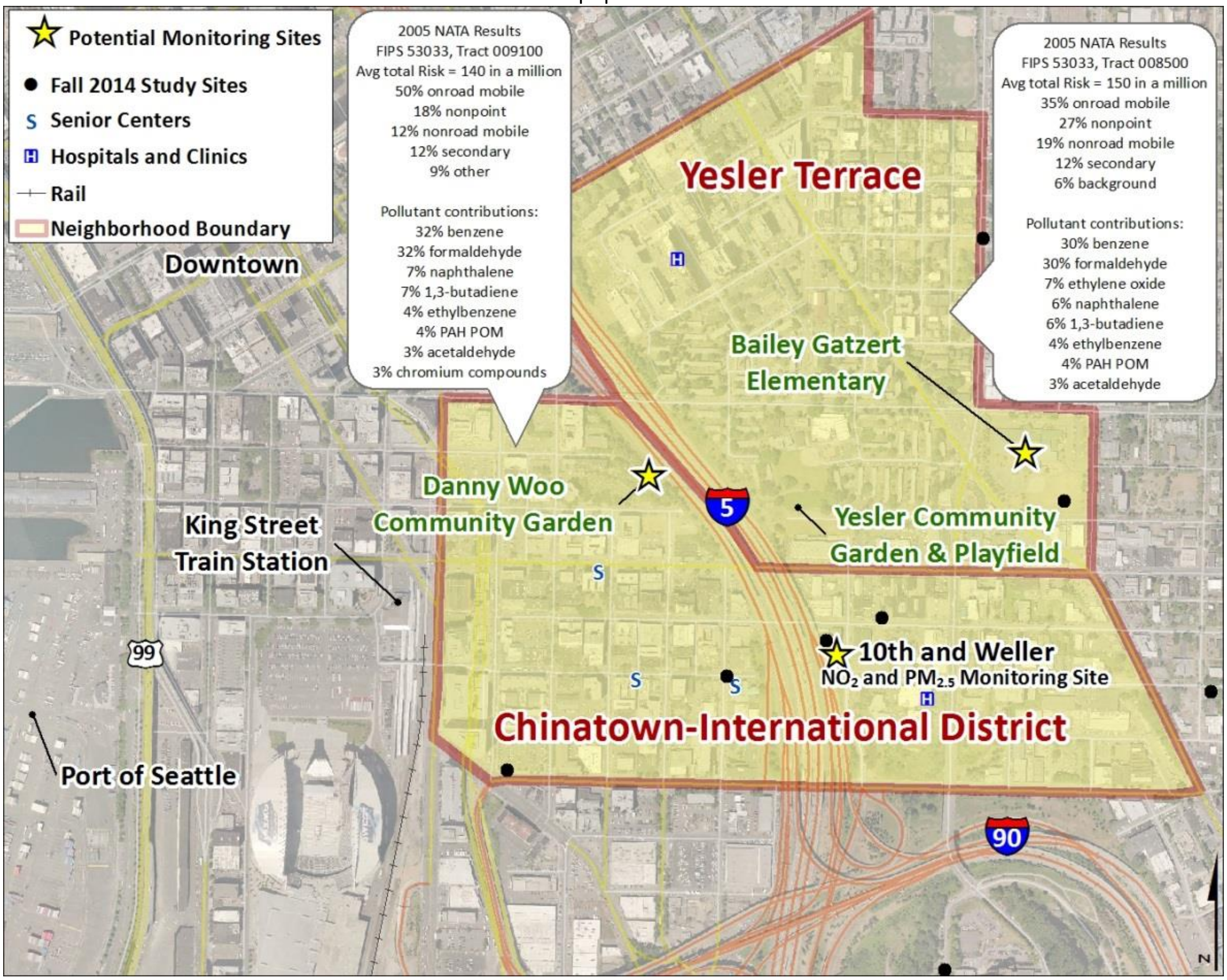


Not only will this project provide a detailed understanding of how highway traffic affects the highly impacted Chinatown-International District and Yesler Terrace neighborhoods, we will extend the results to other parts of the Puget Sound area, the Pacific Northwest, and nationally where people live near high traffic volumes. We will do this by comparing ratios and relationships between total VOCs, specific VOCs and air toxics, traffic counts, and census block populations. We will then apply this information (with appropriate caveats) based on our knowledge of traffic in other locations.

Figure 2 below highlights some of the locations of interest for our study, including the neighborhood boundaries, the current NO_2 and $PM_{2.5}$ near-road monitor, sampling sites from our 2014 sampling pilot study, potential air toxics monitoring sites, and a few locations with concentrated populations with sensitive health (hospitals, senior centers, and schools).

The map also highlights 2005 NATA results from two census tracts that represent the neighborhoods. These risk values do not include diesel particulate matter (DPM). When the California OEHHA unit risk factor is applied, the potential cancer risk for these two census tracts is estimated at 1,500 per million. In this study, we will use analytical tools to estimate our diesel exposure.

Figure 2. Map of the study area including current NO_2 and $PM_{2.5}$ monitoring site, fall 2014 sites, and potential air toxics monitoring locations overlaid with NATA results and locations of sensitive populations



In 2010, the University of Washington also completed a black carbon mobile monitoring campaign in this neighborhood that demonstrates that this community has significant impacts from the roadway (Figure 3).[7] The study also recommended more street level monitoring to better understand the impacts in this community.

With this grant, we can build on prior results by providing more quantifiable potential cancer risk estimates with direct air toxics measurements. The results can also help validate NATA modeling. Additionally, the results can improve our understanding of how criteria pollutant "markers" for air toxics represent reality by examining air toxics/criteria pollutant ratios and relationships.

We have started to establish relationships with community leaders in this neighborhood through a recent air monitoring pilot study we completed in fall 2014, and are beginning to communicate the study's preliminary results. This grant award would directly address data gaps from the fall 2014 study and will help us continue to build community relationships. The grant would also help us work toward identifying potential local mitigation strategies and recommendations that go beyond the federal and state rules that are improving criteria and toxic pollutant emissions from mobile sources (e.g., Tiers 2 and 3 for light-duty vehicles).

We also have an established track record monitoring air toxics. In 2010, we completed two simultaneous EPA air toxics monitoring projects worth over $1M, while meeting project objectives on schedule and within budget. We exceeded our proposed in-kind contributions on both projects.[8]

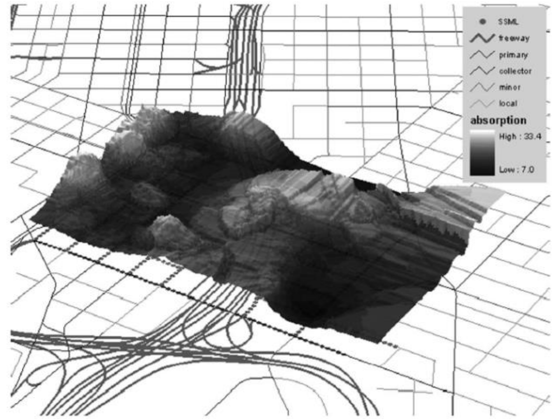


Figure 3. Example result from UW's black carbon mobile monitoring study in the neighborhood

2. TECHNICAL APPROACH

We will sample air toxics in a diverse and highly impacted neighborhood of Seattle using three approaches:

a. Three fixed site locations

We plan to monitor for one year, every six days, for the full suite of VOCs, PAHs, aldehydes, and PM_{10} metals at the 10th & Weller nitrogen dioxide and fine particle near-road monitoring site within the neighborhood (about 20 meters east from I-5). We will also monitor at two additional locations for the four key mobile source air toxics with the highest potential health risks (beyond DPM) in our region (benzene, 1,3-butadiene, formaldehyde, and acetaldehyde).[8,9] We will locate these monitors at different distances from I-5 to address questions of pollution gradients. The second monitor will be placed at a slightly more distant location than the near-road site (100-200 meters away) on the west side of I-5. The third site location will be more distant (400-500 meters) on the east side of I-5 to see where air toxics levels taper off to near "urban background" levels. Locating sites on both the east and west side of the interstate will allow us to explore potential upwind and downwind differences (wind speed and direction are measured at the 10th & Weller monitoring site.) A fourth site, the National Air Toxics Trends Site at Seattle-Beacon Hill, is three miles south of the neighborhood, and will continue to operate without making use of funding from this grant. We will use Beacon Hill data in our analysis and conclusions as appropriate.

We will use all the same monitoring equipment at the fixed sites as used at the NATTS site in Beacon Hill, including canister (VOC) EPA Method TO-15, tube TO-11A (aldehydes), PM_{10} Hi-Vol IO-3 (metals), and PUF (PAH) TO-13A samplers. We will also use our portable samplers for NO, CO, BC, $PM_{2.5}$ nephelometers, and particle counters. Leveraged monitoring will also meet NATTS quality assurance requirements for speciation samplers (including the URG3000N carbon sampler) and FEM approved NO_2, CO, SO_2, and $PM_{2.5}$ monitors.

b. Community-directed sampling

In addition to the fixed sites, we will include about 20 passive VOC canisters for community use for targeted sampling. This will allow the community to identify locations of interest, actively participate in collecting samples, and learn VOC concentrations at those locations. We will sample on the same days that fixed sites are operating to provide greater spatial gradient information.

c. Mobile monitoring

We will use a total VOC monitor (e.g. Aeroqual) to provide even greater spatial resolution beyond the fixed site and community-directed sampling locations for several parameters. For the first few months of the study, we will collocate this monitor at the 10th & Weller near-road NO_2 and $PM_{2.5}$ fixed site. We will also conduct five to 10 mobile sampling runs with the total VOC monitor as well as measure other road pollution indicators (NO, CO, BC, and particle counts).

We have developed techniques from our prior mobile studies to temporally and spatially correct data captured on mobile platforms. We will create patterned routes through grid cells through multiple passes to create a time adjustment curve to correct all data to make apples-to-apples comparisons.

Table 1. Proposed sampling, duration, and frequency

Current and proposed sites	Measured parameters (from this grant and *leveraged*)	Monitoring duration or frequency
10th and Weller (current near-road NO_2 site)	Full suite of VOCs, PAHs, aldehydes, PM_{10} metals, *NO_2, NO_x, NO, CO, BC, $PM_{2.5}$ speciation, $PM_{2.5}$, temperature, winds, traffic counts*	Daily samples every six days for one year
Beacon Hill (current NATTS site)	*Full suite of VOCs, PAHs, aldehydes, PM_{10} metals, NO_2, NO_x, NO, SO_2, CO, BC, $PM_{2.5}$ speciation, $PM_{2.5}$, temperature, winds*	Daily samples every six days for one year
Site on east-side of I-5 (proposed)	Benzene, 1,3-butadiene, formaldehyde, acetaldehyde, NO, CO, BC, $PM_{2.5}$	Daily samples every six days for one year
Site further west of 10th and Weller (proposed)	Benzene, 1,3-butadiene, formaldehyde, acetaldehyde, NO, CO, BC, $PM_{2.5}$	Daily samples every six days for one year
20 other locations as directed by community (proposed)	Benzene, 1,3-butadiene, formaldehyde, acetaldehyde	Possibly deployed at once or in groups
Mobile monitoring	Total VOCs, NO, CO, *BC, $PM_{2.5}$, particle counts*	5-10 days out of the one-in-six day sampling schedule

The 10th and Weller and Beacon Hill monitoring sites are operated by the Washington Department of Ecology, which has agreed to grant us access and support to deliver this grant project if awarded.

3. DATA ANALYSIS

We will evaluate the data in a multi-step process. First, we will complete a full and ongoing evaluation of the data including a full quality assurance assessment. This entails checking data completeness, trends, temporal patterns, and potential interferences. Additional review will help in the analysis, including reviewing detection limits to determine the best statistical estimation techniques needed (especially if the data is significantly left censored). We will calculate summary statistics such as averages, medians, percentiles, for all the measured air toxics.

1) *Estimate potential cancer and non-cancer risks for fixed sites*

   Based on statistical summaries described above, we will calculate potential cancer and non-cancer risk estimates based on unit risk factors and hazard indices as adopted by Washington State Acceptable Source Impact Levels.[10] Based on these estimates, we will provide a ranking of air toxics, which will help us quantify the health hazards attributed to air toxics that are now only roughly estimated through surrogate methods.

2) *Estimate air toxics concentration gradients with proximity to the highway*

   Using all data from fixed sites, community directed sites, and mobile sampling, we will derive concentration gradients with distance to the highway. This will provide us with a local study to reference when discussing risk due to transportation in our region.

3) *Compare air toxics concentrations and risks to the national NATTS network*

   We will aggregate three years of the National Air Toxics Trends Site data across the country, average results, and apply the same unit risk factors to make risk comparisons across the country (especially the local NATTS at Seattle Beacon Hill three miles to the south).

4) *Compare air toxics concentrations to nearby 2011 NATA census tract estimates*

We will compare our results to the 2011 National Air Toxics Assessment model. We will do a comparison across a number of neighboring census tracts using ArcGIS.

5) *Identify & quantify air toxics sources through factor analysis and other analyses*

For our analysis, we will use both collected data from our sensors and leverage collocated data from the near-road nitrogen dioxide site. The leveraged data includes speciation, black carbon, and fine particle information. Our additional sensors will provide carbon monoxide, particle counts, and nitric oxide concentrations, which are "markers" for vehicle pollution.

We will use the results in a factor analysis to identify and quantify air toxics sources. The factor analysis will include monitored concentrations of air toxics, daily black carbon, fine particles, particle number, carbon monoxide, nitric oxide, and traffic counts, temperatures, wind speeds, and humidity data. We will also include organic carbon, elemental carbon, and many other particle fractions from collocated speciation data provided by the Washington State Department of Ecology. We will attempt to estimate concentrations of diesel particulate matter, an important mobile source air toxic, so that we may include its estimated levels and risk (at least qualitatively) as we communicate results.

6) *Extrapolate risks from the gradient study to quantify potentially exposed populations and their potential risk*

We will look at how the gradient data compares to the NATA, and based on traffic volume, we will assess what air toxics concentrations could be near highways in other parts of our jurisdiction.

If the total VOC monitor does appear to provide relatively consistent ratios to benzene, 1,3-butadiene, and formaldehyde, we will use the total VOC data to extrapolate the air toxics levels beyond the fixed sites (with uncertainties indicated prominently). We will explore ratios of total VOCs to specific air toxics, as well as ratios of air toxics to criteria pollutants.

Using both mobile and fixed site data, we will infer gradient curves and maps for measured air toxics like formaldehyde, benzene, and 1,3-butadiene scaled to distance to traffic volume. To compensate for potential biases, we will factor in wind directions and speed sensitivity into our analysis. We will also analyze other potential impacts to help explain unexpected anomalies, possibly with line dispersion modelling of nearby I-90, side streets, or other non-road sources of air toxics.

4. ENVIRONMENTAL JUSTICE IMPACTS

Members of the very diverse and highly impacted Chinatown-International District community have told us that air quality is a significant concern, especially with sensitive subpopulations. This project is designed to meet that concern.

The Chinatown-International District is the center of Seattle's Asian American community. The neighborhood is multiethnic, consisting of Chinese, Japanese, Vietnamese, Filipino, and many other communities. This community is also separated by I-5 at the junction with I-90, a segment with the highest traffic area in the Pacific Northwest.[2] Nearby Yesler Terrace is also a very diverse and low income neighborhood that is bounded by I-5 to the west and includes a number of areas where children may have potential exposures to air pollution from the interstate, including a playfield, a community farm/garden, and an elementary school.

These neighborhoods ranked among the top 1% "most highly impacted" in our jurisdiction based on an agency committee's findings. The committee's ranking criteria included air pollution, health sensitivity to air pollution, and socioeconomic indicators (such as proximity to sources of diesel pollution, hospitalization rates, and household incomes).[4]

Our agency's environmental justice map, the Community Air Tool, shows that the Chinatown-International District and Yesler Terrace neighborhoods experience high traffic volumes, have median incomes around $15K per year, have 40% limited English proficiency, and are in the worst 1% for three types of air pollution-related hospitalizations (asthma, COPD, and cardiac-related).[4,5]

In this study we will provide the community the unique opportunity to direct air toxics sampling based on their own concerns. Sampling will be geared toward near-road pollution, but the community will have the latitude to identify a variety of locations and sources (for example bus stops, parking lots, intersections, loading docks, or highways).

We have already started building relationships in this community through our fall 2014 monitoring pilot study. We also plan to continue to work in this community to provide information and the tools to take next steps. This air toxics study provides an important part of taking action against air pollution by helping to fill in identified data gaps.

Initial conversations with Chinatown-International District community members indicate that the study could play a powerful role in providing potential evidence of air pollution in the area. Residents seem to be particularly interested in using the study's results to validate their own air quality experiences and utilizing the data to eventually help protect their community from pollution. We do not plan to provide any subawards.

5. COMMUNITY COLLABORATION/OUTREACH

The study will help us to continue building long-term relationships with these communities and allow us to create meaningful dialogue about how air quality issues affect residents' day-to-day lives.

In the first step of the project's engagement plan, we will continue to identify key stakeholders through our known partnerships. Some of the important contacts we will first connect with include Asian Counseling Referral Services, the Chinese School Chong Wa, the Nisei Veterans Committee, the Organization for Chinese Americans, Kin On (a Senior Association for Seattle Asians), the Chinese Information Service Center, International Community Health Services, and the International District Emergency Center.

Through these established stakeholders, we will solicit feedback on the project and specifically the community-directed sampling. We will rely on our key stakeholders to identify the most appropriate formats and venues for outreach. These could include leading community members on air monitoring site tours, community meetings and workshops, translation of printed materials, or communicating via customized biweekly air quality summaries we currently publish in the local neighborhood newspaper, the *International Examiner*.[11]

The community engagement phase of the study is intended to spark discussion in the community about air pollution issues and involve community members in the use of the passive air toxics samplers. Community members will learn more about air pollution in general or air toxics in particular, provide input on potential study options, and may even actively participate in the sampling itself.

Our fall 2014 pilot study included Bailey Gatzert Elementary School. It is possible that our outreach and collaboration for this project could also include a different local school within the study area. With a number of schools located near major roadways, near-road pollution is a topic of interest to the Seattle School Board, schools across the Northwest, and nationally. We have the support of the local school district (see letter of support in the attachments of this application), and they may provide another venue for us to conduct our outreach.

Lastly, we will also share our experiences and results with other local, tribal, state, and national partners in a variety of venues, such as NW-AIRQUEST and a national air quality conference (included in our travel budget). To achieve a greater value to the grant, we believe the results, techniques used, and knowledge should be extended to national partners as well.

6. ENVIRONMENTAL RESULTS – Outcomes, Outputs, and Performance Measures

Outcomes: As described in more detail in the Technical Approach and Data Analysis sections above, we will quantify air toxics risks as a function of distance from a major freeway, including at locations selected by the community. We will engage the community throughout the project, and we will communicate estimated potential risks to the community. At the conclusion of the project, we will develop a mitigation plan.

To achieve these project outcomes, we will use the following timeline to measure progress.

Table 2. Project outputs, timeline, and performance measures

Project Outputs	Start	End	Performance Measures
Stage 1: Community Engagement and Study Design	Summer 2015	Ongoing	
• Outreach (see community collaboration/outreach)	Summer 2015	Ongoing	Contacts made, input received
• Potential fixed site and community-directed input and scoping	Summer 2015	Winter 2015	Community-chosen monitoring sites, community-driven project design decisions
• Develop QAPPs, SOPs, and set up contract with analytical laboratory	Winter 2015	Spring 2016	QAPPs finalized, SOPs finalized, lab contract finalized
• Install fixed sites	Winter 2015	Spring 2016	Sites installed
Stage 2: Air Toxics Sampling	Spring 2016	Spring 2017	
• Fixed sites sampling	Spring 2016	Spring 2017	Data collected
• Community-led canister sampling	Spring 2016	Spring 2017	Data collected
• Mobile sampling	Spring 2016	Spring 2017	Data collected
Stage 3: Evaluation and Next Steps	Summer 2017	Spring 2018	
• Data Analysis	Summer 2017	Fall 2017	
• Draft report	Fall 2017	Winter 2017	Draft report completed
• Follow up meetings with community members	Fall 2017	Winter 2017	Input received
• Final report	Spring 2018	Spring 2018	Final report completed
• Community "next steps" plan	Spring 2018	Spring 2018	"Next steps" plan completed

We will hold routine meetings with the project team to review the work and our project timeline (as described in Table 2). The timeline has built in some flexibility in the schedule for unexpected delays (monitoring site installations, etc.). If scheduling deficiencies arise, we will revise the project timeline below and maintain an open and transparent dialogue with the EPA grant administrator through progress reports and less formal check-ins. Additionally, the project manager will check budget balances with managers monthly and adjust as needed.

7. PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

<u>We have a proven track record of fulfilling past EPA grant work successfully and on time</u>. We have agency policies that ensure and enable wise and appropriate use of federal grant funds, and our state auditor routinely audits our agency's use of federal grant funds, with no findings in recent years. Here are a few examples from the last few years:

1) The 2010 Tacoma and Seattle Air Toxics Study provided a comprehensive view of air toxics in Puget Sound, including important findings on the contribution of wood smoke to key air toxics. We completed the $500K project well within timelines and budget. We also exceeded our $100K matching cost-share. The same key agency staff from that project will participate in the project proposed herein (EPA Grant No XA-96069801).[8]

2) The 2010 Air Toxics Methods Development Grant project developed new ways to characterize diesel exhaust using hourly VOCs, fine particle, and black carbon data among other methods. We completed this $600K project within timeline and budget at the same time as the Tacoma and Seattle Air Toxics Study. We also exceeded the $100K cost-share for this grant. The same key agency staff from that project will participate in the project proposed herein (EPA Grant No XA-96066801).[12]

3) In 2012, with EPA Diesel Emission Reduction Act (DERA) funding, we upgraded two Sound Transit passenger commuter trains between Everett, Seattle, and Tacoma to bring them up to the cleanest emission standards. The project was completed on time with respective quarterly and final reports and summaries (EPA Cooperative Agreement No DE-00J66501).

4) With another EPA grant, we scrapped four old tugboat engines for newer, cleaner engines with an estimated diesel particle pollution reduction of 23 tons over the life of the boat. This project was in partnership with Harley Marine, and also was completed on time including respective reports (EPA Assistance Agreement No DE-00J44801-0).

5) We are currently working with Interstate Distributor Company to replace 10 old trucks with new trucks fueled by liquefied natural gas. The project is progressing on schedule and all quarterly reports have been submitted in accordance with the grant's terms (EPA Grant No DE-00J81601-0).

8. BUDGET

See form SF-424A sections A-F in this grant application package for more details. The following table contains the itemized costs related to each budget category.

Table 3. Itemized costs related to each budget category.

Budget Category and Detail	EPA Funding	Cost-Share
Personnel		
(1) Air Monitoring Lead @ $55.06 /hr x 3.1 hrs/week x 130 wks		$22,187.84
(1) Air Resources Specialist @ $47.56 /hr x 5.4 hrs/week x 130 wks		$33,384.78
(1) Air Resources Specialist @ $49.15 /hr x 8 hrs/week x 26 wks		$10,223.20
(1) Environmental Justice Coordinator @ $51.34 /hr x 2.7 hrs/week x 78 wks		$10,812.20
(1) Air Monitoring Specialist II - Special Project Coordinator @ $48.71 /hr x 3.8 hrs/week x 130 wks	$24,061.09	
(1) Air Monitoring Specialist @ $36.36 /hr x 15.5 hrs/week x 130 wks	$73,258.68	
(1) Communications Specialist @ $36.36 /hr x 1.9 hrs/week x 130 wks	$8,980.10	
TOTAL PERSONNEL	*$106,299.87*	*$76,608.02*
Fringe Benefits		
32.92% of salary		
TOTAL FRINGE BENEFITS	*$34,993.92*	*$25,219.36*
Travel		
Airfare for 3 trips for conference attendee/s (separate or same conference)	$1,550	
2 nights for 3 conference/s	$1,500	
2 days per diem for 3 conference/s	$450	
TOTAL TRAVEL	*$3,500*	*$0.00*
Equipment		
TOTAL EQUIPMENT	*$0.00*	*$0.00*
Supplies		
5 small optical particle counters, CO, and NO sensors	$3,750.00	
Supplies for assembling portable samplers (Arduino boards, SD cards, battery power, cords, GPS, display, enclosures, etc)	$3,300.00	
1 Total VOC monitor	$2,500.00	
CO and NO calibration equipment	$2,000.00	
Hardware (for mounting sensors, power cords, probes, denuders, etc)	$2,000.00	
Printed materials for community outreach	$1,000.00	
TOTAL SUPPLIES	*$14,550.00*	*$0.00*
Construction		
TOTAL CONSTRUCTION	*$0.00*	*$0.00*

Contractual		
VOC Canister analysis (1 site all VOCs, 2 sites benzene and 1,3-butadiene) plus 20 more canisters for community guided sampling	$74,484.00	
Aldehyde analysis (1 site all aldehydes, 2 sites formaldehyde and acetaldehyde)	$25,818.00	
PAH analysis (1 site all PAHs)	$36,036.00	
PM_{10} metals analysis (1 site all metals)	$23,790.00	
TOTAL CONTRACTUAL	*$160,128.00*	*$0.00*
Other		
Utilities and rent for two temporary sites	$6,000.00	
Install and setup for two monitoring sites & modify one site	$12,000.00	
TOTAL OTHER	*$18,000.00*	*$0.00*
Indirect Charges		
57.88% projected Federal Negotiated Indirect Cost Rate (based on 2011, not matching latest rate found in the appendix of this application)		
TOTAL INDIRECT	$81,780.85	$58,937.69
TOTAL FUNDING	(fed) $419,252.64	(non-fed) $160,765.07
TOTAL PROJECT COST (federal and non-federal)		**$580,017.71**

9. LEVERAGING

We are committed to a legally obligated cost-share of $160,765.07 as described in the table above and Form SF-424A in this application package.

We are also leveraging other resources not included in the itemized cost-share in this application, including fuel and vehicle use for transportation to the sites, and instruments for collocating with air toxics samplers, two fine particle monitors (Radiance Research nephelometers), black carbon monitors (McGee and microAeth), and particle counters (Dylos). We will also leverage the use of our calibrated flow devices and other maintenance tools, equipment, and accessories for the project. In addition, the Washington State Department of Ecology has agreed to let us leverage their extra air toxics monitors if awarded this grant.

10. EXPENDITURE OF AWARDED GRANT FUNDS

We will continue to follow our strict purchasing, contract, and grant policies to ensure we meet EPA and local government requirements. We will select an air toxics testing lab through a competitive process. We will setup a contract with the lab and build in specific timelines and fixed costs throughout the project period.
Internally, we will continue to have project team meetings to ensure we are meeting milestones and deadlines on schedule. We will follow the timeline in Table 2 above (Section 6) and ensure we meet the three-year timeline to complete the project from notice of being awarded the grant.

REFERENCES

[1] Schulte, Jill, "Traffic Density, Census Demographics and Environmental Equity in Housing: A geographic analysis in urban King County", Nov 2012, prepared for the King County Equity and Social Justice Initiative.
[2] Traffic count estimates from 2012 annual Washington State Department of Transportation shapefile analyzed with ArcGIS, http://www.wsdot.wa.gov/mapsdata/geodatacatalog/.
[3] US EPA, 2005 National Air Toxics Assessment, http://www.epa.gov/airtoxics/nata2005/.
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