

Notes on some different air quality sampling devices that are relatively low cost, can provide good information, are low maintenance, and may be used without extensive sample design, preparation, or expertise in equipment use.

Sampling Method	What it samples	Cost	Possible use	Comments
<p>Passive Summa</p>  <p>Canisters</p> <p>Self-contained internal filter in vacuum sealed canister for single-sample use that does not need to be placed or weighed. One sample provides analysis of over 65 chemicals. Canisters are sent to village and then returned to company for analysis.</p>	<p>Volatile organic compounds such as benzene, toluene, acetone, styrene (from styrofoam), vinyl chloride (a good indicator contaminant for dioxins and furans)- see attached file for list of chemicals for the VOC EPA TO-15 method.</p>	<p>EPA TO-15 VOC scan is \$155 for sampling - 1 liter canisters + \$30 for canister rental fee+ return shipping = about \$210</p>	<p>Give information as to what VOC's are released in smoke at Alaska Village dumpsites when burned outside a burnbox. If do multiple grab samples during a burn (4+?) plus multiple just before the burn, this may give a decent ballpark contaminant levels and what contaminants. Note there may be detectable VOC's of health concern at the dump when it is not burning, but this information has never been looked at for villages either. Could also do 4+ samples in town during the same burn at a location where there is the most smell. Will need to do pre-burn sampling still. Might be an agency or scientist that can use simple Gaussian modeling to provide transport possibilities and also can provide conservative numbers for risk assessment using many assumptions. The more samples the better, but the many factors involved that will make the levels different each time likely means a much better funded study would be needed to come up with significantly better information than just several grab samples.</p>	<p>These are great for grab samples because they are easy to use and almost no preparation. Very little can go wrong with these. They are sturdy and good for rural AK field use.</p> <p>http://www.airtoxics.com/literature/airtoxgrab.swf Video demo of how to use the canister for a grab sample</p> <p>http://www.airtoxics.com/literature/AirToxicsLtdSamplingGuide.pdf Sampling guide that explains more about this method</p> <p>Air Toxics Ltd. is a women-owned California company that has worked well with the flexibility needed in an AK Village field study before.</p> <p>See attached file for chemicals that are analyzed using the EPA TO-15 VOC scan. This is the most economical method if you are looking at contaminants that you do not expect at extremely low levels. Called "the 5 and 20" after the (base reporting limits which are between 5 and 20 ppb)</p>

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<p>DustTrak II Aerosol Monitor 8520</p>  <p>Battery-operated, continuous read-out or data-logging for computer download of particles in air. This is a light-scattering laser photometer measures aerosol contaminants (PM) such as dust, smoke, fumes, and mists.</p>	<p>Particulate matter (PM) - PM1, PM2.5 or PM10 (same machine can read all of these). Health effects associated with increased inhalation of PM include: Increased mortality, Cancer, Hospitalization, Functional Limitation, and Physiological impairment. Those with impaired immune systems, cardiovascular disease, COPD, elderly individuals, infants or young children have been found to be most susceptible to these effects. PM is also indicated as a precipitator of asthma in children and adults.</p>	<p>Purchase at \$4,000 to \$4,400. Rent at \$600/mo. Rent enclosure for \$200/mo. Buy at \$1200 or make your own for about \$600 (TTT does this) The 8520 will be replaced in a month or 2 by md8530, \$1,000 more. The 8520 is a good deal and service will be continued for at least 5 years and can be calibrated for 5 years.</p>	<p>Evaluate the difference in PM during a burn and not during a burn. Also give a good approximation of the behavior of dump smoke PM during a burn and the PM level at the location where the device is (if it is measured for enough days). This will tell you whether the level of PM from the smoke is of concern. People can walk around with this device or it can be at one location, such as at the school or nearest house. Need to conduct monitoring for many weeks at the same time the weather station is on. That way if the wind is blowing away from town, you would know the pm reading might be low.</p>	<p>Product info: http://www.tsi.com/Product.aspx?Pid=11 Product specs: http://www.tsi.com/documents/DustTrak-II-6001986_RevA_USA.pdf TTT Environmental http://www.tttenviro.com/index.htm in Anchorage rents and sells DustTraks and provides tech support. Wide range of PM concentration can be taken - low up to very high. This allows sampling in both high smoke and no smoke conditions. Pretty easy to use and low maintenance and do fine in outdoor field conditions. But must be calibrated and time for set-up. Some training and preparation required. Also, with continuous monitoring the environmental staff will need to check the equipment and download data regularly. This is much easier to use than filter and pump methods for PM sampling where individual filters must be replaced and weighed. DustTrak's are being used now in some projects by people who are not technical AQ experts because they are easy to use and give lots of data.</p> <p>With a weather station data logging, there will be enough data to make some good information about health hazards related to the PM increase during burns. If performed long enough with a good weather station and statistics, the quality of the study could be good enough to have a scientific paper written. The DustTrak can be used in future studies and local monitoring. It can be used for road dust, indoor PM, etc. and can be worn by people or placed at a location. Doesn't work below freezing. So would not be good for outdoor study in winter without a lot of technical work into adapting its use. The Thermo Dataram4 http://www.thermo.com/com/cda/product/detail/0,1055,22453,00.html#Designed_for_High_Sensitivity works down to 10F and a good product but is heavier (hard to wear around) and battery life is shorter (but does have charger if an outlet is present). Possibly not considered as user-friendly. Similar price range to the DustTrak replacement model and should be considered in more detail if stationary source measurement only and the price range is acceptable.</p> <p>Note the DustTrak is very <i>precise</i> in measurement, but does not measure as <i>accurately</i> as approved PM devices for EPA regulatory purposes. Preciseness means that the DustTrak will measure the exact same number in the same conditions all the time. But the number may be a little different that the real number. California Air Board (CARB) is conducting a long-term study to calibrate the DustTrak with a high grad PM monitor. This will allow more accurate translation of numbers. CARB, the air quality leader in the U.S. is using the DustTrak in some of its future projects because it can measure very high concentrations and it is easy to use and mobile.</p>

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<p>Organic Vapor Badges (there are also formaldehyde specific and a couple of other specific badges available)</p> 	<p>Organic vapor concentration over a time averaged period- prepaid lab analysis will do up to 3 chemicals that you can select.</p>	<p>Prepaid analysis 3m organic vapor badges with backup, 5 per case at \$610 at http://www.zefon.com/storage/3m-organic-vapor-w-backup-section-passive-air-monitoring-badges.html Price varies on where you purchase - search online for best price. Badges without backup device are about 30% cheaper.</p>	<p>These can be set up for 1 person to wear many times during a burn and not during a burn. They would conduct similar activities and a difference in their exposure if the dump is burning could be significant. Could do many people also, all keeping careful logs on what they do. If there is a difference with this many people between the level of the chemical during a burn and not during a burn, this would document that people are being exposed to this chemical. These can also be used all around the village - just hang them up in different spots of concern - either 1 or 1 places many times, or many places a couple of times. They need to look at levels during a burn and not during a burn.</p>	<p>These were developed for workers to ensure they were not being exposed to unhealthy levels of solvents. They are very very easy to use and - unlike the dustTrak, these very light and easy to wear. They do not measure the full range of VOC's possible with the canisters and are less precise (plus or minus 25%). An idea of how long to keep badges open is needed. OSHA 8-hr guidelines are available for many chemicals. These can be used for area measurements (need some air flow) or people exposure.</p> <p>There were issues with these badges not being closed all the way in another village study, so staff will want to ensure they are closed at the end of the sampling period.</p> <p>If people wear these, will need to keep strict activity log during sample time. Also will need to sample multiple times during a burn and not during a burn. There will be an issue of when, who, how long, and where to use these, and also what chemical(s) to test. A coordinated effort to know exactly when the dump is on-fire and when the wind is blowing towards the badges is needed. The different activities a person is doing may be difficult to analyze if the routines are very different from day-today. But if enough of these are done, would provide really helpful data because it does show personal exposure. If benzene is tested, will need to account for smoking.</p>

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Weather station  	Temperature, wind direction and speed - continuous and downloadable.	Would need shelter, data logger as well. Davis wx stations are good semi-pro stations. Vantage pro 2, data logger, shelter, tripod = about \$1,000 http://www.davisnet.com/weather/products/weather_product.asp?product_num=06152 station = \$595 http://www.davisnet.com/weather/products/weather_product.asp?product_num=06510USB datalogger = \$165 http://www.davisnet.com/weather/products/weather_product.asp?product_num=07724 shelter = \$275	Use this to determine the exact time period of when the dump is burning. Temperatures are very sensitive, so the temp will go up once the dump is on fire. Also will be able to see which burns went into town and where. Can also be important information if you are able to conduct some basic computer modeling on contaminant transport with the canister analysis results from at the dump and another location. The station also has a wind speed measure that a waste technician can use to judge if it is a good time to light the dump - based on air study results and what wind direction and speed smell the worst for the most people.	Cheaper alternative would be use of a hobo temp logger - about \$100. Then rent or purchase an anemometer (wind). But purchase of a weather station will come in really handy for future studies and also will be good if the school wants to participate in the GLOBE program - which allows kids to take part in logging climate change information as part of math and science classes.

Note to test for heavy metals and other contaminants requires different methods - generally much more preparation- and use-intensive with a good deal of training and experience required to carry out properly. Many things can go wrong and best sampling design/logistics are complex in this uncontrolled smoke situation. These methods generally require a flow pump and filters, extensive calibration, and decisions regarding pump rate, etc. For information on sampling other contaminants, one place to try is Datachem labs 800-280-8071.