# Project Plan for a Community Science Project:
## *Personal Exposure Monitoring Study - Individual*

Low-cost air sensors can be used to measure the air pollution a person is exposed to during their daily routine. For this type of project, a person wears a device as they go about their day. The measurements from these sensors can be used to compare exposures indoors, during a commute to work, walking to classes, exercising, etc. These sensors can be used to estimate exposures for individuals in environmental justice areas.

## Section 1: Title Page

***Using _____ Air Sensors to Monitor Personal Exposure***
*(Name of sensor)*

***to _____ Pollution in _____***
*(Pollutant)* *(Location)*

***During _____***
*(Daily activity of potential exposure, i.e., walking to class)*

**Author: _____**

This is a "blank" copy of a Project Plan which can be used for a Community Science air monitoring project for personal exposure monitoring that is completed by one individual. Blank lines with guiding topics in parentheses are meant for you to fill in. Guidance for filling out this document is in the blue boxes, like this one, and can be deleted in your final copy. This is a template and should be altered to accommodate your specific project. We suggest that your Project Plan be reviewed by the Technical Support or other designated party before beginning any data collection.

This is a general outline to follow for your table of contents. Please feel free to add any additional notable sections here.

## Table of Contents

# Section 2: Problem Definition and Project Objectives

**Problem Definition**

Describe the personal exposure problem you may be experiencing and how it is related to air pollution. You may need to do some research. If so, cite all sources. To help you describe the problem, try to answer the following questions:

- Are you concerned about your exposure to air pollution on a daily walking commute?
- Do you spend some amount of time outside every day in a high traffic area?
- Are you concerned about your exposure inside your daily work building? Why?
- Do you think a specific source is contributing to a potential air pollution problem?
- What pollutants do you think are being emitted?

You will want to end this section with at least 1 testable question that can be answered with the results of the project. The following are example questions:

In *(location/town)*, there are several sources of air pollution that community members may be exposed to. For the purpose of this project, the pollution source of concern is *(source)* [or] the pollutant of concern is *(pollutant)*. *(Pollutant)* can have negative health impacts such as *(examples & cite source)*. This study will collect environmental data using *(air sensor)* to measure *(pollutant)* concentrations in *(location/town)* and will be used to answer the following questions:

- "Am I exposed to air pollution due to idling cars while walking to class?"
- "Am I exposed to high levels of *(pollutant)* on my bike commute to work?"

**Project Objectives**

Describe how the project objectives provide answers to the problem. Include the tasks that will collect information to address the problem. Below are some examples.

- Use *(name of sensor)* sensor to measure personal exposure indoors or at a workplace.
- Use *(name of sensor)* sensor to determine differences in exposure I may experience at home, during a commute to work or school, while outside gardening, or while exercising.
- Use *(name of sensor)* sensor to assist in making personal health decisions for myself.

# Section 3: Technical Support*

When working with air sensors, it's a good idea to consider reaching out for a technical support person/team to train you how to properly use the sensor, make sure it's operating properly, obtain and view data, manage the data, etc. If you can't find any technical support and you would like assistance from the NJDEP Bureau of Air Monitoring, please check our website or email us at bamweb@dep.nj.gov. In any case (with technical support or not), please be sure to read your air sensor's instructions in their entirety and contact the sensor manufacturer as a resource when needed.

| Name & Affiliation of Technical Support | Description of Training | Frequency of Training |
|---|---|---|
| *(Name)* from *(company/organization)* with experience in *(briefly describe experience in related field)* | Training session will be led by *(Name)* on how to properly use air sensors, collect data, and analyze data. | First training before data collection. Then communication throughout data collection and data analysis to address any questions. |

*The Technical Support could be from government agencies such as the NJDEP Bureau of Air Monitoring or U.S. Environmental Protection Agency (USEPA); professors or experienced students from local universities; or technical professionals. **Technical Support can advise for the project but is not responsible for its outcome or success.**

## Section 4: Background

State where and why this project needs to be done. Identify the reasons for conducting the work and/or the current lack of information relating to the project. You can also mention any previous studies or data you may be comparing your project to if it applies. Cite any sources used here.

*(Location)* is located in *(specific area of NJ)* with a population of *(population of project area)*. I *(walk/bike/run)* to *(work/school/for exercise)* in this area, and there is/are *(potential source of air pollution if there is one)* that may cause me and possibly others to be exposed to *(pollutant)* pollution. A previous study was also done in *(location and date(s) of previous study)* to measure an air quality problem and they found *(briefly explain results/conclusions from study that apply to this project)*.

I can collect ambient air quality data using low-cost air sensors and, with the proper oversight, this data could be used to monitor my personal exposure to air pollution in *(location)*. With the use of *(name of sensor)* I hope to determine whether I am exposed to air pollution during *(outdoor activity)*.

## Section 5: Project Location

Unless your project has specific objectives that require a planned activity, you can go about a daily routine or activity when the sensor is attached and powered on. Be sure to provide a description of the sampling areas, explain the route taken if applicable, the activities happening during data collection (i.e., walking to class, biking to work), and the date and time. Provide a map showing the locations, routes, and any other relevant information about the area. Tie this information back to the goals and objectives of the project.

I will wear a *(name of sensor)* as I go about my typical *(activity)* at *(area)* during *(date and time)*. Here are several maps to show the routes that will be taken while *(activity)* and collecting *(pollutant)* data. [insert a map image here with labeled route(s); label sampling areas to match sampling area numbers in Section 7A table; and be sure to have a caption].

## Section 6: Project Schedule

In the table below, list all major project activities that will be performed during the course of the project. Organize this information in any way that best fits your project plan.

| | Week 1 | Week 2 | Week 3 |
|---|---|---|---|
| Acquire sensor(s), plan project, reach out to technical support | X | | |
| Collect data | | X | |
| Data analysis | | X | X |

## Section 7A: Data Collection Methods

**Sampling Design**

Describe and justify the data collection activities. Provide information about the frequency of sampling and the collection of quality control samples. Attach all air sensor instructions as an appendix, or provide the web address if they are accessible online.

| Sampling Area | Pollutant | Sampling Schedule | Total Number of Samples | Sampling Location Objective |
|---|---|---|---|---|
| Area #1 *(Name of location)* | *(Pollutant)* | Frequency and duration of sampling. Explain how many days you plan to sample, etc. | *(# of samples planned at Area #1)* | Define objective for sampling at this location. |
| Area #2 | | | | |
| Area #3 | | | | |

## Section 7B: Equipment List

Generate a list of all necessary field equipment that will be used for the project. Be sure to include the model and serial number when listing air sensors. Make sure the type of air sensor you choose makes sense for a Type 2 project, in that it is lightweight and easily portable during your outdoor activity. If possible, acquire two of the same types of sensor to test the sensor measurement agreement. Refer to the "Resources to Help You Select the Appropriate Low-Cost Sensors" section in the Helpful Links.

| Materials |
|---|
| *(Type of air sensor & serial #)* |
| *(Type of air sensor & serial #)* |
| Data sheets |

## Section 8: Data Collection Sheet

An example of a field data table can be found in the appendix and can be printed out for your use. If the data is being collected and recorded electronically, provide an example of the format of the data, in a spreadsheet or text table.

## Section 9: Data Management

Describe how you will manage the data throughout the project, including recording and transcribing field notes, logging and retrieval of sensor data, and data analysis. Describe the way data handling errors will be managed (i.e., transcription and calculation errors). If the data is recorded electronically, describe how it is stored and if additional calculations will be performed. Mention if this project will be presented anywhere (e.g., town hall, community group meeting, conference, school, etc.)

Field Data and Air Sensor Data:

All data from the field will be recorded on pre-printed data sheets (see appendix). The recorded data will be checked for accuracy and transcription errors and discussed with Technical Support. Data from air sensors will be downloaded and analysis will be done using *(data analysis program used)*. Original raw data will be kept on file in case of discrepancies or errors. The data will be electronically stored in *(location of data)*. This data and results will be presented at *(event and location)*.

## Section 10: Data Checklist for Usability

List the types of checks that will be performed at the end of the project to determine if the data collected is usable for achieving the goals of the project. Below is an example of a checklist. You will then check off this list as you complete the project.

Below is a checklist of things that will take place during data collection and analysis to ensure that the data collection and analysis is accurate. Check off and date when these things were checked and managed:

- ☐ Data collection was performed per air sensor instructions. Date:_____
- ☐ [If possible] Two of the same model air sensors were placed next to each other and run for some time to see how well their measurements agree with each other. Date:_____
- ☐ Any missing data was documented. Date:_____
- ☐ Any unusual events (weather, improper monitoring technique, etc.) that could have caused data to be invalid were noted, and proper decisions were made about whether to consider that data valid. Date:_____
- ☐ Any data entry and transcription errors were found and corrected. Date:_____
- ☐ Data analysis process was checked for errors. Errors were corrected, if any. Date:_____
- ☐ Data and document storage were kept consistent and organized throughout course of project. Date:_____

Explain the usability of your project data. Describe how you plan to determine what is unusable data and how you plan to handle the issue and move forward.

All data issues identified will be discussed with Technical Support to determine data usability on a case-by-case basis. All decisions to allow data that did not fully comply with the above list or the guidance will be explained, and any limitations on data use will be fully discussed in the final project presentation.

## Section 11: References

List any references that were used in any previous sections. This can be added as an Appendix if it's long.

## Appendix: Data Collection Sheet

| **Using __*(name of sensor)*_ to Monitor Personal Exposure in _*(project area)*_** | | | | |
|---|---|---|---|---|
| Name: | | | | Sensor Serial Number: |
| Date | Sampling Area/Route | Start Time | Stop Time | Additional Observations (i.e. area description; weathe; what's nearby; anything physically sensed like smell or visible smog) |
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# Appendix 2: USEPA Low-Medium-High Scale Tables

You may use these tables from USEPA below to assist in interpreting your $PM_{2.5}$ and $O_3$ results from your low-cost sensor project (if they are quantitative). Also use any of the references in the "What Do My Sensor Readings Mean & What are Normal Levels" section of the Helpful Links.

| Pilot version<br>**1-minute particle pollution ($PM_{2.5}$) readings**<br>***Not for regulatory purposes*** | |
|---|---|
| **Low**<br>**0-29 µg/m3** | Enjoy your outdoor activities. |
| **Medium**<br>**30-69 µg/m3** | If medium readings continue (for an hour or more), use the Air Quality Index to plan outdoor activities. |
| **High**<br>**70 - 499 µg/m3** | You may be near a source of particle pollution like dust, smoke or exhaust. Check the Air Quality Index to plan outdoor activities. |
| **Very High**<br>**≥500 µg/m3** | You may be near a source of particle pollution like dust, smoke or exhaust. Check the Air Quality Index to find out if you should adjust outdoor activities. Very high readings may mean the sensor is not working properly. |
| 🔧 | Sensor may be offline. Check the Air Quality Index. |

***Figure 1.*** Above is the low-medium-high table for 1-minute particle pollution ($PM_{2.5}$) readings from an air sensor. This can be used to help guide you in determining what your sensor readings mean.

| Pilot version<br>**1-Minute Ozone Readings**<br>***Not for regulatory purposes*** | |
|---|---|
| **Low**<br>**0-59 ppb** | Enjoy your outdoor activities. |
| **Medium**<br>**60-89 ppb** | If medium readings continue, use the Air Quality Index to plan outdoor activities |
| **High**<br>**90-149 ppb** | If high readings continue, consider adjusting outdoor activities, especially if you are sensitive to ozone. Check the Air Quality Index to find out. |
| **Very High**<br>**≥150 ppb** | If high readings continue, consider adjusting outdoor activities. Check the Air Quality Index to find out. Very high readings may mean the sensor is not working properly. |
| 🔧 | Sensor may be offline. Check the Air Quality Index. |

***Figure 2.*** Above is the low-medium-high table for 1-minute ozone ($O_3$) readings from an air sensor. This can be used to help guide you in determining what your sensor readings mean