STEP FOUR TEACHER GUIDE

Developing Your AirCasting Field Plan

KEEPING TABS ON EQUIPMENT, PARTICIPANTS & DATA GATHERING

Getting organized before you start AirCasting in the field will ensure you don't lose equipment and enable you to better track student participation and manage your air quality data gathering efforts. To begin, set up a charging station for all your AirBeams and smartphones/tablets. Whenever the equipment is not in use, make sure it's plugged in so it'll be ready when you need it.

Next, install the AirCasting app on each of the smartphones/tablets. After installing the AirCasting app on the first device, create an AirCasting profile for your class and then sign into that same profile after installing the AirCasting app on each subsequent device. If you're buying devices specifically for this project, be sure to buy one device and test it with the AirBeam and AirCasting app before buying multiples. If you have one smartphone/tablet for every AirBeam, pair them together and label them both with the last four digits of the AirBeam's unique identifier. To do this, turn on the AirBeam and launch the AirCasting app on the smartphone/tablet you will pair it with, access the smartphone/tablet's Bluetooth settings, note the last four digits of the AirBeam's unique identifier, label both the smartphone/tablet and the AirBeam with this number, then turn off the AirBeam.

To track who has the equipment, make a copy of the AirCasting Actions online Equipment Tracker. When checking out equipment, use this spreadsheet to track what equipment is being used, by whom, and for what use.

If you'll be deploying fixed AirBeams, copy the AirCasting Actions Fixed Site Tracker template When siting fixed AirBeams, complete an entry for each location.

COLLABORATING WITH CBOS
There may be community-based organizations (CBOs) near your school that advocate for the environment, work to improve human health, are fighting inequitable land use decisions, or promoting developments that will improve quality of life. If you plan to conduct your air quality monitoring in collaboration with a community-based organization, now is the time to engage them and get their input. This may take the form of a one-off meeting where students learn about the CBOs priorities and discuss how they might be advanced via air quality monitoring, or it may be a deeper partnership where your students and CBO staff work hand-in-hand over the course of the project to develop your AirCasting Field Plan, see it through to fruition, and leverage the resulting data to improve the well-being of the community.

MOBILE AIRCASTING ROUTE PLANNING

If you'll be recording mobile AirBeam sessions, you need to decide what routes your students will be walking while sampling. To get started, project a map of the school community or area of concern and pass out printed maps that the students will use to plot their routes. Have the students identify possible sources of PM in the mapped area and consider the time of day during which these sources might be generating air pollution. Possible sources include school bus loading and unloading zones, HVAC exhausts, traffic congested streets, charbroiling restaurants and food carts, construction sites, road building, power plants, and manufacturing facilities. If you're working with a CBO, make sure to get their input on potential sources. As a point if comparison, have the students also consider where the PM levels might be lowest.

Next, organize the students into the same groups of 3-5 students you created for the classroom activities in Step 3 and have them develop an AirCasting route based on their understanding of where and when PM levels might be elevated. Make sure students consider time of day and day of the week, e.g. will there be school buses idling out front when you plan to monitor? If not, can someone collect data when school buses are present? You may have different classes or perhaps teams of students test air quality at different times of the day or in specific parts of the school grounds or community. For instance, students may be interested in arriving early to monitor during school bus unloading or they may be interested in monitoring near a facility identified by the CBO as an air polluter. Also consider whether you'll be pausing along your route to collect more data at specific spots, like a suspected emissions source, an intersection where you'll be conducting traffic counts (use the AirCasting Actions Traffic Tracking Guide), or a park where students hang-out or children and their caregivers spend time

Finally, have the students draw their route on the map while marking points of interest, potential emissions sources, and locations where they'll pause (if any) along their route. Assess how long the route will take to complete and if need be, modify the route to make it shorter or longer to accommodate the students' availability. Then name the route; you'll use this name when naming the sessions inside the AirCasting app.

SAFETY & PUBLIC COMMUNICATIONS

Both the teacher and the students are responsible for ensuring everyone on each team is safe while AirCasting. Depending on the age and maturity level of your students, you may need to recruit chaperones to accompany each AirCasting team as they collect their field data.

Before finalizing the routes, consider whether the route that's been selected is safe to traverse and modify the route accordingly. For instance: Does the route have sidewalks? Do the street crossings have painted crosswalks and signaled crossings? Might having students wear fluorescent vests improve safety? Are there restrooms available along the route? Is the route entirely in the public right of way, and if not, do you have the required permissions?

You also need to consider the weather and make sure students are properly supplied with water, jackets, etc. If it's too hot, too cold, or too wet you may need delay AirCasting until later in the day or week.

It's likely that use of the equipment or the group of students themselves might generate questions from curious passersby, truancy officers, or facilities managers wondering why the group is stopping outside their place of work. To prepare students for this likely eventuality, have the students prepare and print out information sheets or cards summarizing the project and it's importance to the community. Students are entitled to occupy public rights of way, like sidewalks, and take pictures, notes and measurements. However, businesses and homeowners may not always respect the rights of young people to occupy public spaces. If students are confronted by an unfriendly person they should avoid confrontation, move on, and inform their teacher of the encounter upon returning to the classroom. If there's an emergency while in the field students should immediately call 911.

PREPARING THE FIELD

After the student groups have mapped out their AirCasting route and planned any stops, it's time to prepare them for being in the field. First, have the groups select single-word team names and introduce them to the roles that need to be filled by members of each team and the responsibilities that come with each role. These roles and responsibilities are described below. These roles should be rotated between AirCasting sessions so every student has an opportunity to perform multiple roles. If there are more roles than students in the group, students can perform more than one role.

AirBeam Carrier Responsibilities:
- Carry the AirBeam in your hand, hang it from a lanyard around your neck, or use the AirBeam belt clip or carabiner to attach it to your clothing or backpack.
- Identify the AirBeam intake and exhaust, make sure they are not covered as you transport
- the AirBeam.

Phone/Tablet Carrier Responsibilities:
- Carry the smartphone or tablet and operate the AirCasting app.
- Launch the AirCasting app and sign-in to your profile (if you're not already signed in).
- Navigate to the app "Settings", and toggle on the "Keep screen on" option (if it's not already on).
- When your team is gathered at the starting point of your mobile monitoring route, work with the AirBeam Carrier to begin recording a "Mobile" AirCasting session. Name the session using your route name and tag it with your team name.
- While recording the mobile AirBeam session, stay within 10 feet of the AirBeam to maintain the Bluetooth connection.
- When PM measurements are higher or lower than the average, communicate this to the rest of your group. You can also note elevated measurements inside the AirCasting app using the "Add a Note" feature.

Cartographer Responsibilities:
- Bring a clipboard or hard surface to write on.

- Carry the map, make sure your team stays on route, and add any pollution sources you encounter to the route map.

Time-Keeper Responsibilities:
- Make sure your team starts and stops AirCasting at the previously agreed upon times.
- If there are planned stops, you're in charge of informing the team of when to stop and when to start walking again.

Observer Responsibilities:
- Keep your eyes peeled for any pollution sources. When you see something of interest, inform the rest of the team, making sure the cartographer adds any pollution sources to the map.
- If your team is stopping to count traffic or observe industrial operations, you're in charge of completing the logs or taking appropriate notes.

While AirCasting, everyone on the team should be observing their surroundings. Pay attention to what you see, smell, and hear as your senses will help you detect pollution.

SITING FIXED AIRBEAMS

If you'll be recording fixed AirBeam sessions, you need to decide where to site them. If you're working with a CBO, make sure to get their input on where fixed AirBeams might best be located. Fixed monitoring requires a secure place to hang your AirBeam where it won't be vandalized or stolen, a power outlet or other power supply (e.g. photovoltaic panel or lead-acid battery), a 2.4 GHz WiFi connection that doesn't require consent to terms and services via a web browser or a 4G cellular network plus a compatible and activated SIM card, an Internet-connected Android or iOS device, and the latest version of the free AirCasting App. AirBeam3s are weather resistant so they can be hung outside without need for shelter. Note that in the case of fixed monitoring, the Android or iOS device is only needed for the initial AirBeam3 configuration. This means, a single Android or iOS device can be used to configure multiple fixed AirBeam3s.

Once you've decided where to site your fixed AirBeams, work with your students, your school administrators, and any outside parties to get them up and running. You may need to seek permission or gather additional materials - e.g. extension cords, wall plugs, zip ties, nylon string, solar panels - before you can successfully site your fixed AirBeams. Before getting to the site, figure out how you plan to hang, power, and connect the AirBeam and practice configuring the AirBeam to record a fixed session. Once the AirBeams are operating, keep tabs on the data streams via the AirCasting app or website. If they stop streaming you'll need to visit the location, troubleshoot any problems, and get the AirBeam back online. The two most common problems are loss of power and interruption of the WiFi network.

In some instances, regulatory agencies in charge of air quality surveillance are willing to have AirBeams collocated with their reference air quality monitors. Communities that have availed themselves of this option are able to use the comparison to gauge whether AirBeam

measurements might be biased high or low. This information can then be used to adjust the data from your network of fixed AirBeams, thereby improving accuracy and data confidence. Collaborating with a regulatory agency also has the added benefit of bringing in subject matter experts that may be willing to speak with your students or help analyze or interpret your AirBeam data. If you're interested in learning more about collocating AirBeams with reference air quality monitors read through this report created by the US Environmental Protection Agency and reach out to your local air quality agency.