



# Air Quality Index | Research Report Q1 2022

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# 1. Summary

The 10 participants we spoke with search and track Air Quality Index (hereafter known as AQI) to stay updated so they can plan ahead to keep their loved ones safe and healthy. To them, bad air quality affects their quality of life. Unless they live in wildfire prone areas, most users relied on weather app(s) pre-installed in their mobile devices (Apple News Weather, Samsung weather widget) to receive AQI information. Some users also relied on local news to keep them informed. For users who experience frequent wildfires, they download weather apps which offer real-time AQI information.

When looking at the AQI Top Card, users prefer to see both numerical and descriptive data to understand the level of severity of air pollution (26-Good, 213-Very Unhealthy). When checking weather forecast on Weather Hub, users were delighted to see both AQI and high/low forecast together. They found them helpful to plan their day or week ahead. When checking Local Map, users found switching between Wildfires and Air Quality to view information “easy”. They found having the AQI information display on both Wildfires and Air Quality Hubs unnecessary and repetitive. Under the Air Quality Hub, users found the most value in the Air Quality Graph which lets them track AQI by the hour. They expect by dragging the scrollbar scrub to a specific time, they would receive additional AQI forecast information. They found the legend underneath the graph “helpful” because it increased their understanding using AQI range.

What they found lacking is easy access to emergency preparedness or local resources to inform them how to prepare and cope when AQI reaches unhealthy or hazardous level.

## 1.1. Show reel (10 mins)

Showreel is a compilation of selected video clips to provide direct exposure to the participants' feedback. Best viewed alongside with the full report.

[https://s3-us-west-2.amazonaws.com/secure.notion-static.com/b2de4a1a-e23d-4bcf-8a49-8c3c6f0fb5e0/Showreel\\_AQI\\_Q1\\_2022.mp4](https://s3-us-west-2.amazonaws.com/secure.notion-static.com/b2de4a1a-e23d-4bcf-8a49-8c3c6f0fb5e0/Showreel_AQI_Q1_2022.mp4)

## 2. Actionable insights

Based on the summary, we have identified the following insights to address. We plan to prioritize these insights with product manager and engineering for continuous improvement.

### List of actionable insights

Aa No.	☰ Insights	☰ Recommendations	▼ Prioritization	☰ Effort estimation	☰ JIRA ticket/Notion/Slack	☰ Feedback
<u>3.2.</u>	90% of users agreed bad air quality affects quality of life	Add <u>Particle Pollution (PM)</u> in Air Quality Hub. " <u>State of the Air</u> " <u>2021 report</u>				

Aa No.	☰ Insights	☰ Recommendations	▼ Prioritization	☰ Effort estimation	☰ JIRA ticket/Notion/Slack	☰ Feedback
<u>3.3.</u>	70% of users receive AQI notifications from pre-installed weather apps which come pre-installed with their mobile devices e.g. Apple weather, Samsung weather widget	(1) Send timely AQI push notifications to inform severe air pollution. Deep link to the Air Quality Hub. Work with @Afra on messaging guidelines. (2) Market Air Quality Hub to raise awareness and drive traffic/adoption				
<u>4.3.</u>	On the Air Quality Hub, 100% of users found having the AQI legend right below Air Quality Graph increases their understanding of using the AQI range	On Air Quality Hub, remove info icon beside Air Quality Index title (and corresponding modal dialog). One legend under the Air Quality Graph is enough.				

Aa No.	☰ Insights	☰ Recommendations	▼ Prioritization	☰ Effort estimation	☰ JIRA ticket/Notion/Slack	☰ Feedback
4.4	100% of users liked the Air Quality Graph which allows them to track AQI by the hour and expect to receive additional AQI forecast at specific time	Check with @Nam Nguyen to identify if it is technically feasible to (1) display AQI forecast by hour (2) filter graph by day or week				
4.6.	[Observation] Viewing the same set of AQI information on both Wildfires and Air Quality hubs is unnecessary.	(1) Remove AQI information on Wildfire Hub. (2) Emphasize if AQI reaches Very Unhealthy level with bolder visual treatment ( <a href="#">See example</a> ) (3) Display real-time images/videos (Long-term)				
4.7	[Observation] While 20% of users found the face icons “ <i>annoying</i> ”, 80% of users would look at the face icons as a visual scent to inform them the severity of AQI range.	Use neutral and inclusive iconography to represent AQI range. <a href="#">Local Haze</a> , <a href="#">Plume Labs</a> , <a href="#">BreezoMeter</a> , <a href="#">AirCare</a> , <a href="#">SouthCoastMD</a> , <a href="#">AirNow</a>				

Aa No.	Insights	Recommendations	Prioritization	Effort estimation	JIRA ticket/Notion/Slack	Feedback
4.8	[Observation] No direct access to Air Quality Hub	Make AQI Top Card (TC) as a standalone card. If there is a Wildfires TC (1st position), display AQI TC as the 2nd position.				

### 3. General findings

#### 3.1. 50% of users do not understand what AQI means

They do understand what Air Quality means and its perceived value to them. The acronym meant little to them. For those who what AQI stands for, they tend live in areas where they experienced frequent wildfires. They perceive AQI as a valuable source of information to help them make an informed decision on how to keep them and their loved ones safe and healthy.

*"It's something really important, especially for a Californian resident that's going through a lot of wildfires." - P2 (Female, 22yo)*

*"All it can mean the air quality index, basically how good the air is or not. Basically if it's high, if it's like 300, I definitely going to stay where I am at and close my door. Yeah." - P3 (Female, 23yo)*

*"I don't know." - P8 (Female, 33yo)*

#### 3.2. 90% of users agreed bad air quality affects quality of life

They live in cities which they experienced wildfires. They perceived Air Quality has an impact on their quality of life e.g. allergies, breathing problems. They use the Air Quality Index (AQI) to plan their day ahead and determine if they are able to head out for their outdoor activities. With wildfires, they depend on AQI to make informed decisions on how to cope e.g. Staying indoors, seal the windows, turn on purifier.

*"Another big reason is because one of my children has a sensitivity in particular to pollutants. And when the air quality is bad and so understanding that is a big reason then I*

*think just in terms of overall awareness for what's going on, i'd, I'd say it's important." - P6 (Male, 39yo)*

*"Well, it does affect me because I live in an area where there's a lot of trapped smog and poor air quality. When wildfires do occur, even during the winter, we have really high AQI ratings or really poor air quality ratings. It does affect me, it actually affected me yesterday. I did not go out during a period of the day when the air quality index is very high. I believe it was 120 and it was a little bit too poor for sensitive people. So I stayed indoors." - P7 (Male, 50yo)*

### **3.3. 70% of users receive AQI notifications from weather apps which come pre-installed with their mobile devices e.g. Apple weather, Samsung weather widget**

Users who live in wildfires-prone areas will use weather apps to track AQI e.g. Purple Air - Realtime Air Quality Map, Accuweather, Weather Channel. 1 user mentioned she liked using the [Purple Air Website](#) (Note: Although PurpleAir currently does not have an app, there is a free iOS app called [Local Haze](#) which supports PurpleAir's monitors) because it has real-time air quality map. 20% of users depend on local news to inform them. Unless there are wildfires happening nearby, users do not check AQI on a day-to-day basis.

*"But I like using Purple Air because they give you the real time and just have a lot of sensors around my house and everywhere that I can just like zoom in and out to see where the air is moving." - P3 (Female, 34yo)*

### **3.4. Users use AQI information to plan ahead in order to keep themselves and their loved ones safe**

They use AQI to determine if it is a good day to head out for outdoor activities or stay indoors. For very unhealthy or hazardous AQI, participants prefer to look for health and safety guidance e.g. close/seal windows or turn on air purifier, evacuation zones, safety guide.

*"I basically use that information to check if I need to to turn up my air purifier or close the Windows or actually like seal the Windows or to ventilate. Basically all the stuff." - P3 (Female, 34yo)*

*"And again, I mention the example of an event being canceled as a result of poor AQI. And that's something that we've experienced firsthand. We were scheduled to attend a football game once where due to a bad air quality, it had to be postponed and move to a later date. And that's something where more and more living in California and especially certain parts of California with a fire season it can be really bad." - P6 (Male, 39yo)*

*"More information on the fire, or possible evacuation details if you are very close. And it would also be really nice to have some link or information you can access that can tell you what you can do to prepare yourself or you home from really bad air quality." - P9 (Male, 35yo)*

### **3.5. Users liked the overall Local Map experience because it is “simple” and easy to understand**

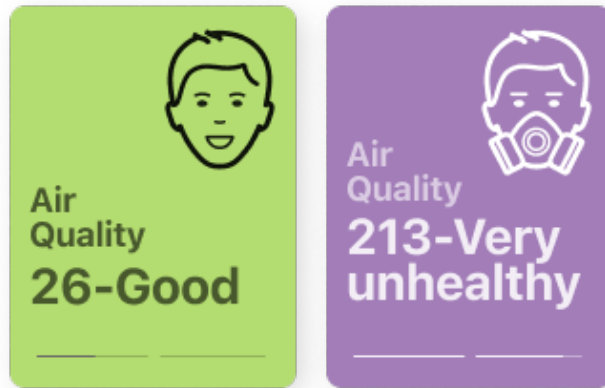
They felt the information provided just enough to keep them informed and help them plan their day or week ahead. On the Weather Hub, they can check the entire week’s weather and AQI forecast. On the AQI Hub, they liked the ability to view AQI across the state and track AQI range on an hourly basis for their city.

*"It's really easy to read and I get what it's showing me and I really appreciate it." - P3 (Female, 34yo)*

*"And then I think up here you could click and have different overlays. So if you wanna see air quality, you can click this and it will show an overlay for that. Same with precipitation and maybe and so on, so forth." - P6 (Male, 39yo)*

*"I do like this a lot. I was part of a fire that was here a few years back. We had to wake up in the middle of the night at, you know, like 11 to midnight to evacuate and I have looked for apps and I've also look for websites on, on a air quality because, you know, southern California we get fire is pretty often so it's something we do have to check up on a lot. So if there's a fire nearby, we need to kind of prep, we need to close the windows, we need to get some air filters. And sometimes if it's really bad, we need to maybe prepare some masks. Um, I do like this a lot though. It's very handy. It's very helpful. It's something that I would definitely use myself." - P9 (Male, 35yo)*

## **4. Detailed findings**



#### **4.1. 100% of users referenced both AQI numerical range and descriptive data to inform them the level of severity of air pollution e.g. 26-Good, 213-Very Unhealthy**

Users noticed the “rotating” High-Low/AQI Top Card and indicated they would tap on the AQI Top card to get more information. When asked what does Air Quality 26-Good mean to them, they mentioned it is a good day to head outdoors because the air is clean. 1 user felt that the animated Top Cards were distracting and posed a challenge to process the information with ease. On the Wildfires Top Card, 1 user expected to see a numerical AQI data beside the description “Very Unhealthy”. He felt that without the numerical range e.g. 213, he failed to understand the level of severity of “Very Unhealthy”.

*“I just saw their quality, which is 26. It’s good.” - P1 (Male, 38yo)*

*“There’s a cycling thing showing the high and lows, but then it’s showing AQI. It says very unhealthy. I mean, but it doesn’t tell you the number, so it just says very unhealthy, but you don’t have the context without the number. So you need the actual AQI number for this to be as helpful as it can be. And there’s room for it.” - P6 (Male, 39yo)*

*“I don’t know what index 213 is, but when I hear air quality, very unhealthy, that’s what I’m assuming.” - P9 (Male, 35yo)*



#### 4.2. [Delighter] On the Weather Hub, 100% of users found having both the weather and AQI forecast display beside each other “helpful”

They found the weather hub "clean", "simple" and "straightforward". 1 user mentioned having both weather and AQI forecast is not something he usually sees with other weather apps he uses.

*“Um, I like that. I don't know about the animated heads where it says good. moderate and healthy. Um I like that the way the air quality is there. Um, along with the weather. Um, I don't think I've seen many apps that do that. Um, so I do like that part of it.” - P1 (Male, 38yo)*

*“I can scroll all the way about a week out. So it's pretty straightforward.” - P5 (Female, 35yo)*

#### 4.3. [Delighter] On the Air Quality Hub, 100% of users liked the Air Quality Graph which allows them to track AQI by the hour and expect to receive additional AQI forecast at specific time

They would look at the map and compared the AQI between the current city and other cities. They liked the ability to have an overall understanding how the day is going to look like hour by hour. It provides them a sense of context, choice and control to plan their day ahead.

They wondered whether by dragging the scrollbar scrub to a specific time, would they be able to receive AQI forecast information? When there is a Wildfire (213-Very Unhealthy), 1 user mentioned by looking at the Air Quality Graph, he has a good overview of how severe the entire day is going to be and plan on sealing the windows, turn on the purifier and stay indoor. 1 user liked knowing the air quality information comes from National Weather Service (Trusted source).

*"Well, I like how it gives the timing. So, it looks like the worst of the air quality is going to be a lot of 10:30 AM And so you probably want to plan around not being i'm actually still in a good section because it's so green. But if it spiked up to red or purple, then you would know to avoid those certain time frame. So I like how it has a time lapse there." - P1 (Male, 38yo)*

*"I think it's really handy, especially if you're, if you work in a different, like for example, if you work in San Francisco or, and you're traveling Sacramento for the weekend or something like that, you would be able to get all the information pretty quickly without having to look at the exact city necessarily next step below the air quality graph." - P4 (Female, 30yo)*

*"And also shows that this information comes again from the National weather service. So I know it's a, it's a rep, reputable information here." - P5 (Female, 35yo)*

#### **4.4. 100% of users users found having the AQI legend right below Air Quality Graph increases their understanding of using the AQI range**

They would drag the bottom sheet to reveal more information. They felt the info icon beside the Air Quality Index is unnecessary and repetitive. They prefer having the legend display right below the Air Quality Graph. For first time users or users who do not use AQI regularly, they perceived the legend as a source of guidance to understand how to use the AQI range to read Air Quality Graph.

*"Just to give information about the breakdown of air quality. So I think it just means another reinforcement of what these numbers might mean, but just think that's just helpful. But if you're checking air quality so much, you'll get used to it. So maybe it's not necessary, but for like people who was just starting to check that will be very useful." - P3 (Female, 34 yo)*

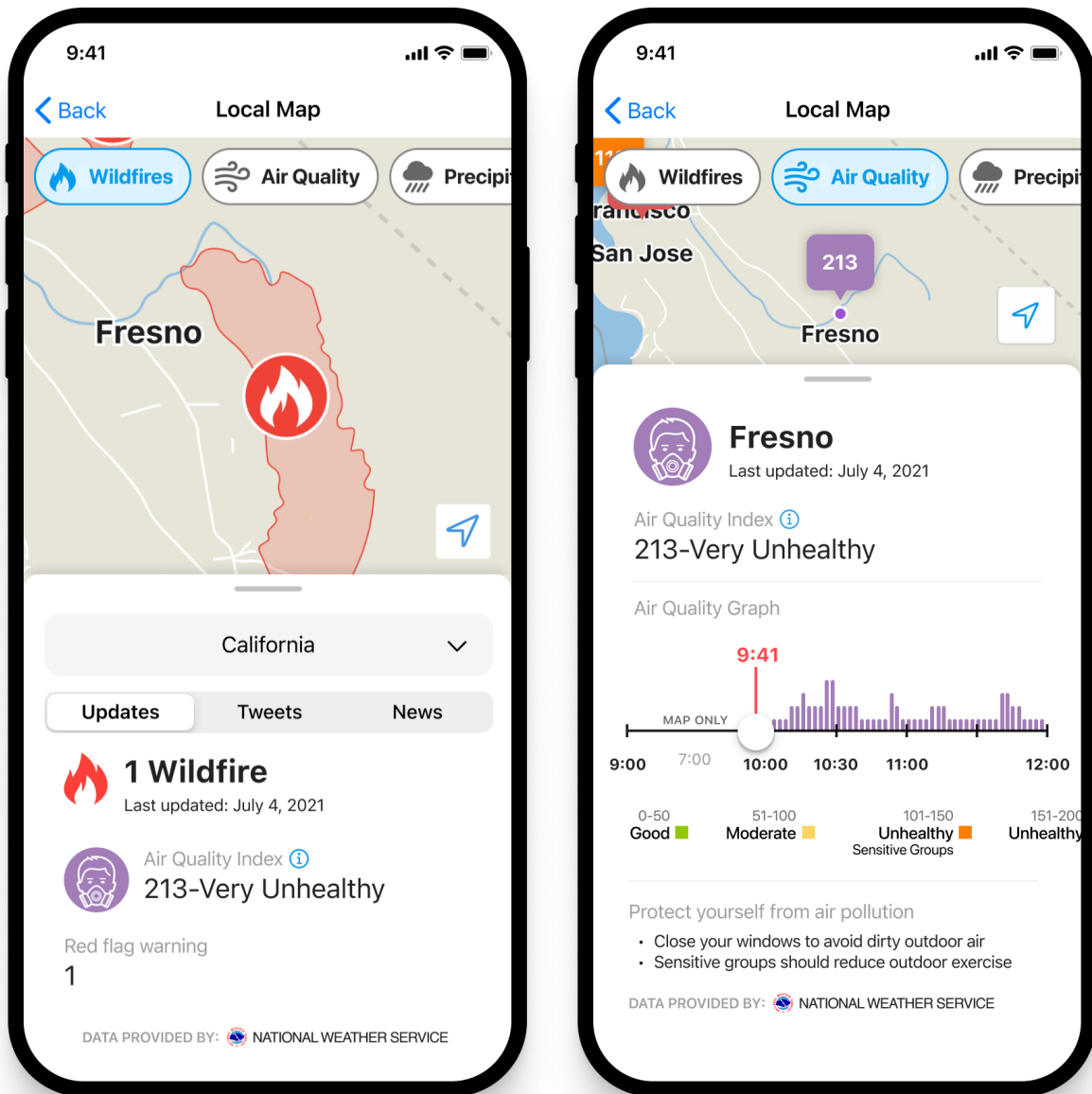
*"So air quality-213. 213 itself doesn't mean anything to me. Um, I don't know if it should. I don't know if there's a legend somewhere for that to me. I think the color and very unhealthy is enough." - P8 (Female, 33yo)*

#### **4.5. [Delighter] 100% of users found it easy to switch between Wildfires and Air Quality Hub to get information.**

They experienced no issues toggling between the Wildfires and Air Quality Hubs. They found displaying call-to-action buttons at the top of the map makes it easy for them to switch to different types of weather information.

*“And yeah, I mean, it's a simple toggle and I think it's a really useful toggle because there's obviously here difference when you're quality versus the actual spread of fire. So, but the information is still closely linked. So having these 2 things side by side makes a lot of sense and it's quite easy to navigate between them. So yeah, I really, um, I feel good about switching between them. I think it's a really nice interaction. I think it's a logical interaction and I appreciate the design. I think it makes sense.” - P6 (Male, 39yo)*

*“I like it a lot. It's very responsive. The color being highlighted to a nice blue kind of, you know, it outlines that so you know that you're on a section and these shows that these are clickable. So I like it, it's very easy, very quick, easy to understand. The buttons are big, you know, they're long, but they're not too much big to take up the square (map). So it's a good size and it's good responsiveness. And I also do like the little symbols right there. Easy to understand.” - P9 (Male, 35yo)*



#### 4.6. [Observation] Viewing the same set of AQI information on both Wildfires and Air Quality Hubs is unnecessary.

When the same set of AQI shows up at both Wildfires and Air Quality hub, users found it difficult to differentiate and discern critical information. It took them a while to re-orient themselves that they were looking at a different hub. Under Wildfires Hub, they focused on AQI and did not notice the wildfire alert below. 1 user lamented the visual treatment for severe AQI e.g. 213-Very Unhealthy is not bold enough to emphasize the severity and hazards it bring to the users.

*"I would highlight the AQI and make it more prominent. I feel like a 213 reading should provide more of a warning graphic. It looks too mundane as it is." - P7 (Male, 50yo)*

*"But the only difference is I can tell really is the air quality is, is it doesn't show the fire. So I mean, it is next to the fire, but the information looks almost the same as the other page." - P9 (Male, 35yo)*

#### **4.7. [Observation] While 20% of users found the face icons "annoying", 80% of users would look at the face icons as a visual scent to inform them the severity of AQI range.**

When looking at the 213-Very Unhealthy AQI range, users mentioned looking at the face icon with the mask informed them the air quality is very bad. 20% of users found the face icons "annoying" and would prefer to have colors to define each AQI range.

*"I'm not a big fan of the faces in the circles, but I like the page otherwise, like it's nice and simple. It's clean, it's good. It's understandable." - P2 (Female, 22yo)*

*"You don't want to go outside. You can see the guys wearing like a respirator mask and it says very unhealthy and 213 extremely high." - P6 (Male, 39yo)*

#### **4.8. [Observation] No direct access to Air Quality Hub**

Users have to tap on the High/Low/AQI Top Card to go to Weather Hub, select the Weather Radar button to get to the Air Quality Hub. 1 user was confused and did not understand why the Weather Radar button brought her to the Air Quality Hub instead of Weather (Precipitation) Hub.

*"Oh, I think this information is pretty helpful. But as I've noticed, like if it says weather radar, I would expect that the weather information to be there before the air quality but if I were to. So yeah If I click on weather, I would expect that to be weather and have the air quality somewhere here, maybe? Yeah, that. So I feel a little bit confused. Why or why the air quality would be more focused than the weather. When I clicked the weather radar. But other than that, that information here is really helpful, and I will definitely use it." - P3 (Female, 34yo)*

## **5. Appendix**

### **5.1. Research goals**

- Understand users' perceived importance of air quality

- Understand how local air quality can affect users' daily lives
- Identify air quality information which matters the most to users
- Describe the insights and user frustrations identified through observation of how users look for air quality information on SmartNews app
- Identify areas of the design that are not intuitively discoverable or may slow down the effectiveness of users in completing their task(s)
- Provide directional feedback to address usability issues and pain points to address

## **5.2. Primary research questions**

### **Behavior**

- Do users know what is Air Quality Index (AQI)?
- How do users check for AQI?
- What kind of information users are looking for?
- Where do users check for information?
- What do users do with the information?

### **Air Quality Top Cards (AQI TC)**

- How do users feel about the amount of information display on TC?
- Where would users find out more information about TC?
- What frustrates users?
- What delights users?

### **Weather Radar Hub**

- How do users find air quality information display on the hub?
- How do users feel about the information display on the map?
- What other information do they expect to see?
- What frustrates users?
- What delights users?

### **Wildfires TC/Hub plus AQI information**

- How do users feel about seeing both Wildfires Top Card and AQI TC?

- How do users feel about seeing AQI information when there is a wildfire?
- What other information do they expect to see?
- What frustrates users?
- What delights users?

### **5.3. Screener questions**

- Have you ever experience wildfires in the state of California?
- Which major cities do you live in the state of California?
- Do you have children?

### **5.4. Build context**

You will be asked to answer 5 questions. Once you answer the questions, you will then be shown a test prototype from a news app.

The test prototype is not completely finished, so some things may not work like expected. If something does not work or isn't clickable, please explain what you would expect to happen and move on to the next task.

### **5.5. Warm up questions**

1. What does AQI mean to you? If you do not know, go to the next task.
2. How does Air Quality affect you?
3. How do you normally receive Air Quality information?
4. What are the top 1-3 websites/apps do you check for Air Quality information?
5. What do you do with the information afterwards?

### **5.6. Intro before the study**

Thank you for answering those questions. Next I will provide you series of tasks. Please try to complete them as you would on your own and if you would feel like stopping or abandoning a task please feel free to say so.

I would like you to read out loud for each task what you will do next when you are trying to complete the task. To begin, click on the prototype link of each task.

### **5.7. Tasks A | Without Wildfires Top Card - San Jose, CA**



**Prototype A:** <https://www.figma.com/proto/nsLSMmzPIHRLYfVXpW49Kh/Native-Map-Integration?page-id=1677%3A25764&node-id=1677%3A27217&viewport=259%2C48%2C0.5&scaling=scale-down&starting-point-node-id=1677%3A28256&hotspot-hints=0>

1. Do not click anywhere on this screen. Describe what do you see?
2. On this screen, use your mouse to indicate where can you find Air Quality information.
3. What does Air Quality 26-Good mean to you?
4. Click on the animated High/Low Temp card. Go to the next task.
5. You are on the weather page. Describe how do you feel about the information?
6. Looking at the Air Quality to the top left, you will notice a blue information icon. Select the icon and describe how do you feel about the information?
7. Click on the Weather Radar button. Go to the next task.
8. Do not click anywhere on on the Local Map screen. Describe how do you feel about the information.
9. Below the Air Quality Graph, try scrolling the legend (multi-color squares) . Describe what the legend means to you.

## 5.8. Tasks B | With Wildfires Top Card - Fresno, CA



**Test Prototype B:**

<https://www.figma.com/proto/nsLSMmzPIHRLYfVXpW49Kh/Native-Map-Integration?page-id=1677%3A25764&node-id=1677%3A26072&viewport=259%2C48%2C0.5&scaling=scale-down&starting-point-node-id=1677%3A25765&hotspot-hints=0>

1. Do not click anywhere on this screen. Describe to me what do you see?
2. Click on the red card which says “1 wildfire in Fresno”. Go to the next task.
3. Do not click anywhere on on the Local Map screen. Describe how do you feel about the information.
4. What does Air Quality Index 213-Very Unhealthy mean to you?

5. Beside Air Quality Index, you will notice a blue information icon. Click on the icon. Describe how do you feel about the information.
6. At the top of the screen, you will see a row of buttons (Not scrollable). Click on the Air Quality button. Go to the next task.
7. Describe to me what has changed. What does the information mean to you?
8. Below the Air Quality Graph, try scrolling the legend (multi-color squares) . Describe what the legend means to you.
9. From the current screen, how do you go back to the Wildfires screen?
10. From the current screen, how do you go back to the Air Quality screen?
11. How do you feel switching between Wildfires button and Air Quality button?

## **5.9. Overall study follow-up questions**

I am curious what do you think of the tasks you completed today.

- What is most confusing to you?
- What is most useful to you?
- If you could make one significant change, what change would you make?