

## EE 538 Avgas Project with Quiet Communities - Fall 2022

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### Project Summary:

My first step this semester was learning about the issue of the use of leaded avgas in the general aviation industry (small-aircraft). The Oversight Committee hearing from July 28<sup>th</sup>, 2022<sup>1</sup> was especially helpful in learning about the issue, in addition to reading scientific articles about the effects of lead on human health, including studies on the effects of leaded avgas specifically. I also read news articles from nonprofits, aviation organizations, and different news sources to better understand the issue through different perspectives. Throughout the semester I kept reading articles from different sources to better understand the issue and what hurdles there are for different stakeholders. I also read to keep up with recent updates. This included reading about the impact of when the FAA certification of GAMI unleaded fuel with a STC (supplemental type certificate) for all general aviation planes was finally approved on September 1<sup>st</sup>, 2022. Another important update was the EPA's proposal to issue an endangerment finding about the use of leaded avgas on October 7<sup>th</sup>, 2022, which organizations have been petitioning the EPA for since 2006.

In addition to continued research on the topic throughout the semester, I met with Professor Reibstein and Jamie Banks of Quiet Communities weekly, where I helped decide who we were inviting to the conference, and what panels we will have at the conference. After the meetings I would email (or call if not successful with email) some of the individuals we wanted to invite to the conference. For government, I was responsible for reaching out to Congressman Ro Khanna, Congresswoman Zoe Lofgren, Secretary Pete Buttigieg's office (Department of Transportation), and Cindy Chavez of Santa Clara County. For academics, I was responsible for reaching out to Marie Lynn Miranda, Sammy Zahran, Michael J McFarland, Bruce Lanphear, and Amy Pritchett. I also reached out to Maricela Lechuga who was a community member near Reid Hillview airport who testified at the Oversight Hearing. I kept track of the responses we heard from people on a Google Sheets document. As we got closer to the conference, I would also attend pre-conference Zoom meetings we had with some of the speakers (when the meetings were at a time when I did not already have something, like class). I attended the Zoom meetings with George Braly, Robert Freeman, Grace Brightbill, and Maria DiPasquantonio & Tia Cantrell of the FAA. I also helped when various tasks came up, such as converting the EarthJustice data on the top 100 lead emitting airports (2021) from a pdf into an excel document, and later creating a map that displayed this data for Jamie (see Figure 1 at the end of the document).

At the conference I said a brief welcome, provided information about Zoom logistics, and told everyone how they could send in their ideas to be considered for the post-conference report. During the conference I monitored the chat and kept track of questions to ask at the end of panels (when there was time for questions), as well as admitted people from the Zoom waiting room. To be posted along with the conference materials on the EE 538 class website and the Quiet Communities website, I created an

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<sup>1</sup> *Toxic air: How leaded aviation fuel is poisoning America's children*. House Committee on Oversight and Reform. (2022, September 20). Retrieved December 18, 2022, from <https://oversight.house.gov/legislation/hearings/toxic-air-how-leaded-aviation-fuel-is-poisoning-america-s-children>

“Introduction to the Issue of Leaded Avgas” four-page pdf document with background information helpful to someone first learning about this issue. I used the slides from my EE 538 class presentation as a basis for this information sheet, but I also added additional information that that would be useful for someone first learning about this issue to read before looking at the conference material. I used different graphics and designs to make the research clear and easy to follow in order to communicate what the issue is, why people should care about its impacts, and why accelerating to unleaded fuels is so important. Jamie also expressed interest in Quiet Communities posting the informational sheet in addition to being put on the EE 538 class website. Perhaps in addition to being put on the websites the informational sheet I made could be distributed, perhaps to different representatives as mentioned briefly at the start of the semester, to raise awareness.

In addition to this informational document, I will help write the post-conference report we will be sending to stakeholders which will contain more specific information about solution-implementation based on what was discussed during the conference.

#### Potential Future Directions:

- Creating a guide for communities about how they can work to make changes in their community with a general aviation airport. (This need was expressed by community members in the chat at the conference.) The guide can include tips for how to communicate about the dangers of lead (since there is often resistance). (Dr. Lanphear’s slides at conference were said to be helpful for this purpose by community members in the chat at the conference.) Tips for how the community can encourage an accelerated transition to unleaded fuels at the local level, and use mitigation strategies, for example as recommended in the NASEM report, in the meantime would also be helpful to provide. California airport managers who have successfully done this, as well as Amy Pritchett who is the chair of the NASEM study, would be especially helpful to talk to in addition to communities.
- Conduct interviews with those who spoke at the conference (and others) to create a report of different perspectives of what specific actions/policies by whom will enable the transition to unleaded fuels to be rapidly implemented (and NASEM mitigation strategies in the meantime). The report of concrete, specific examples can be given to decision-makers.
  - Consider demonstrating airports in California who already transitioned to the unleaded fuels as an example of how this can be done. What resources and policies did they use/rely on? This demonstrates that unlike some may say, more time before the transition is likely not needed, because these airports already did it.
  - Consider using the transition from regular to sustainable jet fuel as a model of what strategies can help with the implementation (Robert Freeman and others mentioned this). Note the speakers mentioned there are differences though. For example, regular jet fuel doesn’t have lead and those buying sustainable jet fuel are often corporations who do not mind the higher prices, but those buying avgas are more sensitive to price changes. Subsidies might therefore be necessary for unleaded avgas, at least at the beginning.
  - Consider looking into the potential benefits of drop-in unleaded fuel (mixing unleaded with the leaded fuel) as mentioned by some of the conference speakers. This gets rid of the price issue since there is only one option and this gets rid of the need for additional infrastructure, but what will guarantee that the fuel will go to 100% unleaded quickly? Compare this mixing approach with only selling unleaded fuels like Santa Clara County (ban on leaded fuels). Also, a claim of needing to have leaded fuel available for those planes who can’t use the

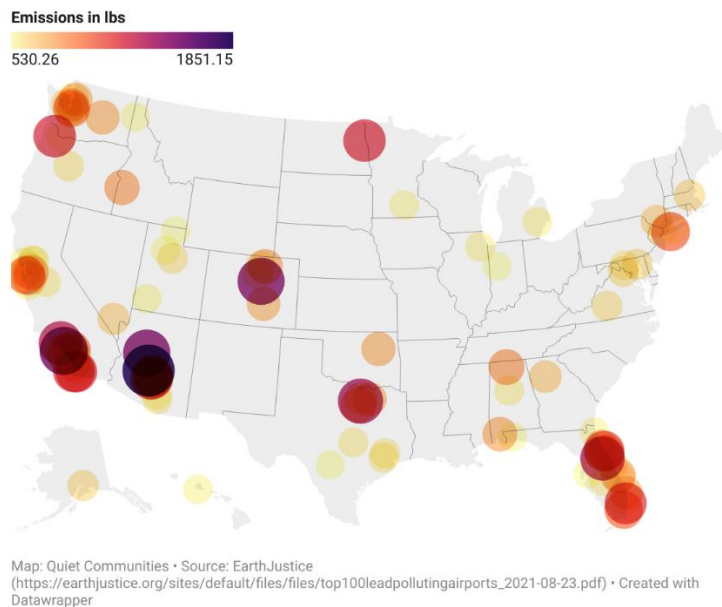
unleaded yet was raised during the conference, but is this true since the GAMI100UL is for the whole fleet?

- While 70% of US lead inventory is lead emissions from avgas<sup>2</sup>, leaded fuel is still allowed in other uses which is important to research after avgas; such as racing cars, farm equipment, marine engines.<sup>3</sup> Are lead particles from farm equipment getting into the soil and into the food we eat? Are those who work with marine engines disproportionately exposed to lead? Who is affected by exposure to racing fuels (communities nearby tracks)?

## Appendix:

### Top 100 Lead Polluting Airports in the US

Airports with the greatest yearly lead emissions in 2021 are shown, with larger circles and darker colors indicating greater lead emissions.



**Figure 1.** Map of the United States indicating the top 10- lead emitting airports.

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<sup>2</sup> EPA. (2022, October 7). *Proposed Finding That Lead Emissions From Aircraft Engines That Operate on Leaded Fuel Cause or Contribute to Air Pollution That May Reasonably Be Anticipated To Endanger Public Health and Welfare*. Federal Register. Retrieved December 11, 2022, from <https://www.federalregister.gov/documents/2022/10/17/2022-22223/proposed-finding-that-lead-emissions-from-aircraft-engines-that-operate-on-leaded-fuel-cause-or>

<sup>3</sup> U.S. Energy Information Administration (EIA). (2020, November 19). *U.S. Energy Information Administration - EIA - independent statistics and analysis*. Gasoline and the environment - leaded gasoline. Retrieved December 11, 2022, from <https://www.eia.gov/energyexplained/gasoline/gasoline-and-the-environment-leaded-gasoline.php#>