City of Palo Alto

City Council Staff Report

(ID # 13636)

Meeting Date: 10/18/2021

Title: Report on Palo Alto Airport Aircraft Leaded Fuel

From: City Manager

Lead Department: Public Works

Executive Summary

The purpose of this informational memorandum is to provide an overview on the issue of lead in aircraft fuel and the steps being taken at the Palo Alto Airport (PAO) to support the use of unleaded fuel.

A study assessing statistical associations between the blood lead levels of sampled children and indicators of aviation gasoline exposure risk around the Reid-Hillview airport was recently completed by Mountain Data Group under contract to Santa Clara County, documenting higher blood lead levels in samples from individuals residing closest to the airport. Given the concerns raised by the study, staff is in contact with both Mountain Data Group and California Department of Public Health to discuss the feasibility of a similar study that would include PAO, whether specific to PAO or through a statewide study.

PAO has been exploring the use of unleaded fuel since the City took control of the Airport in 2014. PAO is currently planning and implementing improvements across the airfield to make unleaded fuel available and reduce the use of leaded fuels.

Background

Overview of the History of Leaded Fuel and the Process to bring Unleaded Aviation Fuel

Tetraethyl lead (lead) first saw use as a gasoline additive in the early 1920s when engineers working for General Motors discovered that when added to gasoline it helped to prevent engine knock in cars[1]. This allowed for the development of more reliable and efficient engines and leaded gasoline was used as the main automotive fuel for over 50 years. A growing understanding of the toxicity of lead caused the U.S. Environmental Protection Agency (EPA) to begin phasing it out of automotive fuels in the 1970s.

[1] https://www.eesi.org/papers/view/fact-sheet-a-brief-history-of-octane

For several reasons, the general aviation piston aircraft fleet continues to rely on fuel with a lead additive, 100LL (low lead). Compared to cars, aircraft generally have higher performance engines with higher octane requirements, have a higher average age[2], are subjected to a wider fluctuation in environmental factors such as temperature, altitude, and pressure, and are at a much greater risk of a serious accident in the event of an engine failure.

100LL is now the only remaining lead-containing transportation fuel, and emissions from small-piston engine aircraft have become the largest contributor of lead emissions produced in the U.S, though total lead emissions are relatively low[3]. The Federal Aviation Administration (FAA) shares the EPA's concern over these emissions and is committed to the removal of lead from aviation gasoline. In 2013, the FAA launched the Piston Aviation Fuels Initiative (PAFI) with the goal of working with fuel producers and aircraft manufacturers to develop an unleaded replacement for 100LL. The program invites fuel producers to submit new unleaded fuel formulations to the FAA for rigorous testing. The goal of the program is to develop an unleaded alternative to 100LL that will work with 100% of the general aviation piston fleet, which has turned out to be a more difficult task than anticipated. The original estimated completion date of 2018 has passed, while the FAA has tested over 279 fuel formulations to find a workable solution[4]. The FAA remains committed to this program and tests are on-going.

In a separate effort, U.S. company Swift Fuels has developed UL94 Unleaded Avgas. Due to its lower octane rating than 100LL (94 vs. 100) it is not able to be used in high performance aircraft. However, it is still compatible with 66% of the U.S. piston aircraft fleet with no modifications necessary[5]. Once in the aircraft fuel tanks, it can be mixed in any ratio with 100LL. It also has the potential to increase the amount of time between required maintenance due to its clean burning characteristics. It is currently available at 22 U.S. airports, most of which are in the mid-west and closer to the Swift Fuels production plant in Indiana[6].

In July 2021, the FAA awarded General Aviation Modifications Inc. a supplemental type certificate (STC) for their newly developed 100 octane unleaded aviation fuel, known as G100[7]. The fuel has been in development and testing for the past decade to achieve this certification. It will initially have limited availability and is currently restricted to use in Cessna 172 aircraft powered by Lycoming engines. As testing continues, the STC is expected to be expanded to the entire piston engine aircraft fleet and the fuel will become more widely available.

With several companies pursuing FAA certification for unleaded fuels, the removal of lead-supplemented aviation fuel from the market is rapidly approaching. Aircraft owners can look forward to alternative fuels that are competitively priced, less harmful, and induce less maintenance.

[2] https://www.documentcloud.org/documents/20475932-26050#document/p45/a2030254
[3] https://www.faa.gov/about/initiatives/avgas/
[4] https://www.faa.gov/news/press_releases/news_story.cfm?newsId=14714
[5] https://www.swiftfuelsavgas.com/faq
[6] https://www.google.com/maps/d/u/0/viewer?mid=1fNC9vcS4U3u15y5FxBZ_d6Mjqvw&ll=40.805955463244246%2C-94.37862123125001&z=5
[7] https://www.avweb.com/aviation-news/gami-awarded-long-awaited-stc-for-unleaded-100-octane-avgas/

There are no federal regulations regarding lead emissions from aircrafts. The EPA has not issued findings under the Clean Air Act to set emissions standards. Thus, there is no legal prohibition or limit on the use of leaded fuel for aircrafts. Fuel sales and flight operations are both aeronautical activities; therefore, the FAA would consider any measures that regulate either the sale or use of leaded fuel under Grant Assurance 22 and consider whether the measure is (1) a reasonable restriction on access and/or (2) unjustly discriminatory.

The Bay Area Air Quality Management District (BAAQMD) has historically monitored air lead concentrations at PAO and it was determined that the air quality lead levels were within acceptable ranges and did not necessitate on-going monitoring. BAAQMD removed their testing equipment from PAO shortly after the Airport was transferred back to the City of Palo Alto in 2014.

The Airport has actively investigated options for bringing unleaded fuel to PAO since 2014. Historically, there was a lack of interest from PAO users due to the absence of its certification for use by aircraft engine manufacturers. However, as described below, technology has since changed and the users of PAO are eager to adopt this new fuel source. Airport tenants have embraced the PAO's sustainability measures and use of an electric fuel truck. PAO is also currently in the process of applying for a federal grant program that would fund the purchase of electric airport operation vehicles, converting PAO's fleet to electric vehicles.

Discussion

Santa Clara County Blood Lead Level Study

On February 11, 2020, the Santa Clara Board of Supervisors authorized a contract with Mountain Data Group to assess statistical associations between the blood lead levels of sampled children and indicators of aviation gasoline exposure risk around Reid-Hillview airport which included residential distance from the airport, residential near angle from the airport or wind direction from the airport, and piston-engine aircraft traffic or number of aircraft operations. On August 3, 2021, the County of Santa Clara released the findings, documenting higher blood lead levels in samples closest (within ½-mile) to the airport. https://news.sccgov.org/sites/g/files/exjcpb956/files/documents/RHV-Airborne-Lead-Study-Report.pdf

The County Administrator's office and County Department of Airport and Roads' Airports Division briefed the Palo Alto City Manager, Director of Public Works, and PAO Manager on the study. Staff is collaborating and continuing to work closely with them.

One approach would be to conduct a similar study of the area around PAO. County staff put City staff in touch with Mountain Data Group, as well as the California Department of Public Health (CDPH), owner of the blood test data involved. Conducting a PAO-specific study would

likely require agreements with CDPH and the County of San Mateo to include East Palo Alto and possibly Menlo Park in the study. Alternatively, CDPH indicated ongoing discussion with the federal EPA on the possibility of a statewide study. Staff is currently waiting to hear back from CDPH about their discussions with EPA and a potential statewide study.

Bringing unleaded aviation fuel to PAO

PAO has been pursuing providing unleaded aviation fuel since taking control of the Airport in 2014. Only recently has both the availability of the product and interest of the pilot community aligned. PAO and its tenants are working to bring the aviation fuel to the Airport this Fall.

1. Palo Alto Aircraft Study

The UL94 product can possibly be used by 66% of the current general aviation fleet at the Palo Alto Airport. A survey was conducted of aircraft based at Palo Alto Airport to determine potential use of Swift Fuel UL94 Unleaded Avgas. At least 55% of those who responded to the survey would consider using UL94 or another sustainable product, with many willing to pay higher costs for the fuel. Many of those who responded to the survey added comments about their aircraft not being able to support the UL94 product, but stated they would consider another sustainable product.

2. Fuel Farm Improvements

Fuel at the Airport is stored at the fuel farm in a series of above ground storage tanks. The tanks are owned by PAO and operated by the Fixed Base Operators (FBOs) who are responsible for the buying, selling, and storage of the fuel.

Assessment of the fuel farm is currently being conducted to address the environmental and facility requirements for the new fuel sales. Additional above ground storage tank(s) will need to be installed to store the unleaded fuel. Currently an implementation plan is being prepared to account for the dedicated infrastructure required, including underground fuel lines and dispensing system. Once a preliminary assessment is completed, staff envisions creating a new capital improvement program project to support the design and construction of the needed fuel farm improvements.

PAO staff are closely monitoring the new sale of UL94 at the Watsonville Airport, the Santa Clara County Airports, and the San Carlos Airport for best practices and lessons learned.

3. Current Transition to Unleaded Aviation Fuel

City staff has met with airport user groups (Flight Schools, Palo Alto Airport Association, Airport Businesses and Tenants), including working with the two FBOs that provide fuel services at the

Airport. Providing unleaded fuel at PAO will require both short- and longer-term actions, so staff is working with both FBOs to obtain deliveries of unleaded fuel while evaluating options for capital investment in additional fuel tanks.

Currently, Rossi Aviation is in the process of procuring UL94 as a source of fuel for eligible aircraft at the Palo Alto Airport. To be better prepared for the fuel to be sold, Rossi Aviation is encouraging their customers to complete the required certifications so that they can begin using this fuel when it arrives at PAO. This certification package is being sold through Swift Fuels. It will provide a placard that must be affixed to the aircraft prior to being able to fuel it. Forms will be provided that will need to be given to the Airframe & Powerplant (A&P) Mechanic so that they can process the documents with the FAA. Rossi Aviation is offering to assist aircraft owners with the process.

Additionally, Rossi Aviation is currently working to offer G100 Unleaded fuel as soon as approvals with the FAA have gone through and more engines are able to use the fuel. The FAA is currently working at a rapid pace and hopes to have many more aircrafts approved in the next year. This would allow for both low and high compression engines to be able to take advantage of unleaded avgas (aviation fuel) by purchasing the 100 Unleaded fuel.

West Valley Flight Club is also working to offer UL94 to its members. They are working with Swift Fuel to pursue two options 1) delivery of the fuel to a mobile refueler and/or 2) delivery to a tank in the fuel farm. West Valley Flight Club is working with Swift Fuels to determine the best solution for their members.

Additional efforts towards Airport Sustainability

Reducing the lead-based fuels at the Airport is only one of many on-going efforts at PAO on its path to carbon neutrality. Recently, PAO was identified as an industry leader in sustainable practices and will be highlighted as a case study in the Transportation Research Board's Airports Cooperative Research Program's Guidebook for Resilience Toolkits at General Aviation Airports.

1. Existing PAO Infrastructure Improvements

In preparation for future demand for electric aircraft and additional solar facilities on the airfield, PAO has installed electrical infrastructure and conduit (underground pipes in which future utility lines will be installed) under the new aircraft-parking apron. This infrastructure and conduit will facilitate the installation of charging stations for electric aircraft and additional solar facility locations, making PAO one of the most advanced electrical infrastructure general aviation airports in the country. These improvements ensure that PAO is an industry leader as this emerging technology enters the aviation market.

2. Planning for Sustainability

In the fall of 2020, PAO went through the consultant selection process required by the FAA for the Airport Layout Plan (ALP) update, and C&S Engineers Inc. was selected to provide planning services. After transferring the Airport in 2014, PAO has applied for an FAA grant each year to update the ALP but funding was not available until this year. The first phase of the Airport Layout Plan (ALP) update has now been initiated.

The ALP will include the Sustainable Airport Comprehensive Plan. This multi-year project will provide a set of documents, developed within a sustainability framework, to guide the Airport's evolution over the next 20 years and beyond. The process will ensure the long-term viability of the Airport, the community, and the natural environment in a way that continues to support all Airport stakeholders. This effort will include an emphasis on technologies and initiatives that will reduce the Airport's reliance on fossil fuels and an evolution towards carbon neutrality. The effort will engage the community and Airport stakeholders to develop a series of sustainability goals and initiatives focusing on categories like the reduction of reliance on lead and fossil fuels, the natural environment, safety, operational improvements, economic diversity, community engagement, and emerging technologies.

PAO will also develop an electric vehicle roadmap, ensuring a conversation regarding the Airport's vehicles and the opportunity to provide electric charging stations to employees, users, businesses, and the public at the Airport.

3. Electric Aircraft

PAO is actively coordinating with electric aircraft manufacturers to ensure that it is prepared to welcome and provide charging for the future electric aircraft fleet. The Airport is also collaborating with other airports across the state to develop a series of waypoints or charging stations for future electric fleets. A recent survey of airport users found that over 35 percent are interested in electric aircraft with interest anticipated to grow as electric aircraft enter the marketplace.

Next Steps

The Palo Alto Airport is committed to supporting the use of unleaded fuel at the airport, and to planning for future sustainability improvements. The following are staff's key upcoming work items in those areas:

1. Partner with California Department of Public Health and Santa Clara County, as appropriate, on implementation of a blood lead level study to include Palo Alto Airport.
2. Work with the two Fixed Base Operators to provide unleaded fuel at the airport, with initial availability of the Swift Fuels UL94 Unleaded product in fall 2021.
3. Manage consultant work to evaluate and develop options for retrofitting the tank farm to accommodate unleaded fuel, and bring a budget action to Council if needed to begin work on capital improvement.

4. Continue to plan for PAO's path to sustainability and carbon neutrality through the Airport Layout Plan update process.

Resource Impact

This report is informational only, so there are no budgetary adjustments recommended at this time. Staff may return to Council to recommend a new capital project to support the design and construction of fuel farm improvements.