

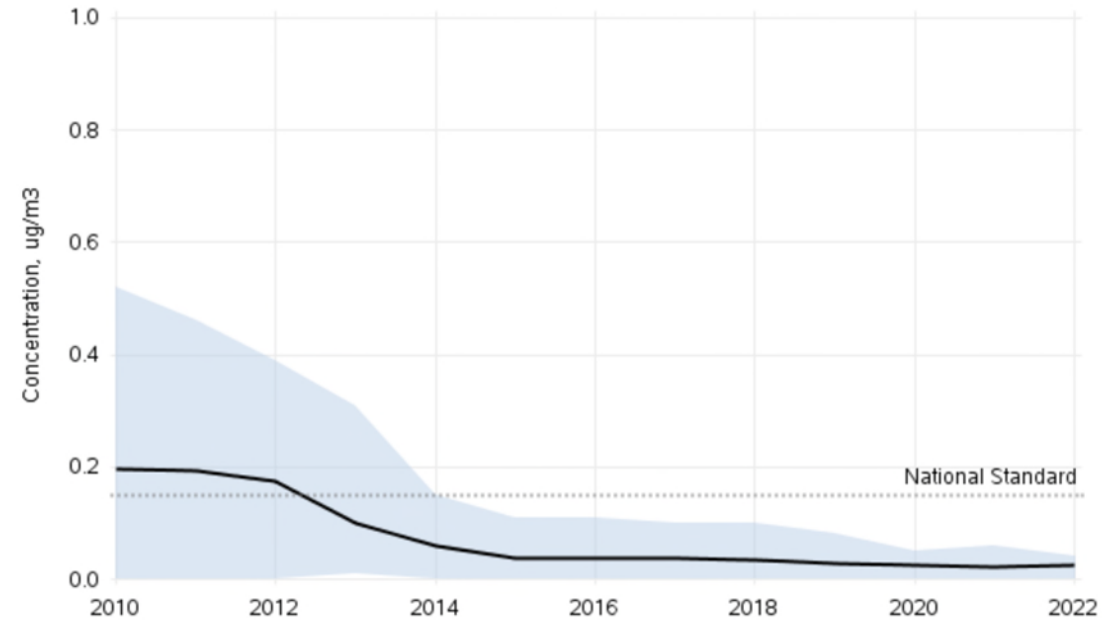
# Fort Lauderdale Executive Airport Lead Emissions Analysis

September 2023

# Lead Emissions Overview

- EPA is concerned about aggregate exposures from all sources of lead, especially given the persistence of lead in the environment.<sup>1</sup>
- Average lead concentrations decreased dramatically after EPA's regulations<sup>2</sup> (e.g., leaded gasoline for use in on-road vehicles was completely phased out as of January 1, 1996).
- In 2008, EPA revised and replaced the lead NAAQS<sup>3</sup> with a standard that was ten times more stringent than the previous standard.<sup>4</sup>
- Average National lead concentrations (3-month average) have decreased by 88% from 2010 to 2022 and are below the national standard.<sup>2</sup>

**Lead Air Quality, 2010 - 2022**  
(Annual Maximum 3-Month Average)  
National Trend based on 81 Sites



**2010 to 2022 : 88% decrease in National Average**

Source: <https://www.epa.gov/air-trends/lead-trends>

<sup>1</sup> EPA, "Fact Sheet", <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100YG46.pdf>

<sup>2</sup> EPA, "Lead Trends", <https://www.epa.gov/air-trends/lead-trends>

<sup>3</sup> EPA, "Lead NAAQS", <https://www.epa.gov/lead-air-pollution/national-ambient-air-quality-standards-naaqs-lead-pb>

<sup>4</sup> EPA, "Lead NAAQS Fact Sheet", [https://www.epa.gov/sites/default/files/2016-03/documents/final\\_rule\\_20081015\\_pb\\_factsheet.pdf](https://www.epa.gov/sites/default/files/2016-03/documents/final_rule_20081015_pb_factsheet.pdf)

# AEDT Analysis

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- A previous AEDT study (2bSP2), used for the 2017 Environmental Assessment (EA) that HMMH previously conducted, was selected as the starting point and converted to the latest version (AEDT 3e).
- Calendar year (CY) 2022, a 12-month period of radar data from FXE Aircraft Noise and Operations Monitoring System (ANOMS), was used to determine the aircraft types and operations using aviation gasoline (avgas) and were imported into AEDT.
- The ANOMS fleet mix was scaled to match the FAA Operations Network (OPSNET)<sup>5</sup> reported 180,551 operations for 2022.
- The overall operation counts were scaled within each FAA category (e.g., air carrier, air taxi, etc.) to the operations reported by OPSNET.

<sup>5</sup> FAA, "OPSNET", <https://aspm.faa.gov/opsnet/sys/main.asp>

# AEDT Analysis (Cont.)

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- Final operation counts consisted of:
  - 59.49% of total operations were aircraft utilizing avgas.
  - There were 187 different fixed-wing and rotary aircraft types.
  - 107,416 Air Taxi and General Aviation (GA) operations (including touch-and-go operations).
- AEDT 3e was then run using these operations and calculated that 1,405,250 pounds or 234,208.3 gallons of Avgas was consumed from aircraft operating below the mixing height (3,000 feet).

# Aircraft Lead Emissions Calculation

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- The AEDT computed fuel burn was applied to the EPA Equation Titled “Lead Emission Calculation”<sup>6,7</sup>
- The following equation was utilized for this specific scenario:

$$Pb \text{ (Tons)} = \frac{234,208.6 \text{ (gallons of avgas)} \times 2.12 \times 0.95}{907,180}$$

$$Pb = 0.520 \text{ Short Tons or } Pb = 1,039.916 \text{ lb.}$$

<sup>6</sup> EPA, “Calculating Piston-Engine Aircraft Airport Inventories for Lead for the 2011 National Emissions Inventory”,

<https://nepis.epa.gov/Exe/ZyPDF.cgi/P100LFGL.PDF?Dockkey=P100LFGL.PDF>

<sup>7</sup> FAA, “Aviation Emissions and Air Quality Handbook Version 3 Update 1”,

[https://www.faa.gov/sites/faa.gov/files/regulations\\_policies/policy\\_guidance/envir\\_policy/airquality\\_handbook/Air\\_Quality\\_Handbook\\_Appendices.pdf](https://www.faa.gov/sites/faa.gov/files/regulations_policies/policy_guidance/envir_policy/airquality_handbook/Air_Quality_Handbook_Appendices.pdf)

# Average Lead Emissions at FXE

- The AEDT analysis estimated that the total lead emissions at FXE in CY 2022 are 0.5199 short tons (1039.916 lb.).
- This yearly value was then scaled down to obtain monthly, daily, and hourly rates of lead emissions at FXE.

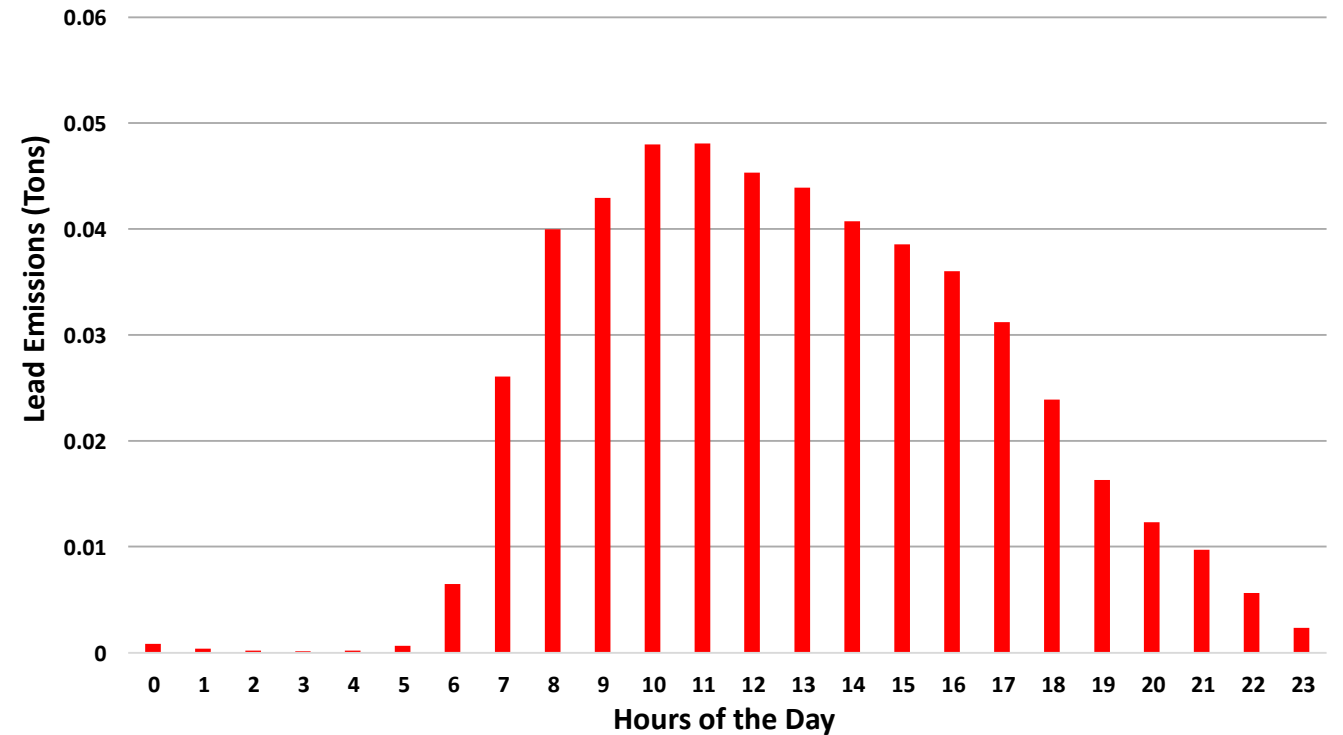
<b>Flight Below Mixing Height</b>		
<b><u>Time Duration</u></b>	<b><u>Emissions (Short Tons)</u></b>	<b><u>Emissions (lb.)</u></b>
Per Hour	<b>5.932E-05</b>	<b>0.119</b>
Per Day	<b>0.001</b>	<b>2.847</b>
Per Month	<b>0.043</b>	<b>86.660</b>
Per Year	<b>0.520</b>	<b>1039.916</b>

# Hourly Distribution of Annual Lead Emissions

- Majority of lead emissions at FXE are produced between 7 AM and 6 PM.
- Maximum emissions rate occurs from 11 AM to 12 PM of approximately 0.04086 tons in CY 2022.

## Hourly Distribution of Annual Lead Emissions

Source: HMMH



# Local Air Quality Impacts

- According to the most recent National Emissions Inventory<sup>8</sup> Broward County contributes:
  - 3.38% of the total lead emissions from aircraft operations in the state of Florida.
- There are 4 airports in Broward County contributing to the state aviation lead emissions.<sup>8</sup>
  - North Perry (HWO) – 1.31%
  - Fort Lauderdale Executive airport (FXE) – 1.00%
  - Pompano Beach Airpark (PMP) – 0.91%
  - Fort Lauderdale -Hollywood International Airport (FLL) – 0.17%
- Broward County is in attainment for lead.<sup>9</sup>
  - An attainment zone is defined by the EPA as a “geographic area in which the air quality meets or is cleaner than the national standard.”<sup>10</sup>



<sup>8</sup> EPA, “2020 National Emissions Inventory (NEI) Data Supporting Data and Summaries”, <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>

<sup>9</sup> EPA, “Greenbook”, [https://www3.epa.gov/airquality/greenbook/anayo\\_ca.html](https://www3.epa.gov/airquality/greenbook/anayo_ca.html)

<sup>10</sup> EPA, “NAAQS Designations Process”, <https://www.epa.gov/criteria-air-pollutants/naaqs-designations-process>



# EPA findings<sup>11</sup> on Piston-Engine Lead Emissions at and Around Airports

- Areas where concentrations may be high (and exceed the lead NAAQS in more active airports) are typically within the fence line of the airports (areas in very close proximity to where pre-flight checks are conducted).
- Lead levels dissipate quickly with distance from piston-engine aircraft exhaust.
- Estimated lead concentrations decrease to below the standard within 50 meters of the area of highest concentration.



<sup>11</sup> EPA, "Fact Sheet", <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100YG46.pdf>

# EPA Fact Sheet<sup>12</sup> on Lead in Soil

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- Lead naturally occurs in soil at low levels.
- Lead does not breakdown over time, so lead deposited in the past can still be a problem today.
- Higher levels of lead are found in soil:
  - Near roadways as a result of air emissions from vehicles that used leaded gasoline.
  - Near the perimeter of buildings that used lead paint that deteriorated as chips and dusts, or from past renovation activities.
- Depending on where you live, it is common to find lead levels in your yard or garden at or above guidance values. This is generally not cause for alarm as there are ways to reduce exposure to lead in soil.
- Soil is highly variable and lead concentrations can be quite different even in samples collected from one or two feet of each other.

# Airport related Soil Sampling Studies

Several studies which analyzed soil samples at airports concluded that they did not contain lead levels that exceed local, state, or federal standards. Recent examples studies include:

- Reid-Hillview Airport (KRHV) in San Jose, California in 2022.<sup>13</sup>
- Peachtree-DeKalb Airport (PDK) in Chamblee, Georgia in 2020.<sup>14</sup>
- Multiple regional airports in Oklahoma in 2017.<sup>15</sup>
- Naples Airport Authority (NAA) in Florida recently completed laboratory testing on the airport and at several nearby downtown residences where no traces of lead or any other aviation fuel contaminants were found.<sup>16</sup>



<sup>13</sup> San Jose Mercury News Report, <https://www.mercurynews.com/2022/06/11/study-finds-no-elevated-lead-levels-in-reid-hillview-airports-soil/>

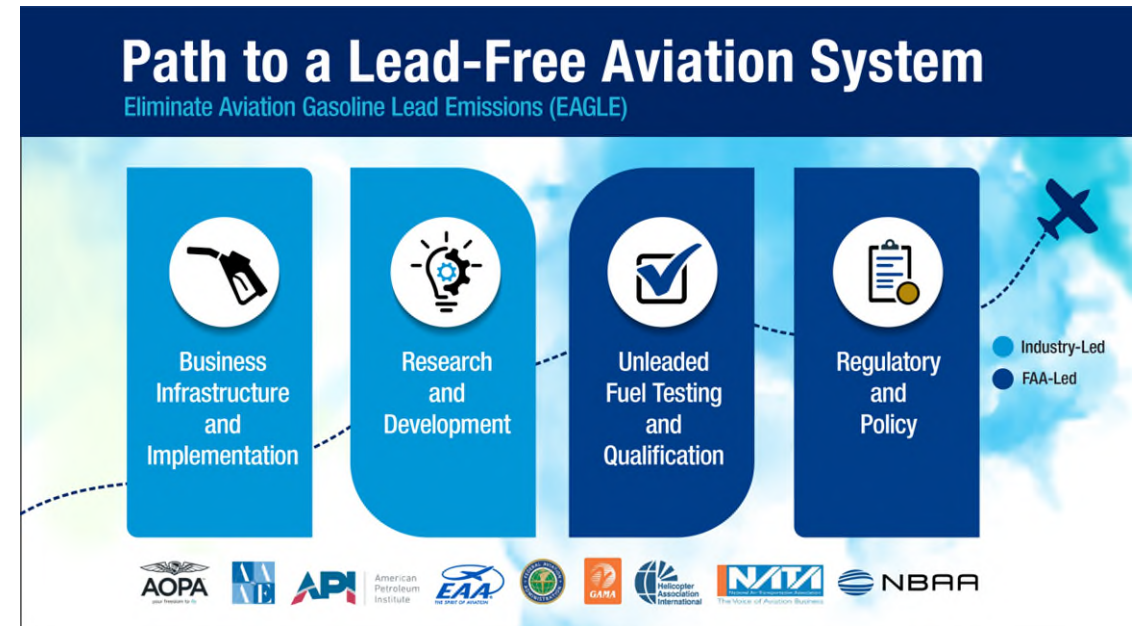
<sup>14</sup> PDK Aviation Park, Soil Sample Testing Report, <https://www.dekalbcountyga.gov/sites/default/files/users/user3595/Soil%20Sample%20Report%20-%20%20Full.pdf>

<sup>15</sup> A geospatial analysis of soil lead concentrations around regional Oklahoma airports, *Chemosphere* (2017), <https://www.sciencedirect.com/science/article/abs/pii/S0045653516313285>

<sup>16</sup> Naples Airport Propels Industry Towards a Cleaner Future, <https://www.flyneples.com/naples-airport-propels-industry-towards-a-cleaner-future>

# FAA's Contributions to a Lead-Free Future

- FAA shares EPA's concerns regarding lead emissions from piston engine aircraft.<sup>17</sup>
- Several initiatives in place to develop strategies to help reduce lead from fuel for piston-engine aircraft.
  - Lead free goal by 2030 via the Eliminate Aviation Gasoline Lead Emissions (EAGLE) Initiative<sup>18,19</sup>



Source: <https://www.faa.gov/unleaded>

<sup>17</sup> FAA, "Aviation Gasoline", <https://www.faa.gov/about/initiatives/avgas>

<sup>18</sup> FAA, "FAA, Industry Chart Path to Eliminate Lead Emissions from General Aviation by the end of 2030", <https://www.faa.gov/newsroom/faa-industry-chart-path-eliminate-lead-emissions-general-aviation-end-2030>

<sup>19</sup> FAA, "EAGLE Initiative", <https://www.faa.gov/unleaded>

# Thank You

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