

SUPPORTING STATEMENT

**AIRCRAFT ENGINES — SUPPLEMENTAL INFORMATION RELATED TO EXHAUST
EMISSIONS**

RENEWAL

OMB Control No. 2060-0680

EPA ICR No. 2427.06

1) IDENTIFICATION OF THE INFORMATION COLLECTION

1 (a) Title of the Information Collection

TITLE: “Aircraft Engines – Supplemental Information Related to Exhaust Emissions (Renewal)”

OMB Control Number: 2060-0680

EPA ICR Number: 2427.06

1 (b) Short Characterization/Abstract

This Information Collection Request (ICR) documents the U.S. Environmental Protection Agency’s (EPA) intent to renew and amend its data collection on new aircraft engine emissions information.

2) NEED FOR AND USE OF THE COLLECTION

2 (a) Authority for the Collection/Need

Under CAA section 231, 42 U.S.C. § 7571, the EPA is responsible for establishing standards for emissions from aircraft engines, and under CAA section 232, 42 U.S.C. § 7572, the Federal Aviation Administration (FAA) is responsible for enforcing these standards. The EPA and the FAA traditionally work within the International Civil Aviation Organization (ICAO) to establish international aircraft emission standards and related requirements. Individual nations, including the U.S., later adopt these standards into their domestic law in fulfillment of their obligations under the Convention on International Civil Aviation (Chicago Convention).¹

¹ ICAO, 2006: *Convention on International Civil Aviation, Ninth Edition*, Document 7300/9, 2006, 116 pp. Available at: http://www.icao.int/publications/Documents/7300_9ed.pdf (last accessed., September 8, 2017). For purchase available at: https://www.icao.int/publications/catalogue/cat_2017_en.pdf (last accessed September 8, 2017). The ICAO Doc 7003/9 *Convention on International Civil Aviation, Ninth edition*, Document 7300/9 2006, 116pp, is found on page 1 of the ICAO Products & Services 2017 Catalog and is copyright protected; Order No. 7003.

Additionally, CAA section 114 additionally provides broad authority for the EPA to collect information related to the regulations we adopt for aircraft engines and other emission sources (42 U.S.C. § 7414(a)(1)).

The EPA is not proposing to apply this reporting to any additional respondents relative to the current ICR. However, the EPA is expanding the scope of this ICR to include supersonic aircraft engines in addition to subsonic aircraft engines, and EPA is replacing one type of data collected with another.

When this ICR was established and previously renewed, the only aircraft engines that were in production, in development, or in use were subsonic engines. Thus, the EPA only included subsonic engines and only referenced to subsonic test procedures. Yet, standards in 40 CFR part 87 (Control of Air Pollution from Aircraft and Aircraft Engines) apply to both subsonic and supersonic aircraft engines. Recently, there has been significant renewed interest in the development of supersonic aircraft and engines. Thus, the EPA is expanding this ICR to apply equally to all engines (subsonic and supersonic aircraft engines) that are required to meet standards under Part 87. The EPA is not expecting any supersonic engines to be certified by the FAA in the three-year period covered by this ICR. The inclusion of supersonic engines would not expand the number of respondents; nor would it place any additional burden on the manufactures because the EPA is only requesting data related to standards under Part 87. If supersonic engines are certified by the FAA, the EPA wants to ensure it has access to this new emissions information in an expeditious manner so that the agency can understand the impacts of this new sector.

The EPA is also proposing to replace the reporting of emission mass for Emission Index (EI) in the ICR for the following gaseous pollutants: hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO_x). This would not impose any additional burden on manufactures because no additional

information is being requested and emissions mass and EI can be simply converted between each other by respondents. Additionally, EIs are more frequently used elsewhere, thus, this proposed replacement should make it easier for manufactures to complete their report.

In addition, this ICR also incorporates some minor updates and clarifications to the reporting template based on feedback provided to the EPA by manufacturers. These updates are described in more detail later in section 4(b).

In March 2017, ICAO adopted a new measurement (test) procedure, emissions standard and reporting requirement for nvPM emissions from subsonic aircraft gas turbine engines with a thrust greater than 26.7 kilonewtons (kN), with an implementation date of January 1, 2020.²

The EPA plans to continue to collect this nvPM data through the two-part process with the FAA that the EPA established in the last renewal. The FAA will verify that the nvPM data, test equipment, and procedures are in accordance with ICAO Annex 16 Volume II Chapter 4 and Appendices 7 and 8. The FAA will notify the manufacturer and the EPA once this verification has been successfully completed. After that point, manufacturers will submit the data to the EPA. The full list of parameters to be submitted to EPA are described later in Section 4(b) (ii) and (iii), and these parameters are consistent with ICAO's reporting requirement.

2 (b) Practical Utility/Users of the Data

The EPA believes it is necessary to continue the existing collection to further understand the characteristics of aircraft engines that are subject to emission standards and their impact on emission

² The February 2016 agreement by Committee on Aviation Environmental Protection (CAEP), a body of ICAO, was formally adopted by ICAO in March 2017, and applies to aircraft gas turbine engines that have a rated output greater than 26.7 kilonewtons (kN). For purchase available at: https://www.icao.int/publications/catalogue/cat_2021_en.pdf (last accessed September 7, 2021). The ICAO Doc 10069, *Report of the Tenth Meeting, Montreal, 1-12 February 2016, Committee on Aviation Environmental Protection Report*, 432pp, is found on page 25 of the ICAO Products & Services 2021 Catalog and is copyright protected; Order No. 10069.

inventories. Much of this information is required to develop both present and future emission inventories. The emission inventory methodology includes the following information:

- Engine model or submodel;
- Mass of hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO_x), and nvPM by engine model or submodel for each operating mode of the landing and takeoff cycle (LTO) (i.e., take-off, climbout, taxi/ground idle); and
- Number of LTOs by engine model or submodel operating in the study area (e.g., one or more airports) over the study time period (e.g., annually).

Projecting future emission inventories requires information on the emissions characteristics of particular engines to be coupled with data used to forecast fleet turnover (older airplanes and engines being retired as new equipment is added to the fleet). More specifically, the forecast methodology relies on:

- emission rate information,
- knowledge of the annual production levels for each engine model or submodel including the year in which production of certain engine models or submodels ended, and
- information on the activity and life expectancy of the aircraft/engines.

Having such information available helps the Agency set and enforce appropriate and achievable emission standards and related requirements for aircraft engines in the context of the international process. This data may also be useful in evaluating alternative approaches to transitioning to new standards.

With participation from the EPA and the FAA, ICAO is continuing to work on developing future subsonic and supersonic aircraft engine standards. The data collected pursuant to this information collection would be used to help inform any future EPA rulemaking to codify such possible future standards under U.S. law.

3) NONDUPLICATION, CONSULTATIONS, AND OTHER COLLECTION CRITERIA

3 (a) Non-duplication

ICAO maintains an “emissions databank” with much of the information that is the subject of the new reporting requirement. The ICAO databank is a useful tool for providing a general overview of the aircraft fleet, but it is not updated on a consistent basis, it contains a varying amount of voluntarily reported data from each manufacturer, and it does not specifically include information for every engine sub-model. It also lacks information on smaller thrust category turbofans or turboprops and contains no information on engine production volumes. The EPA has attempted to use the emissions databank to conduct analyses in support of policy development, but at times was not able to get reliable information in certain key areas.

EPA needs the information on engine technology, performance parameters, and emissions data submitted under this ICR to conduct accurate technology assessments and aircraft emission inventories and develop appropriate policy; therefore, the ICAO databank is not alone a sufficient tool to inform our policy decisions, including future standard-setting actions. In the context of the roles of the EPA and the FAA with regard to aircraft engine emission standards, it is consistent with EPA policy and practice to ask for timely and reasonable reporting of emission certification testing and other information that is relevant to our emission standards.

3 (b) Public Notice Required Prior to Information Collection Request (ICR)

Submissions to OMB

The EPA published a notice in the *Federal Register* on May 7, 2021, announcing the proposed ICR renewal and providing a 60-day public comment period.³ The EPA received 3 public comments; and all were substantive and relevant to this renewal.

³ OMB Control Number 2060-0680, EPA ICR No. 2427.06,86 FR 24615.

One commenter was supportive of the renewal of the ICR and expansion of the scope to include supersonic engines, and the other two commenters did not support renewing the ICR. These latter commenters raised concerns regarding the data being available elsewhere and the burden estimates.

In particular, the concern expressed was that much of the emissions data that is requested in the ICR is already reported to the ICAO Engine Emissions Database (EEDB). There is no dispute that the emission rates in EPA's ICR are the same as those voluntarily reported to ICAO's EEDB because both are the certified values. However, as we discussed in 3 (a) above, the EEDB is a voluntary data collection. In the past, the EEDB has not always been updated on a regular basis, nor have data for all engines been reported in a timely manner. While the frequency of updates and timeliness of reporting to the EEDB have improved in recent years, the EPA needs to ensure that we have accurate and up-to-date information, and the EPA does not believe it is appropriate to rely on voluntary reporting for such information. The EPA further notes that the EEDB does not contain production information, which would be required by this ICR.

It was also suggested that publicly available databases, such as the Cirium,⁴ could provide similar information, especially regarding production volumes. The EPA is aware and has made use of services such as these previously, and we anticipate we will continue to use these types of services to supplement our future analyses. When evaluating policies or making decisions that could impact manufacturers' existing engines, the EPA desires to have the highest quality data to ensure that we are basing decisions on correct data. Manufacturer-supplied data is the most accurate method for us to do this.

Voluntary public databases also do not include information on the number of spare or exempted engines that are produced, which the ICR includes. A commenter discussed an alternative method for estimating the number of spare engines needed based on market size. However, there was not sufficient

⁴ <https://www.cirium.com/>

information in the comment to evaluate if this proposed method could be expanded to cover full engine programs. Further, there was not any analysis provided by the commenter demonstrating if the full methodology was robust and would align with historical trends. Also, a question this type of methodology raises is how stable the methodology would be over time. Based on trade press articles, maintenance intervals are generally increasing over time. It is unclear how this methodology would adapt or account for any changes in the number of required spare engines over time.

Another concern raised in the comments was that the burden estimate was too low. It was suggested that annual updates to the database would likely take 40-60 hours per year rather than the 11 hours (6 hours for gaseous emissions reporting, and 5 hours for nvPM emission) that the EPA estimated. These increased time estimates are difficult to evaluate given the lack of supporting information in the comments. Nonetheless, the EPA reevaluated and updated its burden estimate in response to the general comment that the burden estimate is too low. As commenters noted, and we agree, much of the data is certification data and would not change from year to year. However, the production data does need to be collected anew for each reporting year as production volumes change from year to year. The EPA reevaluated the effort associated with the collection of production data and determined that additional clerical hours for data gathering and additional aerospace engineer hours for data review and quality assurance would be appropriate to account for the annual collection of production data. Accordingly, the EPA is updating its annual reporting burden to account for two dedicated days of work for clerical staff (14 additional hours) and an additional half working day of time for aerospace engineering staff (4 additional hours) to account for the burden to gather production information. This increases the estimated annual reporting to be 30 hours total per-manufacturer for gaseous and nvPM emissions.

Commenters also noted that the estimated burden to report nvPM data for a new engine type to FAA for review would likely be closer to 120 hours per engine type, rather than the 40 hours per engine

type EPA previously estimated. No further information was provided by the commenter to support the 120-hour estimate. When this ICR was most recently renewed and the nvPM reporting added, no comments were received that indicated the estimates were too low. At this time, EPA does not have sufficient information to justify changing the estimate of 40 hours, and thus, the EPA is not updating it per the commenter's request.

Commenters also indicated that some manufacturers consider production numbers to be confidential business information (CBI). We note that EPA has promulgated regulations regarding how we handle CBI information at 40 CFR 1068.10. Furthermore, row 4 in the data reporting template is designated to allow manufacturers can indicate if the information in each column is to be treated as CBI.

The EPA is submitting the revised documents to the Office of Management and Budget (OMB) and publishing revised renewal materials for another public comment period.

3 (c) Consultations

The EPA communicated with manufacturers on a regular basis as a part of our work at ICAO when developing the existing collection. These discussions have included the extent, form, and timing of the information submissions. A manufacturer noted that since the nvPM tests are a new requirement there will be a different number of engine tests for nvPM than for other gaseous emissions. New columns have been added to the template to allow this to be reported more easily. We also received feedback from the manufacturers that it would be easier to report the emissions index rather than emissions mass. These values are directly convertible, so we have incorporated this change as well.

The EPA is in regular communication with the FAA's Office of Environment and Energy as part of our ongoing work related to aircraft engine emissions. We routinely discuss certification issues,

including the FAA review of nvPM data collection. FAA is supportive of reviewing the nvPM emissions information collected by the EPA as part of this ICR.

The EPA consulted with three respondents. There have been no substantive changes to the ICR since its last approval by OMB.

3 (d) Effects of Less Frequent Collection

We require annual reporting. This is consistent with the current requirement to submit aircraft engine-related NO_x, HC, CO, smoke, and CO₂ information (see 40 CFR §§ 87.42 and 87.64 for the EPA's regulations requiring reporting of these emissions); along with nvPM emissions information. Since the technical emissions information will not typically change from year to year; much of the new information received each year will often be limited to the production volumes for the preceding year and to manufacturers introducing new aircraft engine types or models. Having the information updated every year will be most helpful for assessing technology trends and their impacts on national emissions inventories. It will also help us to stay abreast of developments in the aircraft engine industry.

3 (e) General Guidelines

This collection of information is consistent with all OMB guidelines under 5 CFR § 1320.5.

3 (f) Confidentiality

The provisions of 40 CFR 1068.10 apply for information you consider confidential.

3 (g) Sensitive Questions

This information collection does not ask any questions concerning sexual behavior or attitudes, religious beliefs, or other matters usually considered private.

4) THE RESPONDENTS AND THE INFORMATION REQUESTED

4 (a) Respondents/North American Industrial Classification Systems (NAICS) Codes

All the expected respondents are manufacturers of new aircraft engines, which are represented by NAICS Code 336412.

4 (b) Information Requested

(i) Data items, including record keeping requirements⁵

Reporting elements identified in 4)(ii) list the 14 elements approved in the existing collection relating to gaseous and smoke emissions. Each element is applicable for each affected aircraft gas turbine engine sub-model that is subject to the standards under 40 CFR part 87 and serves as a key tool for informing public policy assessments.

Reporting elements identified in 4)(iii) list 13 additional reporting elements approved in the existing collection relating to non-volatile Particulate Matter (nvPM) emissions. Each element is applicable for each subsonic aircraft turbofan or turbojet engine sub-model with a rated thrust greater than 26.7kN, as a key tool for informing public policy assessments. This information will be gathered using the test procedures described in Annex 16, Volume II, Chapter 4, Appendices 7 and 8.⁶ The nvPM

⁵ The following abbreviations for units are used within this section:

- Kilogram kg
- Gram g
- Milligram mg
- Microgram µg
- Meter m
- Kilonewton kN
- Watts W

⁶ ICAO, 2017: *Aircraft Engine Emissions*, International Standards and Recommended Practices, Environmental Protection, Annex 16, Volume II, Fourth Edition, July 2017. Available at https://www.icao.int/publications/catalogue/cat_2021_en.pdf (last accessed September 7, , 2021). The ICAO Annex 16 Volume II is found on page 17 of the ICAO Products & Services Catalog, English Edition of the 2021 catalog, and it is copyright protected; Order No. AN16-2. The ICAO Annex 16, Volume II, Fourth Edition, includes Amendment 10 of January 1, 2021. Amendment 10 is also found on page 17 of this ICAO catalog, and it is copyright protected; Order No. AN 16-2/E/12.

data will be reported along with the annual report on HC, CO, NO_x, smoke, and CO₂ emissions as required under 40 CFR § 87.42 and 87.64.

(ii) Information relating to Gaseous Emissions and Smoke:

- Company corporate name as listed on the engine type certificate;
- Calendar year of reporting period;
- Complete sub-model name (this will generally include the model name and the sub-model identifier, but may also include an engine type certificate family identifier);
- The type certificate number, as issued by the FAA (specify if the sub-model also has a type certificate issued by a certifying authority other than the FAA);
- Date of issue of type certificate and/or exemption, i.e., month and year;
- Emission standards to which the engine is certified;
- If this is a derivative engine, identify the original certified engine model;
- Engine sub-model that received the original type certificate for the engine type certificate family;
- Production volume of the sub-model for the previous calendar year, or if zero, state that the engine model is not in production and list the date of manufacture (month and year) of the last engine produced;
- Regarding the above production volume report, specify (if known) the number of engines that are intended for use on new aircraft (certified and exempted), the number intended for use as certified spare engines on in-use aircraft, and the number of excepted spare engines;
- Reference pressure ratio;
- Combustor description (type of combustor where more than one type available on an engine);
- Engine maximum rated thrust output (Foo), in kilonewtons (kN) or watts (W) (depending on engine type);
- Unburned hydrocarbon (HC) emission index (g / kg of fuel) over each segment of the Landing and Take-off Cycle (LTO), i.e. Take-off, Climb, Approach, Taxi / Ground Idle;
- Unburned hydrocarbon (HC) mass (g) total (weighted) over the LTO cycle;
- HC characteristic level (Dp/Foo);
- CO emissions index (g / kg of fuel) over each segment of the LTO cycle;

- Carbon monoxide (CO) mass (g) total (weighted) over the LTO cycle;
- CO characteristic level (Dp/Foo);
- Oxides of Nitrogen (NO_x) emission index (g / kg_fuel) over each segment of the LTO Cycle;
- NO_x mass (g) total (weighted) over the LTO Cycle
- NO_x characteristic level (Dp/Foo);
- Smoke number (SN) at each segment of the LTO cycle;
- Maximum SN at any thrust setting;
- SN characteristic level;
- Carbon dioxide (CO₂) mass (g) total (weighted) and over each segment of the LTO Cycle;
- Number of emission tests run per sub-model;
- Number of engines tested per sub-model;
- Fuel flow (grams / second) total (weighted) and over the LTO Cycle;
- Any additional remarks to the EPA.

(iii) Data collection for nvPM emissions from aircraft gas turbine engines:

- Number of emission tests run per sub-model – if different than for gaseous;
- Number of engines tested per sub-model – if different than for gaseous;
- Maximum nvPMmass concentration⁷ (µg/m³);
- Characteristic Maximum nvPMmass concentration (µg/m³);
- nvPM EI_{mass} (mg/kg of fuel) for each thrust setting of the LTO cycle;
- nvPM mass system loss correction factor for each thrust setting of the LTO cycle;
- nvPM EI_{mass} (mg/kg of fuel) corrected for system losses (i.e., nvPM EI_{mass} at the engine exit) for each thrust setting of the LTO cycle;
- nvPM mass characteristic level (LTO_{mass} / rated thrust)
- nvPM EI_{num} (number of particles/kg of fuel) for each thrust setting of the LTO cycle;
- nvPM EI_{num} system loss correction factor for each thrust setting of the LTO cycle;
- nvPM EI_{num} (number of particles/kg of fuel) corrected for system losses (i.e., nvPM EI_{num} at the engine exit) for each thrust setting of the LTO cycle;

⁷ Note, maximum nvPM levels shall be reported at thrusts producing the maximum nvPM Mass concentration, maximum EI mass, and maximum EI number. These maximum levels can be at any thrust setting, and they are not limited to the four LTO thrust settings. The thrust points corresponding to these nvPM emissions levels may be different for the maximum nvPM Mass concentration, maximum EI mass, and maximum EI number.

- nvPM num characteristic level (LTONum / rated thrust);
- Maximum nvPM EImass (mg/kg of fuel);
- Maximum nvPM EImass system loss correction factor;
- Maximum nvPM EImass (mg/kg of fuel) corrected for system losses (i.e., nvPM EImass at the engine exit);
- Maximum nvPM EInum (number of particles/kg of fuel);
- Maximum nvPM EInum system loss correction factor; and
- Maximum nvPM EInum (number of particles/kg of fuel) corrected for system losses (i.e., nvPM EInum at the engine exit).

The annual report must be submitted for each calendar year in which a manufacturer produces any covered aircraft gas turbine engine. These reports are due to the EPA by February 28 of each year, for the previous calendar year. In instances where emissions information provided for a previous year remains valid and complete for the current reporting year, manufacturers may report production figures and state that there are no changes instead of resubmitting the original information, as provided by 40 CFR § 87.42(f). Production volume for engines produced under an exemptions/exception should be reported here, as provided by 40 CFR 87.50(d). The additional information required under 40 CFR 87.50(d) should be reported in a separate report to the Designated EPA Program Officer. To facilitate and standardize reporting, we will continue to provide an Excel template⁸ to each manufacturer.

Since the nvPM testing is a new procedure, manufacturers may have conducted a different number of tests for nvPM vs other gaseous pollutants. Based on feedback from manufacturers, the EPA will add a new column to the nvPM tab in the template to so the number of nvPM tests conducted can be specified.

⁸ The template for the existing ICR is EPA Form Number: 5900-223 or OMB Control Number: 2060-0629. The current template can be found at <https://www.epa.gov/vehicle-and-engine-certification/compliance-reporting-aircraft>. This will be updated

4 (c) Recordkeeping Requirements

Manufacturers need not keep records other than copies of the information submitted to the EPA. They must keep these records for at least three years, the records must be kept readily available, and the EPA may review them at any time. See 40 CFR § 87.46.

5) THE INFORMATION COLLECTED – AGENCY ACTIVITIES, COLLECTION METHODS, AND INFORMATION MANAGEMENT

5 (a) Agency Activities

(i) EPA

The EPA activities associated with the information collection request include creating a reporting template, coordinating with the FAA on emission testing and nvPM reporting, and answering manufacturers' questions about how to complete the template. Once the reporting program is in place, the EPA activities will include monitoring and review of emission reports, further communication and outreach, and program evaluation.

(ii) FAA

The FAA activities for the information collection request are limited to the nvPM data submission. These activities include reviewing manufacturers' emissions reports to verify that the nvPM data, test equipment, and procedures are in accordance with ICAO Annex 16 Volume II Chapter 4 and Appendices 7 and 8. Also, the FAA activities will include answering manufacturers' questions about these emissions reports. The FAA activities will include reviewing and verification of emission reports for nvPM data and further communication with manufacturers. The FAA will notify the manufacturer and the EPA after this verification has been successfully completed.

5 (b) Collection Methodology and Management

Data requested relating to emissions standards in 40 CFR part 87 (described in 4)(ii)) will be collected in the process of type certification on an aircraft engine under 40 CFR part 87. All manufacturers seeking a type certificate from the FAA under 14 CFR part 21 shall submit data to the EPA for these engine types.

The nvPM data requested in this collection will be submitted to the FAA for verification that it has been collected in the proper manner. The manufacturers will collect nvPM data using the procedures described in Annex 16 Volume II Chapter 4 and Appendices 7 and 8.⁹ Following the notification of verification from the FAA, manufacturers will fill out the reporting template with the nvPM data and provide to the EPA.

The EPA will ensure completeness of the collected information by reviewing each submittal.

We generally expect manufacturers to submit data electronically via email to aircraft_engine_reporting@epa.gov. We will maintain records of these files and plan to post non-CBI data on our website.

5 (c) Small Entity Flexibility

One manufacturer, Williams International, is a small business under the criteria established by the Small Business Administration. The information collection involves a minimal amount of effort, so we have not adopted any provisions to reduce the burden of sending or keeping this information. Williams International is not expected to respond to the request for nvPM data because they do not produce an aircraft engine that produces a thrust greater than 26.7kN.

⁹ ICAO, 2016; Draft Annex 16 Vol. II is available in the CAEP/10 Meeting report. For purchase available at: https://www.icao.int/publications/catalogue/cat_2017_en.pdf (last accessed September 8, 2017). The ICAO Doc 10069, *Report of the Tenth Meeting. Montreal, 1-12 February 2016, Committee on Aviation Environmental Protection Report*, 432pp, is found on page 25 of the ICAO Products & Services 2017 Catalog and is copyright protected; Order No. 10069.

5 (d) Collection Schedule

We require annual reporting. This is consistent with the existing collection requirement to submit aircraft engine-related NO_x, HC, CO, smoke, nvPM, and CO₂ information. The EPA anticipates issuing the CAA section 114 letters by January 1, 2022. These CAA section 114 letters will serve as a reminder to respondents about what data we are requiring to be submitted and provide any necessary clarification about the process. These letters will require the manufacturer of an aircraft gas turbine engine to submit completed reporting forms to the EPA by February 28, 2022.

Much of the information will not change from year to year; we expect that the new information will often be limited to production volumes for the preceding year and to manufacturers introducing new aircraft engine types or models. Having the information updated every year will be most helpful for assessing technology trends and impacts and in a broader sense confirming, in a timely way, that manufacturers are properly complying with regulatory requirements. It will also help us to stay abreast of any developments in the characteristics of the aircraft engine industry.

6) ESTIMATING THE BURDEN AND COST OF THE COLLECTION

Section 6(a) of this Supporting Statement provides estimates of burden hours for all respondent types. Section 6(b) contains estimates of respondent costs for the information collection. Section 6(c) summarizes Federal burden and costs. Section 6(d) describes the respondent universe and the total burden and cost of this collection to respondents. Section 6(e) presents the bottom-line burden and cost. The burden statement for this information collection is in Section 6(f).

6 (a) Estimating Respondent Burden

(i) Estimated burden for elements relating to gaseous and smoke emissions data collection

The EPA estimates that the annual burden of the ICR relating to gaseous and smoke emission data, to each respondent would be 25 hours per year over the three years covered by this information collection.

The EPA estimates that up to 7 respondents^{10,11} will submit a report to the EPA each year containing information regarding gaseous and smoke emissions.

(ii) Estimated burden of relating to nvPM emissions data collection

The EPA estimates that the emissions testing burden to affected entities for reporting information to the FAA for verification will be 40 hours per engine type. This burden would be incurred only once for each engine type for the first incidence of nvPM data being reported for that engine type and would not be incurred again for that same engine type when reported in subsequent years unless the manufacturer made changes to the engine that changed its emissions characteristics.

The EPA estimates that the additional annual reporting burden of the nvPM collection to each respondent would be 5 hours per year over the three years covered by this information collection.

The EPA estimates that up to 6¹² respondents will submit data in their report to the EPA each year relating to the nvPM collection.

¹⁰ General Electric, Pratt & Whitney, Pratt & Whitney Canada, Rolls Royce, Honeywell, Williams International, and Safran Aircraft Engines.

¹¹ Based on publicly available information, there are no additional manufacturers developing supersonic engines.

¹² As discussed in 5(c) Williams International is not expected to produce an engine that meets the criteria to provide nvPM data.

6 (b) Estimating Respondent Costs

Costs to respondents associated with this information collection include labor costs (i.e., the cost of labor by manufacturers to meet the existing information collection requirements). Because the requirements merely supplement existing activities, we believe manufacturers will incur no non-labor costs (e.g., the cost of purchasing and installing equipment or contractor costs associated with providing the required information).

To calculate labor costs, the EPA estimated technical, managerial, clerical, and legal loaded labor rates for each industry sector using labor rates from the Bureau of Labor Statistics¹³ and applying a 60% loading factor.¹⁴ The loaded labor rates¹⁵ in 2021 US Dollars are: \$128.56 for managers; \$92.77 for aerospace Engineers; \$38.18 for clerical staff, and \$132.25 for legal staff in 2021 dollars.¹⁶

(i) Gaseous and Smoke Emissions Data Collection

During the three years covered by this information collection, the EPA estimates that the annual burden imposed on each of the 7 anticipated respondents/engine manufacturers will average 25 hours or \$1,541 (175 hours or \$10,785 annually in total) each year for tasks covered related to gaseous or smoke emissions information). This is based on an estimated effort involving 1 hour for managers, 6.5 hours for engineers, 16 hours for clerical staff, and 1.5 hours or attorneys. Manufacturers are already required to submit similar information annually, so we expect that continuing to submit and keeping the additional records will involve no capital costs and no Operations and Maintenance (O&M) costs. Table 1 presents the total cost to all manufacturers each year for the existing collection.

¹³ Prices adjusted to 2021 dollars using an annual inflation rate of 1.24%. This was calculated based on the change in the Producers Price Index for Aerospace Produce and Parts Manufacturers from January 2015 to January 2021.

¹⁴ The ICR Handbook (November 2005) recommends using a multiplier of 1.6 to account for benefits and overhead related to government wages; this is considered a conservative estimate (potentially high) for the private sector.

¹⁵ This rate reflects total compensation labor rate for workers in the aircraft manufacturing industry based on BLS Occupational Employment Statistics, Aerospace Product and Parts Manufacturing Industry; Date retrieved: July 25, 2017, <https://data.bls.gov/oes/#/indOcc/Multiple%20occupations%20for%20one%20industry>

¹⁶ The labor rates for the previously approved ICR are: \$71.03 for managers; \$55.20 for Engineers/technicians; \$29.65 for clerical staff, and \$101.00 for legal staff.

Table 1: Estimated Annual Burden for Elements of the Existing Collection

	Hours per Response	BLS - Mean Hourly Wage (5/2019)	Inflated Mean Hourly Wage (1/2021)	Load Factor	Loaded Labor Rate	Labor Cost	Number of Respondents	Total Hours	Total Cost
Manager Aerospace	1	\$ 78.80	\$ 80.35	0.6	\$ 128.56	\$ 128.56	7	7	\$ 900
Engineer	6.5	\$ 56.86	\$ 57.98	0.6	\$ 92.77	\$ 602.99	7	45.5	\$ 4,221
Clerical Staff	16	\$ 23.40	\$ 23.86	0.6	\$ 38.18	\$ 610.84	7	112	\$ 4,276
Legal Staff	1.5	\$ 81.06	\$ 82.66	0.6	\$ 132.25	\$ 198.38	7	10.5	\$ 1,389
Totals	25					\$ 1,541		175	\$ 10,785

(ii) nvPM data collection

The EPA anticipates only 6 of the 7 expected respondents will submit data on the nvPM collection. One manufacturer does not produce any engines that would meet the requirements to report under this new collection.

The EPA does not expect that manufacturers will need to re-test any engines. However, when a manufacturer develops a new engine, this would require the compilation of data to be submitted to the FAA for verification. As an estimate, the EPA is assuming that each manufacturer will develop one new engine sometime in the next 3 years.

(1) One Time costs for new nvPM collection

Before manufactures submit emission data to the EPA, the data will need to be submitted to the FAA for review and verification. Based on input from the FAA, the EPA estimates it could take up to 40 hours or \$3,711 per engine type to prepare and submit nvPM data to the FAA. Expecting there will be 6 engine types being used during this ICR's reporting period, the EPA estimates a total of 240 hours and

\$22,264 in one-time labor costs associated with efforts to prepare and submit data to the FAA. Annualized over the 3 years, across all six respondents, the average annual total burden would be 80 hours or \$7,421.

Table 2- Respondent one-time costs

	Hours per Respondent	BLS Mean Hourly Wage (5/2019)	Inflated Mean Hourly Wage (1/2021)	Load Factor	Loaded Labor Rate	Labor Cost per Engine	# of Engine Types /Models	Total Startup Hours	Total Startup Labor Cost
Aerospace Engineer	40	\$ 56.86	\$ 57.98	0.6	\$ 92.77	\$ 3,711	6	240	\$ 22,264

(2) Annual Labor Costs for nvPM Emissions collection

The EPA estimates that the annual cost to each aircraft gas turbine engine manufacturer to fill out this additional nvPM data could average up to 5 hours or \$429 per year, over the three years covered by this information collection. This is based on an estimated effort involving 5 hours for aerospace engineers.

Table 3 - Annual Labor Costs for nvPM Emissions Collection

	Hours per Respondent	BLS Mean Hourly Wage (5/2019)	Inflated Mean Hourly Wage (1/2021)	Load Factor	Loaded Labor Rate	Labor Cost	Number of Respondents	Total Hours	Total Cost
Aerospace Engineer	5	\$56.86	\$57.98	0.6	\$92.77	\$464	6	30	\$2,783

6 (c) Estimating Agency Burden and Cost

This section describes the burden and cost to the Federal government associated with this information collection, both existing and new data. Federal activities under this information collection include FAA verification of testing and EPA oversight of the reporting program.

The EPA estimates the salary, overhead, and benefits of agency staff to be \$73.94. To derive this figure, the EPA multiplied the hourly compensation at GS-12, Step 5 on the 2017 General Schedule pay scale for the Detroit/Ann Arbor area (\$46.21) by the standard government benefits multiplication factor of 1.6 to account for overhead and benefits.

(i) FAA burden and cost

There are no FAA costs associated with the gaseous or smoke emissions collection of data. The FAA activities associated with the proposed collection of nvPM data includes oversight and implementation of guidance to manufacturers for data collection and testing, monitoring and verification of emission reports, communication and outreach, and program evaluation. The EPA estimates that this would involve up to 20 staff hours per engine type. The EPA estimates that there could be 6 engine types to be verified by the FAA. The anticipated costs for FAA activities related to this collection are not included in the Agency burden tabulations for this ICR.

(ii) EPA burden and cost

The EPA activities associated with the collection include oversight and implementation of the reporting program, e.g., monitoring and verification of emission reports, communication and outreach, and program evaluation. The EPA estimates that this will involve up to 10 staff hours per year for the gaseous and smoke collection. The nvPM collection could involve up to 5 staff hours per year for these activities.

6 (d) Estimating the Respondent Universe and Total Burden and Costs

For the gaseous and smoke collection, the EPA expects to receive annual reports from 7 manufacturers, 6 of whom have previously submitted data, and potentially 1 new manufacturer. The EPA expects to receive data from 6 manufacturers for the data associated with the nvPM collection.

6 (e) Bottom Line Burden Hours and Costs

The EPA estimates that each respondent's burden and costs associated with the activities described in Section 4(b)(ii) over the three years covered by this request, will average 25 hours or \$1,541¹⁷ per year (Table 1). This results in a total for all respondents of 525 hours or \$32,356 over the 3 years (175 hours or \$10,785 per year)

For the new nvPM data collection, the EPA estimates that respondents would incur one-time start-up burden of 40 labor hours or \$3,711 per engine type to prepare and submit the test results to the FAA for verification (Table 2). The EPA estimates that the additional reporting burden and costs associated with the activities described in Section 4(b)(iii), over the three years covered by this request, will average 5 hours per year or \$464 (Table 3). This results in a total estimated burden for all respondents of 330 hours or \$30,613 total over the 3 years (110 hours or \$10,204 per year).

The total cost over the 3 years to all respondents for this information collection is estimated to be 855 hours or \$62,970. Individually this ICR is estimated to be 122 hours and \$8,996 per respondent over the 3 years (or 40.7 hours and \$2,999 per year). This is described in more detail in Table 4.

The EPA's estimated burden for this information collection is 15 hours or \$1,109 per year (45 hours or \$3,327 over 3 years)

¹⁷ All values presented in 2021 dollars

Table 4 - Total burden

		Gaseous and Smoke Collection				nvPM Collection					Total	
		Response hours	Labor Cost	Number of Respondents	Capital / Startup Cost	Response hours	Labor Cost	Number of Respondents	One-time Hours	One-Time Cost	Annual Burden (hours)	Annual Cost (2017 \$)
Respondent Burden	2022	25	\$1,541	7	\$-	5	\$ 464	6	80	\$ 7,421	285	\$ 20,990
	2023	25	\$1,541	7	\$-	5	\$ 464	6	80	\$ 7,421	285	\$ 20,990
	2024	25	\$1,541	7	\$-	5	\$ 464	6	80	\$ 7,421	285	\$ 20,990
EPA Burden	2022	10	\$ 739	1	\$ -	5	\$ 370	1	0	\$ -	15	\$ 1,109
	2023	10	\$ 739	1	\$ -	5	\$ 370	1	0	\$ -	15	\$ 1,109
	2024	10	\$ 739	1	\$ -	5	\$ 370	1	0	\$ -	15	\$ 1,109
FAA Burden*	Data Verification	0	\$ -	0	\$ -	0	\$ -	6	120	\$ 8,872	120	\$ 8,872

** For the FAA Burden, the number of respondents is equal to the estimated number of engines they would need to verify the data from. Rather than the number of manufacturers who are reporting data.

Total OEM Reporting Burden	855	\$ 62,970
(per year)	285	\$ 20,990
Individual respondent burden	122	\$ 8,996
(per year)	40.7	\$ 2,999
Total Government Burden	165	\$ 12,199
(per year)	55	\$ 4,066
Total EPA Burden	45	\$ 3,327

(per year)	15	\$ 1,109
Total FAA Burden	120	\$ 8,872
(per year)	40	\$ 2,957
Total Burden	1020	\$ 75,169

Approved OEM Reporting Burden (from 2018)	1506	\$ 129,597
(per year)	502	\$ 43,199

Change in OEM Burden	-651	\$ (66,627)
(per year)	-217	\$ (22,209)

6 (f) Change in Burden Estimates

There has been no change in the requirements for the existing collection. Labor costs have changed slightly due to updated cost data from the Bureau of Labor Statistics (BLS). The burden hours to collect the information has been increased by 19 hours in response to comments received that the estimated burden was too low.

The collection of nvPM data allows U.S. aircraft engine manufacturers to demonstrate compliance with international standards developed at ICAO. The initial collection had a very high start-up cost to test all of the engines. Since manufacturers have already tested all of their existing engines, the one-time cost to have the nvPM data verified by the FAA has been accomplished. However, the EPA realizes that manufacturers will still be developing new engines that will need to be verified in the future. Thus, EPA estimates that 6 engines may need to go through this verification process.

The net result of the increase in collection hours and removal of one-time startup costs results in an estimated reduction of manufacturer cost and hours of \$-66,627 and 651 hours over the next three years.

6 (g) Burden Statement

The respondent reporting and recordkeeping burden for this collection of information is estimated to be up to 855 hours or \$62,970 over the 3 years of this collection. Total burden to the government and all respondents is estimated to be 1020 hours or \$75,169. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and

disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for the EPA's regulations are listed in 40 CFR part 9 and 48 CFR chapter 15.

To comment on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques, the EPA has established a public docket for this ICR under Docket ID Number EPA-HQ-OAR-2016-0546, which is available for online viewing at www.regulations.gov, or in person viewing at the Air and Radiation Docket in the EPA Docket Center (EPA/DC), EPA West, Room 3334, 1301 Constitution Avenue, NW, Washington, D.C. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Reading Room is (202) 566-1744, and the telephone number for the Air and Radiation Docket is (202) 566-1742. An electronic version of the public docket is available at www.regulations.gov. This site can be used to submit or view public comments, access the index listing of the contents of the public docket, and to access those documents in the public docket that are available electronically. When in the system, select "search," then key in the Docket ID Number identified above. Also, you can send comments to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW, Washington, D.C. 20503, Attention: Desk Officer for EPA. Please

include the EPA Docket ID Number EPA-HQ-OAR-2016-0546 and OMB Control Number 2060-0680 in any correspondence.