

SUPPORTING STATEMENT

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

RENEWAL

OMB Control No. 2060-0680

EPA ICR No. 2427.04

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: 2427.04

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. In addition to the data it already collects (under Clean Air Act (CAA) sections 231 and 114), the EPA is proposing to collect new data on non-volatile particulate matter (nvPM)¹ emissions from certain classes of aircraft engines.

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).²

¹ Non-volatile particulate matter (nvPM) are solid particles that exist at the aircraft gas turbine engine exhaust nozzle exit plane that do not volatilize when heated to a temperature of 350 degrees centigrade. The measurement procedure is designed to prevent condensation and formation of semi-volatile organic and other components of PM (e.g., sulfates, nitrates and ash) emissions from gas turbine engines. Notes, (i.) by definition the measurement procedure excludes quantification of semi-volatile organics, sulfates, or nitrates that condense below 350 degrees centigrade, (ii.) the mass measurement does not quantify ash, and (iii.) gas turbine engine exhaust typically produces PM measured in the nanometer size range (PM_{2.5} = 2.5 micrometers = 2500 nanometers).

² 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

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)).

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, 2020.³ This new international emissions standard is based on nvPM mass concentration and was derived from the current international visibility standard (the EPA's visibility standards, as measured by engine smoke number, are set forth at 40 CFR part 87, subpart C). This international nvPM standard requires new measurement procedures to gather emissions data and requires engine manufacturers to complete nvPM emissions tests by January 1, 2020, for all in-production aircraft gas turbine engines with rated thrust greater than 26.7kN.⁴

The EPA and the FAA, along with other regulatory authorities around the world, are working with manufacturers to fund nvPM emissions tests for 24 aircraft gas turbine engines. Data for 23 engines was provided to ICAO by the end of the summer of 2017, and this data will be used to inform the development of future international nvPM mass and particle number standards, which are currently the subject of negotiations among member nations. The U.S., as one of the member nations, would adopt domestic standards at least as stringent as these international standards to meet our treaty obligations under the Chicago Convention.

Although the existing ICR (OMB Control Number 2060-0680) does not expire until September 30, 2018, the EPA, in consultation with the FAA, has decided to renew and amend the ICR now, in order to incorporate a requirement to report the new nvPM data. This will ensure sufficient lead time for

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³ 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_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.

⁴ More specifically, the international nvPM standard applies to all turbofan and turbojet engines of a type or model, and their derivative versions, with a rated thrust greater than 26.7 kN and whose date of manufacture of the individual engine is on or after January 1, 2020 (or those engines built on or after January 1, 2020).

aircraft gas turbine engine manufacturers to perform engine emission tests according to the new measurement procedure set forth in ICAO Annex 16, Volume II, Chapter 4 and Appendices 7 and 8.

Establishing, and then collecting data according to, a new nvPM reporting regime will be a two-part process in which the EPA and FAA play separate roles. Prior to January 1, 2020, manufacturers will submit the nvPM data to the FAA for verification. 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 and amend the existing collection to further understand the characteristics of aircraft engines that are subject to emission standards and their impact on emission 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 (e.g., the life of an aircraft is nominally 25-30 years)

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 working on developing future subsonic aircraft gas turbine engine standards for nvPM mass and particle number emissions. These future ICAO nvPM standards may replace the existing international visibility standards. The new nvPM 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.

Current estimates of aircraft engine nvPM emissions are based on rough approximations using smoke number data correlated to limited nvPM testing. The new nvPM data proposed to be collected will characterize the aircraft engine emission measurements at the instruments and at the aircraft engine exit, through the application of a correction for particles lost in the measurement system according to procedures listed in Annex 16 Volume II Chapter 4 and Appendices 7 and 8.⁵ The system losses are significant as the measurement system is permitted to be up to 35 meters long.

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

⁵ 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.

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 were 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 October 16, 2017, announcing the proposed ICR renewal and providing a 60-day public comment period.⁶ The EPA received 7 public comments; however, only 1 comment was relevant to this renewal. The one substantive comment was received from the Aerospace Industries Association (AIA), which requested that some aircraft engines that have low-production volumes, and may end production in the near future be excluded from the new data requests for nvPM information. AIA suggested that this exclusion could be for up to 50 engines per year, but AIA did not propose a time frame to end the exclusion. The EPA does not believe it is appropriate to adopt AIA's request to include exclusion provisions for an engine model nearing the end of its production cycle. There were no exemption provisions included in the CAEP/10 nvPM standards adopted by ICAO. The EPA believes that adopting AIA's suggested exclusion provisions would create an inconsistency between the U.S. requirements and those adopted by other countries. Such an inconsistency would undermine the bi-lateral agreements the U.S. has in place with foreign airworthiness authorities which serve as a basis for the common certification of aviation products. However, after discussions with the FAA, the EPA believes that it is reasonable and consistent with

⁶ OMB Control Number 2060-0680, EPA ICR No. 2427.04, 82 FR 48074.

international agreements to exclude engines meeting the definition of “spare engine”^[2] that will not be installed on a new aircraft, subject to EPA’s regulations addressing such spare engines at 40 CFR 87.50(c) and (d).

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

When developing the existing collection, the EPA has communicated with manufacturers on a regular basis as a part of our work at ICAO. These discussions have included the extent, form, and timing of the information submissions. There have been no substantive changes to the ICR since its last approval by OMB.

For the new collection of nvPM data, the EPA, along with the FAA, worked through ICAO to develop a consistent and robust test procedure to measure nvPM emissions from aircraft engines. This test procedure is described in Annex 16 Vol. III, Appendix 7 and Appendix 8. This consultative process involved the active participation of aircraft gas turbine engine manufacturers and regulating authorities from around the world. In Feb. 2016 ICAO decided to require the collection of nvPM emissions information from all in-production engines by 2020. The EPA is proposing to adopt data collection requirements that are consistent in scope and timing with those agreed upon internationally by manufacturers and regulators at ICAO.

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). 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

^{[2][2]} Spare engine means an engine installed (or intended to be installed) on an in-service aircraft to replace an existing engine. 40 CFR 87.1.

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

In general, emission data and related technical information collected under CAA section 114 cannot be treated as confidential business information (CBI). However, consistent with governing EPA regulations, in instances where engine manufacturers clearly mark information that they consider to be confidential, EPA will store and disclose such claimed CBI as described in 40 CFR part 2. If manufacturers send the EPA information without claiming it as CBI, the EPA may make it available to the public without further notice to the manufacturer⁷. Although CBI determinations are usually made on a case-by-case basis, the EPA has issued guidance on what constitutes emission data that cannot be considered CBI (56 FR 7042, February 21, 1991).

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 requirements

⁷ See 40 CFR §§ 87.42(c)(4), 87.42(d)

Reporting elements, identified in 4)(ii) list the 14 elements approved in the existing collection. Each element is applicable for each affected aircraft gas turbine engine sub-model and serves as a key tool for informing public policy assessments.

The EPA is proposing to require 13 additional reporting elements listed below in 4)(iii) for each affected aircraft gas turbine engine sub-model 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 8.⁸

This new nvPM data will be reported in addition to the reporting elements with the annual report on HC, CO, NO_x, smoke, and CO₂ emissions that is already required to be submitted under 40 CFR § 87.42 and 87.64.

(ii) Information from existing collection request:

- 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, i.e. Annex 16, Volume II, edition number and publication date;
- 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;

⁸ 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.

- 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, the number intended for use as certified (non-exempt) 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, in kilonewtons (kN) or watts (W) (depending on engine type);
- Unburned hydrocarbon (HC) mass (g) total (weighted) and over each segment of the Landing and Take-off Cycle (LTO), i.e. Take-off, Climb, Approach, Taxi / Ground Idle;
- HC characteristic level;
- Carbon monoxide (CO) mass (g) total (weighted) and over each segment of the LTO cycle;
- CO characteristic level (i.e. mass of CO over LTO cycle / Rated Thrust (Dp/Foo));
- Oxides of Nitrogen (NOx) mass (g) total (weighted) and over each segment of the LTO Cycle;
- NOx characteristic level (i.e. mass of NOx over LTO cycle / Rated Thrust (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) New data collection for nvPM emissions from aircraft gas turbine engines⁹:

- Maximum nvPMmass concentration (micrograms (μg)/meter³ (m^3));
- Characteristic nvPMmass concentration ($\mu\text{g}/\text{m}^3$)
- nvPM Elmass (milligram (mg)/kilogram (kg) of fuel) for each thrust setting of the LTO cycle;
- nvPM Elmass (mg/kg of fuel) system loss correction factor for each thrust setting of the LTO cycle;
- nvPM Elmass (mg/kg of fuel) corrected for system losses (i.e. nvPM Elmass at the engine exit) for each thrust setting of the LTO cycle;
- nvPM Elnum (number of particles/kg of fuel) for each thrust setting of the LTO cycle;
- nvPM Elnum (number of particles/kg of fuel) system loss correction factor for each thrust setting of the LTO cycle;
- nvPM Elnum (number of particles/kg of fuel) corrected for system losses (i.e. nvPM Elnum at the engine exit) for each thrust setting of the LTO cycle;
- Maximum nvPM Elmass (mg/kg of fuel);
- Maximum nvPM Elmass (mg/kg of fuel) system loss correction factor;
- Maximum nvPM Elmass (mg/kg of fuel) corrected for system losses (i.e. nvPM Elmass at the engine exit);
- Maximum nvPM Elnum (number of particles/kg of fuel);
- Maximum nvPM Elnum (number of particles/kg of fuel) system loss correction factor;
- and
- Maximum nvPM Elnum (number of particles/kg of fuel) corrected for system losses (i.e. nvPM Elnum at the engine exit).

The annual report must be submitted for each calendar year in which a manufacturer produces any affected aircraft gas turbine engine. These reports are due to the EPA by February 28 of each year, for the previous calendar year. The nvPM emissions data will be required starting in 2020 for aircraft

⁹ 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 not be the same for the maximum nvPM Mass concentration, maximum EI mass, and maximum EI number.

gas turbine engine models produced in the 2019 calendar year.¹⁰ 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 template¹¹ to each manufacturer. Both the existing NO_x, HC, CO, smoke, and CO₂ reporting and the new nvPM reporting (beginning in 2020 for nvPM) will be incorporated into one submission utilizing this template in order to minimize the reporting burden to the manufacturer, as previously discussed.

The EPA will begin adding the new nvPM columns to the reporting template in the first year after this existing collection is amended and renewed. This will give manufacturers the opportunity to voluntarily report any data they may have at that point. However, we do not anticipate any responses for 2019. Providing this nvPM emissions data to the EPA will not be required until 2020.

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

¹⁰ If an engine model will not be produced after December 31, 2019, the new nvPM emissions data (described in 4(b)(iii)) will not be required to be submitted for this engine model. All other requested information from the existing collection (described in 4(b)(ii)) is still required to be submitted for these engines models produced in 2019.

¹¹ 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

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 new nvPM data. 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. Once the reporting program is in place, the FAA activities will include review 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 through the existing ICR (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 new 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 8.¹² Following the notification of verification from the FAA, manufacturers will fill out the reporting template with the nvPM data and provide this to the EPA. The EPA will ensure completeness of the collected information by reviewing each submittal.

¹² 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.

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 additional request for nvPM data because they do not produce an aircraft engine that produces a thrust greater than 26.7kN and therefore would not be subject to this requirement.

5 (d) Collection Schedule

We require annual reporting. This is consistent with the existing collection requirement to submit aircraft engine-related NOx, HC, CO, smoke, and CO₂ information (see 40 CFR §§ 87.42 and 87.64). The EPA anticipates issuing the CAA section 114 letters by January 1, 2019. 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, 2019.

Aircraft gas turbine engine manufacturers have conducted nvPM engine emissions tests in accordance with the test procedures in Annex 16 to support work at ICAO. Once this renewal of the existing collection is approved, including the new nvPM data, the EPA anticipates that manufacturers will begin to collect and submit all data to the FAA for verification. There is no requirement to provide the additional nvPM data to the EPA until 2020. Prior to that, manufacturers may choose to voluntarily provide the EPA with the nvPM data if it has been collected by the manufacturer and verified by the FAA.

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.

The EPA plans to add the new nvPM data items listed in section 4)(iii) of this Supporting Statement as additional columns to the existing reporting template. The EPA will issue CAA section 114 and 40 CFR part 87 letters using this updated template beginning in 2019.

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 in the existing collection

The EPA estimates that the annual burden of the existing ICR to each respondent would be 6 hours per year over the three years covered by this information collection.

The EPA estimates that up to 7 respondents¹³ will submit a report to the EPA each year relating to the existing ICR.

(ii) Estimated burden of proposed new nvPM data collection

The EPA estimates that the one-time startup 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.

¹³ General Electric, Pratt & Whitney, Pratt & Whitney Canada, Rolls Royce, Honeywell, Williams International, & Safran Aircraft Engines.

The EPA estimates that the additional annual reporting burden of the new 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 6¹⁴ respondents will submit data in their report to the EPA each year relating to the new nvPM collection.

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 Statistics¹⁵ and applying a 60% loading factor.¹⁶ The loaded labor rates¹⁷ in 2017 US Dollars are: \$123.02 for managers; \$85.71 for aerospace Engineers; \$37.54 for clerical staff, and \$141.46 for legal staff in 2017 dollars.¹⁸

(i) Existing 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 6 hours or \$539 n (42 hours or \$3,772 annually in total) each year for tasks covered under the existing

¹⁴ As discussed in 5(c) Williams International is not expected to produce an engine that meets the criteria to provide nvPM data under the new collection.

¹⁵ Prices adjusted to 2017 dollars using an annual inflation rate of 1.17%. This was calculated based on the change in the Producers Price Index for Aerospace Produce and Parts Manufacturers from January 2015 to January 2017.

¹⁶ 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.

¹⁷ 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>

¹⁸ 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.

ICR.). This is based on an estimated effort involving 1 hour for managers, 1.5 hours for engineers, 2 hours for clerical staff, and 1.5 hours for 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.

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

		Hours per Response	BLS Mean Hourly Wage (2016)	Inflated Mean Hourly Wage - 2017	Load Factor	Loaded Labor Rate	Labor Cost	Number of Respondents	Total Hours	Total Cost
Respondent Annual Burden	Manager	1	\$76.00	\$ 76.89	0.6	\$ 123.02	\$ 123.02	7	7	\$ 861
	Aerospace Engineer	1.5	\$52.95	\$ 53.57	0.6	\$ 85.71	\$ 128.57	7	10.5	\$ 900
	Clerical Staff	2	\$23.19	\$ 23.46	0.6	\$ 37.54	\$ 75.08	7	14	\$ 526
	Legal Staff	1.5	\$87.39	\$ 88.41	0.6	\$ 141.46	\$ 212.19	7	10.5	\$1,485
Totals		6 hours					\$539 / respondent		42 hours	\$3,772

(ii) New nvPM data collection

Based on the information that has been provided to the EPA under the existing reporting requirements, and the nvPM testing being funded by regulators, the EPA has initially estimated that there would be 33 engine types expected to provide nvPM data to the EPA under this new requirement.

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

a. One Time Start-up 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 \$3,428 per engine type to prepare and submit nvPM data to the FAA. Expecting there will be 33 engine types being used during this ICR's reporting period, the EPA estimates a total of 1,320

hours and \$113,139 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 440 hours or \$37,713.

Table 2- Respondent one-time start-up cost

	Hours per Response	BLS - Mean Hourly Wage (2016)	Inflated Mean Hourly Wage - 2017	Load Factor	Loaded Labor Rate	Labor Cost per Engine	# of Engine Types/ Models	Total Startup Hours	Total Startup Labor Cost
Aerospace Engineer	40	\$ 52.95	\$ 53.57	0.6	\$ 85.71	\$ 3,428	33	1,320	\$ 113,139

b. Annual Labor Costs for new nvPM 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 new nvPM Collection

	Hours per Response	BLS Mean Hourly Wage (2016)	Inflated Mean Hourly Wage (2017)	Load Factor	Loaded Labor Rate	Labor Cost	Number of Respondents	Total Hours	Total Cost
Aerospace Engineer	5	\$ 52.95	\$ 53.57	0.6	\$ 85.71	\$ 429	6	30	\$ 2,571

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 \$54.48. To derive this figure, the EPA multiplied the hourly compensation at GS-12, Step 5 on the 2017 General Schedule

pay scale (\$34.05) 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 existing collection of data. The FAA activities associated with the proposed collection of new 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 33 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 existing collection. The new nvPM collection could involve up to 5 staff hours per manufacturer per year for these activities.

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

For the existing 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 new 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 6 hours or \$539¹⁹ per year (Table 1). This results in a total for all respondents of 126 hours or \$11,316 over the 3 years (42 hours or \$3,772 per year)

¹⁹ All values presented in 2017 dollars

For the new nvPM data collection, the EPA estimates that respondents would incur one-time start-up burden of 40 labor hours or \$3,428 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 \$429 (Table 3). This results in a total estimated burden for all respondents of 1350 hours or \$115,710 total over the 3 years (450 hours or \$37,570 per year).

The total cost over the 3 years to all respondents for this information collection is estimated to be 1,506 hours or \$129,597. Individually this ICR is estimated to be 215 hours and \$18,514 per respondent over the 3 years (or 72 hours and \$6,171 per year). This is described in more detail in Table 4.

The EPA's estimated burden for this information collection is 30 hours or \$1,634 per year (90 hours or \$4,903 over 3 years)

Table 4 - Total burden

		Existing Collection				New Collection					Total	
		Response hours	Labor Cost	Number of Respondents	Startup Cost	Response hours	Labor Cost	Number of Respondents	Startup Hours	Startup Cost	Annual Burden (hours)	Annual Cost (2017 \$)
Respondent Burden	2019	6	\$ 539	7	\$ -	0	\$ -	0	440	\$ 37,713	482	\$ 41,485
	2020	6	\$ 539	7	\$ -	5	\$ 429	6	440	\$ 37,713	512	\$ 44,056
	2021	6	\$ 539	7	\$ -	5	\$ 429	6	440	\$ 37,713	512	\$ 44,056
EPA Burden	2019	10	\$ 545	1	\$ -	0	\$ -	0	0	\$ -	10	\$ 545
	2020	10	\$ 545	1	\$ -	5	\$ 272	6	0	\$ -	10	\$ 2,179
	2021	10	\$ 545	1	\$ -	5	\$ 272	6	0	\$ -	40	\$ 2,179
FAA Burden	Data Verification	0	\$ -	0	\$ -	0	\$ -	6	600	\$ 35,957	600	\$ 32,688

Total Respondent Reporting Burden	1506	\$ 129,597
(year)	502	\$ 43,199
Individual Respondent Burden	215	\$ 18,514
(year)	72	\$ 6,171
Total Government (EPA & FAA) Burden	750	\$ 40,860
(year)	250	\$ 13,620
Total EPA Burden	90	\$ 4,903
(year)	30	\$ 1,634
Total Burden	2256	\$ 170,457

6 (f) Change in Burden Estimates

The EPA had previously estimated there would be 10 responses to the data collection. This estimate included some joint ventures between aircraft engine manufacturers as separate respondents. However, it has been the EPA's experience that these ventures do not report separately. For this reason, the number of respondents for the existing collection has been reduced to 7 reflect the number of responses that the EPA has received. 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).

A new data collection, for nvPM emissions data, has been added to the existing collection. The addition of nvPM data to the ICR will allow U.S. aircraft engine manufacturers to demonstrate compliance with international standards developed at ICAO. The additional collection has resulted in an estimated increase of 1,326 hours (440 hours/year) of respondent burden to collect nvPM data, submit the data to the FAA for verification, and submit verified data to the EPA. Only 6 respondents are expected for the new data collection. This is because one manufacturer subject of the existing data collection does not produce any engines that meet the requirements of the new data collection.

6 (g) Burden Statement

The respondent reporting and recordkeeping burden for this collection of information is estimated to be up to 1,506 hours or \$129,597 over the 3 years of this collection. Total burden to the government and all respondents is estimated to be 2,256 hours or \$180,457. 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.

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.