tribal governments are known to own or operate BSCP manufacturing facilities. Thus, Executive Order 13175 does not apply to the final rule or today's action.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

Executive Order 13045 (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns the environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the EPA must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by EPA.

The EPA interprets Executive Order 13045 as applying only to those regulatory actions that are based on health or safety risks, such that the analysis required under section 5–501 of the Executive Order has the potential to influence the rule. Today's action is not subject to Executive Order 13045 because the final BSCP rule, which today's action does not change, is based on technology performance and not on health or safety risks.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

Executive Order 13211 (66 FR 28355, May 22, 2001) provides that agencies shall prepare and submit to the Administrator of the Office of Information and Regulatory Affairs, OMB, a Statement of Energy Effects for certain actions identified as ''significant energy actions.'' Section 4(b) of Executive Order 13211 defines ''significant energy actions'' as ''any action by an agency (normally published in the **Federal Register**) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking: (1)(i) That is a significant regulatory action under Executive Order 12866 or any successor order, and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action.''

Today's action is not subject to Executive Order 13211 because it is not a significant regulatory action under Executive Order 12866 nor is it likely to have a significant adverse effect on the supply, distribution, or use of energy.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act (NTTAA) of 1995 (Pub. L. 104–113; 15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory and procurement activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, business practices) developed or adopted by one or more voluntary consensus bodies. The NTTAA directs EPA to provide Congress, through annual reports to OMB, with explanations when an agency does not use available and applicable voluntary consensus standards.

Today's action does not involve technical standards. Therefore, EPA is not considering the use of any voluntary consensus standards.

List of Subjects for 40 CFR Part 63

Environmental protection, Administrative practice and procedures, Air pollution control, Hazardous substances, Intergovernmental relations, Reporting and recordkeeping requirements.

Dated: November 10, 2005.

Stephen L. Johnson,

Administrator.

[FR Doc. 05–22805 Filed 11–16–05; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 87

[OAR–2002–0030; FRL–7997–3]

RIN 2060–AK01

Control of Air Pollution From Aircraft and Aircraft Engines; Emission Standards and Test Procedures

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: In this action, we are amending the existing United States regulations governing the exhaust emissions from new commercial aircraft gas turbine engines. Under the authority of section 231 of the Clean Air Act (CAA), 42 U.S.C. 7571, the Environmental Protection Agency (EPA) is establishing new emission standards for oxides of nitrogen (NO_X) for newly certified commercial aircraft gas turbine engines with rated thrust greater than 26.7 kilonewtons (kN). This action adopts standards equivalent to the NO_X standards of the United Nations International Civil Aviation Organization (ICAO), and thereby brings the United States emission standards into alignment with the internationally adopted standards (ICAO standards for newly certified engines were effective beginning in 2004). In addition, today's action amends the test procedures for gaseous exhaust emissions to correspond to recent amendments to the ICAO test procedures for these emissions.

On December 19, 2005, the new NO_X standards will apply to newly certified gas turbine engines—those engines designed and certified after the effective date of the regulations (for purposes of this action, the date of manufacture of the first individual production model means the date of type certification). Newly manufactured engines of already certified models (*i.e.*, those individual engines that are part of an already certified engine model, but are built after the effective date of the regulations for such engines and have never been in service) will not have to meet these standards.

Today's amendments to the emission test procedures are those recommended by ICAO and are widely used by the aircraft engine industry. Thus, today's action will help establish consistency between U.S. and international standards, requirements, and test procedures. Since aircraft and aircraft engines are international commodities, there is commercial benefit to consistency between U.S. and international emission standards and control program requirements. In addition, today's action ensures that domestic commercial aircraft meet the current international standards, and thus, the public can be assured they are receiving the air quality benefits of the international standards.

DATES: This final rule is effective December 19, 2005.

The incorporation by reference of certain publications listed in this regulation is approved by the Director of the Federal Register as of December 19, 2005.

ADDRESSES: EPA has established a docket for this action under Docket ID No. OAR–2002–0030. All documents in the docket are listed in the EDOCKET index at *http://www.epa.gov/edocket.* Although listed in the index, some information is not publicly available,

i.e., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in EDOCKET or in hard copy at the Air Docket in the EPA Docket Center, EPA/DC, EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The 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 Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Mr. Bryan Manning, Assessment and Standards Division, Office of Transportation and Air Quality, Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105; telephone number: (734) 214–4832; fax number: (734) 214–4816; e-mail address: *manning.bryan@epa.gov,* or Assessment and Standards Division Hotline; telephone number: (734) 214–4636; e-mail address: *asdinfo@epa.gov.*

SUPPLEMENTARY INFORMATION:

Does This Action Apply to Me?

Entities potentially regulated by this action are those that manufacture and sell commercial aircraft engines and aircraft in the United States. Regulated categories include:

Category	NAICS [a] codes	SIC codes [b]	Examples of potentially affected entities
Industry	336412	3724	Manufacturers of new aircraft engines.
Industry	336411	3721	Manufacturers of new aircraft.

[a] North American Industry Classification System (NAICS).
[b] Standard Industrial Classification (SIC) system code.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your activities are regulated by this action, you should carefully examine the applicability criteria in 40 CFR 87.20 (part 87). If you have any questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

How Can I Get Copies of This Document and Other Related Information?

Docket. EPA has established an official public docket for this action under Docket ID No. OAR–2002–0030 at *http://www.epa.gov/edocket.* The official public docket consists of the documents specifically referenced in this action, any public comments received, and other information related to this action. The public docket does not include Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. The official public docket is the collection of materials that is available for public viewing at the Air Docket in the EPA Docket Center, (EPA/DC) EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. 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) 566–1742, and the telephone number for the Air Docket is (202) 566–1742.

Electronic Access. You may access this **Federal Register** document electronically through the EPA Internet under the ''**Federal Register**'' listings at *http://www.epa.gov/fedrgstr/.*

An electronic version of the public docket is available through EPA's electronic public docket and comment system, EPA Dockets. You may use EPA Dockets at *http://www.epa.gov/edocket/* to view public comments, access the index listing of the contents of the official public docket, and to access those documents in the public docket that are available electronically. Although not all docket materials may be available electronically, you may still access any of the publicly available docket materials through the docket facility identified above. Once in the system, select ''search,'' then key in the appropriate docket identification number.

Outline of This Preamble

I. Introduction

A. Brief History of EPA's Regulation of Aircraft Engine Emissions

Section 231(a)(2)(A) of the Clean Air Act (CAA) directs the EPA Administrator to ''issue proposed emission standards applicable to the emission of any air pollutant from any class or classes of aircraft or aircraft engines which in his judgment causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare.'' 42 U.S.C. 7571(a)(2)(A). In addition, section 231(a)(3) provides that after we propose standards, the Administrator shall issue such standards ''with such modifications as he deems appropriate.'' 42 U.S.C. 7571(a)(3). Under this authority EPA has conducted several rulemakings since 1973 establishing emission standards and related requirements for several classes (commercial and general aviation engines) of aircraft and aircraft engines. Most recently, in 1997 EPA promulgated NO_X emission standards for newly manufactured gas turbine engines of already certified models [1] (those individual engines that are part of an already certified engine model, but are built after the effective date of the regulations for such engines and have never been in service) [2] and for newly certified gas turbine engines (those engines designed and certified after the effective date of the regulations [3]).[4] In addition, EPA promulgated a carbon monoxide (CO) emission standard for newly manufactured gas turbine engines in this same 1997 rulemaking. At the time, the 1997 rulemaking established consistency between the U.S. and international standards. (See 40 CFR part 87 for a description of EPA's aircraft engine emission control requirements and 14 CFR part 34 for the Department of Transportation's regulations for ensuring compliance with these standards in accordance with section 232 of the Clean Air Act.)

B. Interaction With the International Community

Since publication of the initial standards in 1973, EPA, together with the Federal Aviation Administration (FAA), has worked with the International Civil Aviation Organization (ICAO) on the development of international aircraft engine emission standards. ICAO was established in 1944 by the United Nations (by the Convention on International Civil Aviation, the ''Chicago Convention'') ''* * * in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equality of opportunity and operated soundly and economically.'' [5] ICAO's responsibilities include developing aircraft technical and operating standards, recommending practices, and generally fostering the growth of international civil aviation.

In 1972 at the United Nations Conference on the Human Environment, ICAO's position on the human environment was developed to be the following: ''[i]n fulfilling this role ICAO is conscious of the adverse environmental impact that may be related to aircraft activity and its responsibility and that of its member States to achieve maximum compatibility between the safe and orderly development of civil aviation and the quality of the human environment.'' Also, in 1972 ICAO established the position to continue ''* * * with the assistance and cooperation of other bodies of the Organization and other international organizations * * * the work related to the development of Standards, Recommended Practices and Procedures and/or guidance material dealing with the quality of the human environment * * *.'' [6] At the 35th Assembly in October 2004, ICAO's 188 Contracting States affirmed that ICAO should continue to take the leadership role in all international civil aviation matters relating to the environment.[7]

The United States is one of 188 participating member States of ICAO.[8] Under the basic ICAO treaty established in 1944 (the Chicago Convention), a participating nation which elects not to adopt the ICAO standards must provide a written explanation to ICAO describing why a given standard is impractical to comply with or not in its national interest.[9] ICAO standards require States to provide written notification and failure to provide such notification could have negative consequences as detailed below.

If a Contracting State files a written notification indicating that it does not meet ICAO standards, other Contracting States are absolved of their obligations to ''recognize as valid'' the certificate of airworthiness issued by that Contracting State, since that certificate will not have been issued under standards ''equal to or above'' ICAO standards. In other words, other Contracting States do not have to allow aircraft belonging to that Contracting State to travel through their airspace.[10] Further, if it fails to file a written notification, it will be in default of its obligations, and risks mandatory exclusion of its aircraft from the airspace of other Contracting States and

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[1] In the proposal, we referred to such engines as already certified, newly manufactured engines or already certified engines; however, this terminology may need some clarification for the final rulemaking (thus, we use the term ''newly manufactured engines of already certified models'').

[2] This does not mean that in 1997 we promulgated requirements for the re-certification or retrofit of existing in-use engines.

[3] Throughout this rule, the date of manufacture of the first individual production model means the date of type certification.

[4] U.S. EPA, ''Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures;'' Final Rule, 62 FR 25356, May 8, 1997.

[5] ICAO, ''Convention on International Civil Aviation,'' Sixth Edition, Document 7300/6, 1980. Copies of this document can be obtained from the ICAO Web site located at *http://www.icao.int.*

[6] International Civil Aviation Organization (ICAO), Foreword of ''Aircraft Engine Emissions,'' International Standards and Recommended Practices, Environmental Protection, Annex 16, Volume II, Second Edition, July 1993. Copies of this document can be obtained from the ICAO Web site located at *http://www.icao.int.*

[7] ICAO, ''Assembly—35th Session, Report of the Executive Committee on Agenda Item 15,'' Presented by the Chairman of the Executive Committee, A35–WP/32, October 12, 2004.

[8] As of March 2, 2005 there were 188 Contracting States according to the ICAO Web site located at *http://www.icao.int.*

[9] Text of Article 38 of Chicago Convention:

Any State which finds it impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organization of the differences between its own practice and that established by the international standard * * * In any such case, the Council shall make immediate notification to all other states of the difference which exists between one or more features of an international standard and the corresponding national practice of that State.

[10] Text of Article 33 of Chicago Convention:

Certificates of airworthiness and certificates of competency and licenses issued or rendered valid by the contracting State in which the aircraft is registered, shall be recognized as valid by the other contracting States, provided that the requirements under which such certificates or licenses were issued or rendered valid are equal to or above the minimum standards which may be established from time to time pursuant to this Convention.

the loss of its voting power in the Assembly and Council.[11]

The Chicago Convention does not require all Contracting States to adopt identical airworthiness standards. Although the Convention urges a high degree of uniformity, it is expected that States will adopt their own airworthiness standards, and it is anticipated that some states may adopt standards that are more stringent than those agreed upon by ICAO. However, because any State can ban use within its airspace of any aircraft that does not meet ICAO standards, States that wish to use aircraft in international air transportation have agreed to adopt standards that meet or exceed the stringency levels of ICAO standards.[12] Because States are required to recognize certificates of any State whose standards meet or exceed ICAO standards, a State is assured its aircraft will be permitted to operate in any other Contracting State if its standards meet or exceed the minimum stringency levels of ICAO standards.

As long as a participating nation of ICAO adopts aircraft emission standards that are equal to or more stringent than ICAO's standards, the certificates of airworthiness for such nations are valid. Thus, aircraft belonging to countries with more stringent standards are permitted to travel through the airspace of other countries without any restriction. To ensure operation internationally without constraints, a participating nation which elects to adopt more stringent standards is obligated to notify ICAO of the differences between its standards and ICAO standards.[13] However, if a nation sets tighter standards than ICAO, air carriers not based in that nation (foreign-flag carriers) would only be required to comply with the ICAO standards.

The ICAO Council's Committee on Aviation Environmental Protection (CAEP) undertakes ICAO's technical work in the environmental field. The CAEP is responsible for evaluating, researching, and recommending measures to the ICAO Council that address the environmental impact of international civil aviation. CAEP is composed of various Study Groups, Work Groups, Committees and other contributing memberships that include atmospheric, economic, aviation, environmental, and other professionals committed to ICAO's previously stated position regarding aviation and the environment. At CAEP meetings, the United States is represented by the FAA, which plays an active role at these meetings (see section VI for further discussion of FAA's role). EPA has historically been a principal participant in the development of U.S. policy in ICAO/CAEP and other international venues, assisting and technically advising FAA on aviation emissions matters. If the ICAO Council adopts a CAEP proposal to adopt a new environmental standard, it then becomes part of the ICAO standards and recommended practices (Annex 16 to the Chicago Convention).[14]

On June 30, 1981, the ICAO Council adopted its first international standards and recommended practices covering aircraft engine emissions.[15] These standards limit aircraft engine emissions of NO_X, CO, and hydrocarbons (HC), in relation to other engine performance parameters, and are commonly known as stringency standards. On March 24, 1993, the ICAO Council approved a proposal adopted at the second meeting of the CAEP (CAEP/2) to tighten the original NO_X standard by 20 percent and amend the test procedures. At the next CAEP meeting (CAEP/3) in December 1995, the CAEP recommended a further tightening of 16 percent and additional test procedure amendments, but on March 20, 1997 the ICAO Council rejected this stringency proposal and approved only the test procedure amendments. At its next meeting (CAEP/4) in April 1998, the CAEP adopted a similar 16 percent NO_X reduction proposal, which the ICAO Council approved on February 26, 1999.[16] The CAEP/4 16 percent NO_X reduction standard applies to new engine designs certified after December 31, 2003 (*i.e.*, it applies only to newly certified engines, rather than to newly manufactured engines of already certified models).[17] [18]

As discussed earlier, in 1997 EPA amended its regulations to adopt the 1981 ICAO NO_X and CO emission standards, as well as the NO_X emission standards and test procedures revised by ICAO in 1993. As discussed above, the U.S. has an obligation under the Convention on International Civil Aviation to notify ICAO regarding differences between U.S. standards and ICAO standards, and to provide notification on the date by which the program requirements will be consistent. In response to the recent actions by ICAO and for the reasons discussed below, in today's rulemaking EPA is adopting standards for newly certified engines that are equivalent to ICAO's 1999 amendment to the NO_X emission standard and the test procedure changes approved by ICAO in 1997, and EPA is adopting other technical amendments to further align EPA and ICAO requirements.

C. EPA's Responsibilities Under the Clean Air Act

As discussed earlier, section 231 of the CAA directs EPA, from time to time, to propose aircraft engine emission standards applicable to the emission of any air pollutant from classes of aircraft engines which in its judgment causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare. 42 U.S.C. 7571(a)(2)(A). Section 231(a)(3) provides that after we propose standards, the Administrator shall issue such standards ''with such modifications as he deems appropriate.'' 42 U.S.C. 7571(a)(3). In addition, EPA is required to ensure, in consultation with the Secretary of Transportation, that such standards' effective dates provide the necessary time to permit the development and application of the requisite technology, giving appropriate consideration to compliance cost. 42 U.S.C. 7571(b). Also, EPA must consult with the FAA before proposing or promulgating emission standards. 42 U.S.C. 7571(a)(2)(B)(i). (See section VI of today's proposal for further discussion of EPA's coordination with FAA and FAA's responsibilities under the CAA.)

In addition, section 233 of the CAA vests authority to implement emission standards for aircraft or aircraft engines only in EPA.[19] States are preempted

[11] Articles 87 and 88 of Chicago Convention.

[12] Article 33 of Chicago Convention.

[13] Article 38 of Chicago Convention.

[14] ICAO, ''Aircraft Engine Emissions,'' International Standards and Recommended Practices, Environmental Protection, Annex 16, Volume II, Second Edition, July 1993. Copies of this document can be obtained from ICAO (*http://www.icao.int*).

[15] ICAO, Foreword of ''Aircraft Engine Emissions,'' International Standards and Recommended Practices, Environmental Protection, Annex 16, Volume II, Second Edition, July 1993. Copies of this document can be obtained from ICAO (*http://www.icao.int*).

[16] International Civil Aviation Organization (ICAO), Aircraft Engine Emissions, Annex 16, Volume II, Second Edition, July 1993, Amendment 4 effective on July 19, 1999. Copies of this document can be obtained from ICAO (*http://www.icao.int*).

[17] These NO_X standards will be interchangeably be referred to as the 1998 CAEP/4 standards and the 1999 ICAO standards throughout this Notice.

[18] Newly manufactured engines of already certified models are those individual engines that are part of an already certified engine model, but are built after the effective date of the regulations for such engines and have never been in service. This does not mean the re-certification or retrofit of existing in-use engines.

[19] CAA section 233 entitled ''State Standards and Controls'' states that ''No State or political subdivision thereof may adopt or attempt to enforce any standard respecting emissions of any air

Continued

from adopting or enforcing any standard respecting aircraft engine emissions unless such standard is identical to EPA's standards. 42 U.S.C. 7573.

II. Why Is EPA Taking This Action?

As mentioned above, section 231(a)(2)(A) of the CAA authorizes the Administrator to ''from time to time, issue proposed emission standards applicable to emission of any air pollution from any class or classes of aircraft or aircraft engines which in his judgment causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare.'' 42 U.S.C. 7571(a)(2)(A).

One of the principal components of aircraft exhaust emissions is NO_X. NO_X is a precursor to the formation of ozone.[20] Many commercial airports are located in urban areas and many of these areas have ambient ozone levels above the National Ambient Air Quality Standards (NAAQS) for ozone (*i.e.*, they are in nonattainment for ozone). This section discusses the contribution of aircraft engines to the national NO_X emissions inventory and the health and welfare impacts of these emissions.

A. Inventory Contribution

EPA's estimate of the contribution of aircraft to the national NO_X emission inventory is set out in Table II.A–1. Note that this table provides the inventory contributions only for 2001, and therefore does not take into account the impacts of our recent mobile source emission control programs for highway vehicles and nonroad engines and equipment which will go into effect in the coming years.[21] Those new standards are expected to reduce NO_X emissions from highway and nonroad engines by 90 percent or more on a per-engine basis. (Nor does the table account for aviation's reduced NO_X emissions due to slower growth and changes in fleet composition after 2001.) Nonetheless, as these new programs go into effect, the relative size of the contribution of aircraft to national NO_X levels may increase due to the decrease in the contribution of those other mobile sources.

TABLE II.A–1.—ANNUAL NO_X BASELINE LEVELS[a] FROM EPA'S NATIONAL AIR QUALITY AND EMISSIONS TRENDS REPORT, AUGUST 2003

[Short tons, 2001]

Category	NO_X (Thous. Tons)	
Aircraft[b c]	81	0.7%
Nonroad	4,075	32.8%
Highway	8,249	66.5%
Total Mobile Source	12,405	

[a] Source: U.S. EPA, ''Average Annual Emissions, All Criteria Pollutants Years Including 1970–2001,'' Updated August 2003. A copy of this document can be found in Docket No. OAR–2002–0030.

[b] These aircraft emissions are a conservative estimate as they reflect military operations only at FAA and FAA-contracted facilities and not at military bases. See the following memo for further discussion of the contribution of military aircraft to total aircraft emissions: U.S. EPA, ''Earlier and Current Estimates of Military Aircraft Emissions (Updated),'' Memorandum to Docket OAR–2002–0030 from Bryan Manning, May 11, 2005.

[c] There is a new draft version of the national emissions inventories (for 2002), and the percentage contribution of the above sources to the total mobile source NO_X inventory remains essentially the same.

Aircraft emissions are emitted from a variety of aircraft types used for public, private, and military purposes including commercial aircraft, air taxis, general aviation, and military aircraft.[22] Commercial aircraft emissions contribute from 74 to 99 percent of the NO_X aircraft emissions in the U.S. The high end of this range represents commercial aircraft's fraction of national aircraft NO_X emissions when current estimates for all aircraft types (commercial aircraft, air taxis, general aviation, and military aircraft) are added together.[23] The lower end of the range is commercial aircraft's contribution of NO_X aircraft emissions in the U.S. when combining earlier[24] military aircraft estimates with current emission estimates for the three other aircraft types (the earlier and current estimates were based on different methods or models for calculating aircraft emissions in 2001). This range was provided since the current estimates of military aircraft emission have limitations—*i.e.*, military aircraft estimates are a conservative estimate as they reflect military operations only at FAA and FAA-contracted facilities and not at military bases. For a discussion on obtaining improved military aircraft emission estimates, see Section 5 of the Summary and Analysis of Comments for this rulemaking. (See the following memorandum for a further description of the contribution of military aircraft to total aircraft emissions: U.S. EPA, ''Earlier and Current Estimates of Military Aircraft Emissions (Updated),'' Memorandum to Docket OAR–2002–0030 from Bryan Manning (Document No. OAR–2002–0030–0214), May 11, 2005.)

While the current contribution of aircraft to nationwide NO_X is less than one percent, their contribution on a local level, especially in areas containing or adjacent to airports can be much larger and is also expected to grow. This is illustrated by EPA's 1999 study that examined NO_X emissions from aircraft for ten cities: Atlanta, Boston-Lawrence-Worcester, Charlotte-Gastonia, Chicago-Gary-Lake County, Houston-Galveston-Brazoria, New York-New Jersey-Long Island, Philadelphia, Phoenix, Los Angeles Air Basin and

pollutant from any aircraft or engine thereof unless such standard is identical to a standard applicable to such aircraft under this part.'' 42 U.S.C. 7573.

[20] Ground-level ozone, the main ingredient in smog, is formed by complex chemical reactions of volatile organic compounds (VOC) and NO_X in the presence of heat and sunlight. Standards that reduce NO_X emissions will help address ambient ozone levels. They can also help reduce particulate matter (PM) levels as NO_X emissions can also be part of the secondary formation of PM. See Section II.B below.

[21] For additional information on the inventory impacts of our new rules, see Tables IV–A–1 and IV–A–2 in our Advance Notice of Proposed Rulemaking for an additional tier of standards for locomotives and marine diesel engines below 30 liters per cylinder displacement (69 FR 39276, June 29, 2004).

[22] Commercial aircraft include those aircraft used for scheduled service transporting passengers, freight, or both. Air taxis also fly scheduled service carrying passengers, freight or both, and they usually are smaller aircraft than those operated by air carriers. Air taxis have played an increasing role in the operations of the U.S. aviation system, and by 2015, such operations are forecast to represent 54 percent of operations (see Table II.A–2 and the FAA website *http://www.apo.data.faa.gov/main/taf.asp*). General aviation includes most other aircraft used for recreational flying and personal transportation. Aircraft that support business travel, usually on an unscheduled basis, are included in the category of general aviation. Military aircraft cover a wide range of sizes, uses, and operating missions. While they are often similar to civil aircraft, they are modeled separately because they often operate primarily out of military bases and frequently have distinctive flight profiles.

[23] U.S. EPA, ''Average Annual Emissions, All Criteria Pollutants Years Including 1970–2001,'' Updated August 2003. A copy of this document can be found in Docket No. OAR–2002–0030.

U.S. EPA, ''Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and other Nonroad Components of the National Emissions Inventory, Volume I—Methodology,'' Prepared for EPA by Eastern Research Group, Inc., October 7, 2003. A copy of this document can be found in Docket No. OAR–2002–30.

[24] The earlier military estimates are based on emission inventories from the Final Rule for Control of Emissions from Land-based Nonroad Diesel Engines, 69 FR 38958, June 29, 2004. Also, see the following memorandum for further discussion of the contribution of military aircraft to total aircraft emissions and related references: U.S. EPA, ''Earlier and Current Estimates of Military Aircraft Emissions (Updated),'' Memorandum to Docket OAR–2002–0030 from Bryan Manning (Document No. OAR–2002–0030–0214), May 11, 2005.

Washington DC.[25] [26] Nineteen airport facilities with significant commercial jet aircraft activity were identified within these selected areas. On average for these ten cities, commercial aircraft's contribution is expected to increase from about 2 percent of regional total NO_X emissions in 1990 to about 5 percent in 2010.

It should be noted that the above study of the impacts of airports on regional air quality was conducted before the tragic events of September 11, 2001, and the economic downturn in the aircraft transportation sector and resulting slowing of emissions growth. A report by the Department of Transportation in 2003 indicated that the combination of the September 11, 2001 terrorist attacks and cut-backs in business travel have had a significant effect on air transportation demand.[27] The FAA expects the demand for air travel to recover and then continue a long-term trend of annual growth, though from a lower base and a slower rate in the United States.[28] Thus, there is both a short-term decrease in aircraft transportation activity as a result of 9/11, with negative growth for a few years and associated decreases in aircraft emission contributions and lower emissions growth than originally anticipated over the time period assessed. This is illustrated in Table II.A–2, which compares the results of an earlier, pre-9/11 FAA activity forecast to a recent, post-9/11 forecast. As operations increase, the inventory impact of these aircraft on national and local NO_X inventories and on ozone levels will also increase.

TABLE II.A–2.—FAA TERMINAL AREA FORECAST SUMMARY REPORT OF NATIONWIDE AIR CARRIER AND COMMUTER/AIR TAXI OPERATIONS [a b c d e]

Year	Air carrier & commuter/air taxi operations 12/14/00 forecast (pre-9/11)	Percent change 12/14/00 forecast between years listed	Air carrier & commuter/air taxi operations 6/30/05 forecast (post-9/11)	Percent change 6/30/05 forecast between years listed	Percent change versus earlier forecast
1999	28,860,731	.....	28,947,500	.....	0.3
2000	29,445,619	2.0	29,714,995	2.7	0.9
2001	30,033,967	2.0	29,366,221	−1.2	−2.2
2002[c]	30,663,508	2.1	27,803,970	−5.3	−9.3
2005	32,619,194	6.4	29,877,529	7.5	−8.4
2010	36,015,595	10	33,118,411	11	−8.0
2015	39,549,526	10	36,280,526	10	−8.3
2020	N/A	.....	39,695,796	9	

[a] Source: U.S. FAA, ''APO Terminal Area Forecast Summary Report,'' Aircraft Operations, December 14, 2000; and ''APO Terminal Area Forecast Summary Report,'' Aircraft Operations, June 30, 2005. See the following FAA Web site: *http://www.apo.data.faa.gov/main/taf.asp*. A copy of these reports can be found in Docket No. OAR–2002–0030.

[b] Operations means the number of arrivals and departures (see Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0258).

[c] Air carrier operations refers to flights of commercial aircraft with seating capacity of more than 60 seats.

[d] Commuter/air taxi operations refers to aircraft with 60 or fewer seats conducting scheduled commercial flights/non-scheduled or for-hire flights.

[e] The change in operations from 2000 to 2002 was +4.1% for the 12/14/2000 forecast, and it was −6.4% for the 6/30/2005 forecast.

The data in Table II.A–2 show that prior to 9/11 growth in air carrier and commuter/air taxi operations was expected to increase by 34 percent from 2000 to 2015.[29] The revised growth forecast for this period estimates that aircraft activity will now increase only 22 percent in the period 2000–2015. In fact, the originally anticipated operation levels in 2015 are now forecast not to be reached until 2020.[30]

Aircraft emissions are a large portion of total emissions associated with airports. Air pollutants resulting from airport operations are emitted from several types of sources including aircraft main engines and auxiliary power units (APUs); ground support equipment (GSE), which includes vehicles such as aircraft tugs, baggage tugs, fuel trucks, maintenance vehicles, and other miscellaneous vehicles used to support aircraft operations; and ground access vehicles (GAV), which include vehicles used by passengers, employees, freight operators, and other persons to enter and leave an airport.

[25] U.S. EPA, ''Evaluation of Air Pollutant Emissions from Subsonic Commercial Jet Aircraft,'' April 1999, EPA420–R–99–013. A copy of this document is available at *http://www.epa.gov/otaq/aviation.htm*. It can also be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0002. As indicated in the report, comments received from reviewers of this study indicated that uncertainty may exist in the national forecasts of growth in aircraft activity, on future composition of the aircraft fleet, and on the accuracy of a default mixing height. Such uncertainties carry over into projections of future emissions, and resolution of uncertainties may result in higher or lower ground-level emissions estimates from future aircraft.

[26] Based on the one-hour ozone standard, nine of the ten metropolitan areas are currently not in attainment of NAAQS for one-hour ozone; the tenth city has attained the one-hour ozone standard and is considered an one-hour ozone ''maintenance'' area. Based on the 8-hour ozone standard, all ten metropolitan areas are currently not in attainment of NAAQS for 8-hour ozone. See section II.B.1 of this rule for further discussion on the ozone NAAQs. Also, for more detailed information on the 8-hour ozone standard, see the following EPA Web sites: *http://www.epa.gov/airlinks/ozpminfo.html*, *http://www.epa.gov/airlinks/airlinks4.html* or *http://www.epa.gov/ttn/naaqs/ozone/o3imp8hr*.

[27] U.S. Department of Transportation, Office of Inspector General, ''Airline Industry Metrics,'' CC–2203–007, January 7, 2003. A copy of this document can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0012.

[28] U.S. General Accounting Office, ''Aviation and the Environment: Strategic Framework Needed to Address Challenges Posed by Aircraft Emissions,'' GAO–03–252, February 2003. This document is available at *http://www.gao.gov/cgi-bin/getrpt?GAO-03-252*, and it can also be found in the Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0005.

[29] U.S. FAA, ''APO Terminal Area Forecast Summary Report,'' Aircraft Operations, December 14, 2000. A copy of this document can be found in Docket No. OAR–2002–0030.

[30] U.S. FAA, ''APO Terminal Area Forecast Summary Report,'' Aircraft Operations, June 30, 2005. The flight forecast data is based on FAA's Terminal Area Forecast System (TAFS). TAFs is the official forecast of aviation activity at FAA facilities. This includes FAA-towered airports, federally-contracted towered airports, nonfederal towered airports, and many non-towered airports. For detailed information on TAFS and the air carrier activity forecasts see the following FAA Web site: *http://www.apo.data.faa.gov/main/taf.asp*. The June 30, 2005 aviation forecasts contained in TAFS for Fiscal Years 2002–2020 included the impact of the terrorists' attacks of September 11, 2001 and the recent economic downturn. Currently, the aviation industry is undergoing significant structural and economic changes. These changes may necessitate revisions to forecasts for a number of large hub airports prior to the update of the entire TAF next year. A copy of the June 30, 2005 forecast summary report can also be found in Docket No. OAR–2002–0030.

EPA estimates that aircraft engines comprise approximately 45 percent of total air pollutant emissions from airport operations. GAV account for another 45 percent and APUs and GSE combined make up the remaining 10 percent.[31] [32] Since EPA has established stringent emission standards for GAVs and other highway and nonroad vehicles used at airports, overall emissions from these vehicles will continue to decline for many years. This means that aircraft will contribute an increasing portion of total emissions associated with airport operations.

B. Health and Welfare Effects

NO_X emissions from commercial aircraft and other mobile and stationary sources contribute to the formation of ozone. In addition, NO_X emissions at low altitude also react in the atmosphere to form secondary particulate matter ($PM_{2.5}$), particularly ammonium nitrate, and contribute to regional haze.[33] The NO_X standards adopted in this rule will help reduce ambient ozone and potentially secondary PM levels and thus will help areas with airports achieve and/or maintain compliance with the NAAQS for ozone and potentially PM.[34] In the following section we discuss the adverse health and welfare effects associated with NO_X emissions.

1. Ozone

a. What are the health effects of ozone pollution?

NO_X is a precursor in the photochemical reaction which forms tropospheric ozone. Ground-level ozone, the main ingredient in smog, is formed by complex chemical reactions of VOCs and NO_X in the presence of heat and sunlight. The health effects of ozone pollution are described in detail in EPA's Air Quality Criteria Document for Ozone and Other Photochemical Oxidants and are also described in the Final Regulatory Analysis for our recent Clean Air Nonroad Diesel rule.[35] The following is a summary of those effects.

Ozone can irritate the respiratory system, causing coughing, throat irritation, and/or uncomfortable sensation in the chest. In addition, ozone can reduce lung function and make it more difficult to breathe deeply, and breathing may become more rapid and shallow than normal, thereby limiting a person's normal activity. Ozone also can aggravate asthma, leading to more asthma attacks that require a doctor's attention and/or the use of additional medication. In addition, ozone can inflame and damage the lining of the lungs, which may lead to permanent changes in lung tissue, irreversible reductions in lung function, and a lower quality of life if the inflammation occurs repeatedly over a long time period. People who are of particular concern with respect to ozone exposures include children and adults who are active outdoors. Those people particularly susceptible to ozone effects are people with respiratory disease, such as asthma, people with unusual sensitivity to ozone, and children. Beyond its human health effects, ozone has been shown to injure plants, which has the effect of reducing crop yields and reducing productivity in forest ecosystems.[36] [37]

New research suggests additional serious health effects beyond those that were known when the ozone NAAQS was revised in 1997. Between 1997 and a 2002 literature review, over 1,700 new health and welfare studies relating to ozone have been published in peer-reviewed journals.[38] Many of these studies investigate the impact of ozone exposure on such health effects as changes in lung structure and biochemistry, inflammation of the lungs, exacerbation and causation of asthma, respiratory illness-related school absence, hospital and emergency room visits for asthma and other respiratory causes, and premature mortality. EPA is currently evaluating these and other studies as part of the ongoing review of the air quality criteria and NAAQS for ozone. A revised Air Quality Criteria Document for Ozone and Other Photochemical Oxidants will be prepared in consultation with EPA's Clean Air Science Advisory Committee (CASAC).[39] Key new health information falls into four general areas: development of new-onset asthma, hospital admissions for young children, school absence rate, and premature mortality. In all, the new studies that have become available since the 8-hour ozone standard was adopted in 1997 continue to demonstrate the harmful effects of ozone on public health and the need for areas with high ozone levels to attain and maintain the NAAQS.

b. What are the current and projected 8-hour ozone levels?

There is currently one ozone NAAQS, an 8-hour standard. The 8-hour ozone standard is met when the fourth highest daily maximum 8-hour average ozone concentration measured over a 3-year period is less than or equal to 0.084 parts per million (ppm). The former 1-hour ozone standard was revoked in June 2005.[40]

[31] The California FIP, signed by the Administrator 2/14/95, is located in EPA Air Docket A–94–09, item number V–A–1. The FIP was vacated by an act of Congress before it became effective.

[32] For comparison, the 1997 EPA Draft Final Report entitled, ''Analysis of Techniques to Reduce Air Emission at Airports'' (prepared by Energy and Environmental Analysis, Inc), estimated that for the four airports studied (which are large air traffic hubs) on average aircraft comprise approximately 35 percent of NO_X emissions from airport operations; GAV account for another 35 percent, and APUs and GSE contribute about 15 percent each for the remaining 30 percent. For NO_X and VOC together, aircraft contribute about 35 percent; GAV account for another 40 percent, and APUs and GSE combined make up the remaining 25 percent. This document can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0071.

[33] As described later in section II.B.2, fine particles refer to those particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers (also known as $PM_{2.5}$).

[34] The NO_X standards being set today will also help reduce levels of nitrogen dioxide (NO_2), for which NAAQS have been established. Currently, every area in the United States has been designated to be in attainment with the NO_2 NAAQS.

[35] U.S. EPA (1996). Air Quality Criteria for Ozone and Related Photochemical Oxidants, EPA/600/P–93/004aF. This document can be found in Docket No. OAR–2002–0030. Document Nos. OAR–2002–0030–0165 through OAR–2002–0030–0194. (U.S. EPA (2005), Air Quality Criteria for Ozone and Related Photochemical Oxidants (First External Review Draft), EPA/600/R–05/004aA–cA. This document can be found in Docket No. OAR–2002–0030, Document Nos. OAR–2002–0030–0202, –0210, and –0211.) U.S. EPA (2004). Final Regulatory Assessment: Control of Emissions from Nonroad Diesel Engines, EPA420–R–04–007. This document can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0128.

[36] U.S. EPA (1996). Review of National Ambient Air Quality Standards for Ozone, Assessment of Scientific and Technical Information, OAQPS Staff Paper, EPA–452/R–96–007. Docket No. A–99–06. Document No. II–A–22.

[37] U.S. EPA (1996). Air Quality Criteria for Ozone and Related Photochemical Oxidants, EPA/600/P–93/004aF. This document can be found in Docket No. OAR–2002–0030, Document Nos. OAR–2002–0030–0165 through OAR–2002–0030–0194. (U.S. EPA (2005). Air Quality Criteria for Ozone and Related Photochemical Oxidants (First External Review Draft), EPA/600/R–05/004aA–cA. This document can be accessed electronically at: *http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_cd.html.* This document can also be found in Docket No. OAR–2002–0030, Doc. Nos. OAR–2002–0030–0202, –0210, and –0211.)

[38] New Ozone Health and Environmental Effects References, Published Since Completion of the Previous Ozone AQCD, National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711 (7/2002). This document can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0131.

[39] U.S. EPA (2005), Air Quality Criteria for Ozone and Related Photochemical Oxidants (First External Review Draft), Volume I Document No. EPA/600/R–05/004aA, Volume II Document No. EPA/600/R–05/004bA, Volume III Document No. EPA/600/R–05/004cA. This document can be found in Docket No. OAR–2002–0030, Document Nos. OAR–2002–0030–0202, –0210, and –0211.

[40] U.S. EPA, National Ambient Air Quality Standards for Ozone; Final Rule. 62 FR 38855 (July 18, 1997). U.S. EPA, ''Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard—Phase 1,'' Final Rule, 69 FR 23951 (April 30, 2004).

On June 15, 2004, the 8-hour ozone nonattainment designations became effective.[41] Nationwide, there are approximately 159 million people living in 126 areas that are designated as not attaining the 8-hour ozone NAAQS based upon the monitored data from 2001–2003 and other factors. The CAA defines a nonattainment area as an area that is violating an ambient standard or is contributing to a nearby area that is violating the standard. All or part of 474 counties are designated as nonattainment for the 8-hour ozone NAAQS. These counties are spread over wide geographic areas, including most of the nation's major population centers, which include much of the eastern half of the U.S. and large areas of California.[42]

From air quality modeling performed for the recent Clean Air Interstate Rule (CAIR),[43] we anticipate that without emission reductions beyond those already required under promulgated regulation and approved State Implementation Plans (SIPs), ozone nonattainment will likely persist into the future. With reductions from programs already in place, including the CAIR, the number of counties in the eastern U.S. violating the ozone 8-hour standard is expected to decrease in 2015 to 16 counties where 12 million people are projected to live.

On June 2, 2003 (68 FR 32802), EPA issued a proposal for the implementation process to bring the nation's air into attainment with the 8-hour ozone NAAQS, including proposed requirements that States submit SIPs that address how areas will attain the 8-hour ozone standard.[44] The second phase (Phase II) of this proposed implementation process for the 8-hour ozone NAAQS will be finalized in the next few months, and it will describe the SIP submittal date requirements. (Phase I of the proposed implementation process was finalized on April 30, 2004 (69 FR 23951), but it did not include these SIP submittal date requirements.)[45]

The Act (Title I, Part D) contains two sets of requirements for State plans implementing the national ozone air quality standards in nonattainment areas. Subpart 1 contains general requirements for SIPs for nonattainment areas for any pollutant, including ozone, governed by a NAAQS. Subpart 2 provides more specific requirements for ozone nonattainment SIPs. Under subpart 1, a state must demonstrate that its nonattainment areas will attain the ozone 8-hour standard as expeditiously as practicable, but no later than five years from the date that the area was designated nonattainment. However, based on the severity of the air quality problem and the availability and feasibility of control measures, the Administrator may extend the attainment date ''for a period of no greater than 10 years from the date of designation as nonattainment.'' Based on these provisions, we expect that most or all areas covered under subpart 1 will attain the 8-hour ozone standard in the 2007 to 2014 time frame. For areas covered under subpart 2, the maximum attainment dates provided under the Act range from 3 to 20 years after designation, depending on an area's classification. Thus, we anticipate that areas covered by subpart 2 will attain the 8-hour ozone standard in the 2007 to 2024 time period.

Since the emission reductions expected from the standards we are adopting in this rule will occur during the time period when areas will need to attain the standard under either option, projected reductions in aircraft engine emissions will assist States in their efforts to attain and maintain the 8-hour ozone NAAQS.

2. Particulate Matter

a. What is particulate matter?

Particulate matter represents a broad class of chemically and physically diverse substances. It can be principally characterized as discrete particles that exist in the condensed (liquid or solid) phase spanning several orders of magnitude in size. PM_{10} refers to particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers. Fine particles refer to those particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers (also known as $PM_{2.5}$). The emission sources, formation processes, chemical composition, atmospheric residence times, transport distances and other parameters of fine and coarse particles are distinct. This discussion focuses on fine PM since the NO_X emitted by aircraft engines can react in the atmosphere to form fine PM as discussed below.

Fine particles are directly emitted from combustion sources and are formed secondarily from gaseous precursors such as oxides of nitrogen (NO_X). Fine particles are generally composed of sulfate, nitrate, chloride, ammonium compounds, organic carbon, elemental carbon, and metals. Aircraft engines emit NO_X which reacts in the atmosphere to form secondary $PM_{2.5}$ (namely ammonium nitrate). Combustion of coal, oil, diesel, gasoline, and wood, as well as high temperature process sources such as smelters and steel mills, produce emissions that contribute to fine particle formation. Fine particles can remain in the atmosphere for days to weeks and travel through the atmosphere hundreds to thousands of kilometers. Thus emissions from aircraft, as well as those from other sources, could affect nonattainment areas far from their source.

The relative contribution of various chemical components to $PM_{2.5}$ varies by region of the country. Data on $PM_{2.5}$ composition are available from the EPA Speciation Trends Network in 2001 and the *I*nteragency *M*onitoring of *PRO*tected *V*isual *E*nvironments (IMPROVE) network in 1999 covering both urban and rural areas in numerous regions of the U.S. These data show that nitrates formed from NO_X play a major role in the western U.S., especially in the California area where it is responsible for about a quarter of the ambient $PM_{2.5}$ concentrations.[46] (However, the majority of NO_X involved in this process does not come from aircraft.)

b. What are the health effects of $PM_{2.5}$?

Scientific studies show ambient PM is associated with a series of adverse health effects. These health effects are discussed in detail in the recently released EPA Criteria Document for PM.[47] They are also described in the Final Regulatory Analysis for our recent

[41] U.S. EPA, ''Air Quality Designations and Classifications for the 8-hour Ozone National Ambient Air Quality Standards; Early Action Compact Areas With Deferred Effective Dates,'' Final Rule, 69 FR 23858 (April 30, 2004).

[42] A map that shows the current 8-hour ozone and $PM_{2.5}$ nonattainment areas, federal Class I areas, and a list of affected counties can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0209.

[43] U.S. EPA, ''Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule); Revisions to Acid Rain Program; Revisions to the NO_X SIP Call,'' Final Rule, 70 FR 25162, May 12, 2005.

[44] U.S. EPA, ''Proposed Rule to Implement the 8-hour Ozone National Ambient Air Quality Standard,'' Proposed Rule, 68 FR 32802 (June 2, 2003).

[45] U.S. EPA, ''Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard—Phase 1,'' Final Rule, 69 FR 23951 (April 30, 2004).

[46] See the Regulatory Impact Analysis: ''Final Regulatory Analysis: Control of Emissions from Nonroad Diesel Engines,'' EPA420–R–04–007, May 2004. This document is available at *http://www.epa.gov/nonroad/* and in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0128.

[47] U.S. EPA, Air Quality Criteria for Particulate Matter (OCT 2004), Volume I Document No. EPA600/P–99/002aF and Volume II Document No. EPA600/P–99/002bF. This document is available in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0129 and OAR–2002–0030–0130.

Clean Air Nonroad Diesel rule.[48] The following is a summary of those effects.

The health effects associated with short-term variation in ambient particulate matter (PM) have been indicated by epidemiologic studies showing associations between exposure and increased hospital admissions for ischemic heart disease, heart failure, respiratory disease, including chronic obstructive pulmonary disease (COPD) and pneumonia. Short-term elevations in ambient PM have also been associated with increased cough, lower respiratory symptoms, and decrements in lung function. Additional studies have associated changes in heart rate and/or heart rhythm in addition to changes in blood characteristics with exposure to ambient PM. Short-term variations in ambient PM have also been associated with increases in total and cardiorespiratory mortality. Studies examining populations exposed to different levels of air pollution over a number of years, including the Harvard Six Cities Study and the American Cancer Society Study, suggest an association between exposure to ambient $PM_{2.5}$ and premature mortality.[49] [50] Additionally, one long-term study provides evidence for premature mortality specifically associated with PM generated by mobile sources.[51] Two studies further analyzing the Harvard Six Cities Study's air quality data have also established a specific influence of mobile source-related $PM_{2.5}$ on daily mortality [52] and a concentration-response function for mobile source-associated $PM_{2.5}$ and daily mortality.[53]

c. What are current and projected levels of PM?

The NAAQS for $PM_{2.5}$ were established by EPA in 1997 (62 FR 38651, July 18, 1997). The short-term (24-hour) standard is set at a level of 65 $\mu g/m^3$ based on the 98th percentile concentration averaged over three years. The long-term standard specifies an expected annual arithmetic mean not to exceed 15 ug/m^3 averaged over three years.

Approximately 88 million people live in 208 full and partial counties and 39 areas which EPA has designated nonattainment for the $PM_{2.5}$ NAAQS.[54] In addition, tens of millions of people live in areas where there is a significant future risk of failing to maintain or achieve the $PM_{2.5}$ NAAQS.

This is illustrated by the air quality modeling performed recently in connection with our CAIR rule, which suggests that elevated $PM_{2.5}$ levels are likely to continue to exist in the future in many areas in the absence of additional emission controls.[55] For example in the eastern U.S. in 2015, based on emission controls currently adopted, we project that 16 million people will live in 18 counties with average $PM_{2.5}$ levels above 15 μ/m^3.

While the final implementation process for bringing the nation's air into attainment with the $PM_{2.5}$ NAAQS is still being completed in a separate rulemaking action, the basic framework is well defined by the statute. EPA designated $PM_{2.5}$ nonattainment areas on April 5, 2005. Following designation, section 172(b) of the Clean Air Act allows states up to three years to submit a revision to their state implementation plan (SIP) that provides for the attainment of the $PM_{2.5}$ standard. Based on this provision, states could submit these SIPs as late as the end of 2007. Section 172(a)(2) of the Clean Air Act requires that these SIP revisions demonstrate that the nonattainment areas will attain the $PM_{2.5}$ standard as expeditiously as practicable but no later than five years from the date that the area was designated nonattainment. However, based on the severity of the air quality problem and the availability and feasibility of control measures, the Administrator may extend the attainment date ''for a period of no greater than 10 years from the date of designation as nonattainment.'' Therefore, based on this information, we expect that most or all are as will need to attain the $PM_{2.5}$ NAAQS in the 2009 to 2014 time frame, and then be required to maintain the NAAQS thereafter.

Potentially, today's aircraft NO_X standards may contribute to attainment and maintenance of the existing PM NAAQS since NO_X contributes to the secondary formation of $PM_{2.5}$.

C. Other Environmental Effects

This section presents information on four categories of public welfare and environmental impacts related to NO_X and fine PM emissions: Acid deposition, eutrophication of water bodies, plant damage from ozone, and visibility impairment. These environmental effects are described in detail in the Final Regulatory Assessment for our recent Clean Air Nonroad Diesel rule.[56]

1. Acid Deposition

Acid deposition, or acid rain as it is commonly known, occurs when NO_X and SO_2 react in the atmosphere with water, oxygen, and oxidants to form various acidic compounds that later fall to earth in the form of precipitation or dry deposition of acidic particles.[57] Acid rain contributes to damage of trees at high elevations and in extreme cases may cause lakes and streams to become so acidic that they cannot support aquatic life. In addition, acid deposition accelerates the decay of building materials and paints, including irreplaceable buildings, statues, and sculptures that are part of our nation's cultural heritage. To reduce damage to automotive paint caused by acid rain and acidic dry deposition, some manufacturers use acid-resistant paints, at an average cost of $5 per vehicle for a total of $80–85 million per year when applied to all new cars and trucks sold in the U.S. each year.

The NO_X reductions from today's action will help reduce acid rain and acid deposition, thereby helping to reduce acidity levels in lakes and

[48] U.S. EPA (2004). Final Regulatory Assessment: Control of Emissions from Nonroad Diesel Engines, EPA420–R–04–007. This document can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0128.

[49] Dockery, DW; Pope, CA, III; Xu, X; *et al.* (1993) An association between air pollution and mortality in six U.S. cities. N Engl J Med 329:1753–1759.

[50] Pope, CA, III; Thun, MJ; Namboordiri, MM; *et al.* (1995) Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults. Am J Respir Crit Care Med 151:669–674.

[51] Hoek, G; Brunekreef, B; Goldbohm, S; *et al.* (2002) Association between mortality and indicators of traffic-related air pollution in the Netherlands: a cohort study. Lancet 360:1203–1209.

[52] Laden F; Neas LM; Dockery DW; *et al.* (2000) Association of fine particulate matter from different sources with daily mortality in six U.S. cities. Environ Health Perspect 108(10):941–947.

[53] Schwartz J; Laden F; Zanobetti A. (2002) The concentration-response relation between $PM_{(2.5)}$ and daily deaths. Environ Health Perspect 110(10): 1025–1029.

[54] A map that shows the current 8-hour ozone and $PM_{2.5}$ nonattainment areas, federal Class I areas, and a list of affected counties can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0209. The final $PM_{2.5}$ designations were effective on April 5, 2005. (U.S. EPA, ''Air Quality Designations and Classifications for the Fine Particles ($PM_{2.5}$) National Ambient Air Quality Standards,'' Final Rule, January 5, 2005 (70 FR 944); ''Air Quality Designations for the Fine Particles ($PM_{2.5}$) National Ambient Air Quality Standards,'' Supplemental Notice, April 5, 2005, located at *http://www.epa.gov/pmdesignations/.*)

[55] U.S. EPA, ''Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule); Revisions to Acid Rain Program; Revisions to the NO_X SIP Call,'' Final Rule, 70 FR 25162, May 12, 2005.

[56] U.S. EPA (2004). Final Regulatory Assessment: Control of Pollution from Nonroad Diesel Engines, EPA420–R–04–007. This document can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0128.

[57] Much of the information in this subsection was excerpted from the EPA document, Human Health Benefits from Sulfate Reduction, written under Title IV of the 1990 Clean Air Act Amendments, U.S. EPA, Office of Air and Radiation, Acid Rain Division, Washington, DC 20460, November 1995. A copy of this document is available in Docket No. OAR 2002–0030, Document No. OAR–2002–0030–0028.

streams throughout the country and helping to accelerate the recovery of acidified lakes and streams and the revival of ecosystems adversely affected by acid deposition. Reduced acid deposition levels will also help reduce stress on forests, thereby accelerating reforestation efforts and improving timber production. Deterioration of our historic buildings and monuments, and of buildings, vehicles, and other structures exposed to acid rain and dry acid deposition will be reduced, and the costs borne to prevent acid-related damage may also decline.

2. Eutrophication and Nitrification

In recent decades, human activities have greatly accelerated nutrient impacts, such as nitrogen and phosphorus, causing excessive growth of algae and leading to degraded water quality and associated impairment of fresh water and estuarine resources for human uses.[58] Eutrophication is the accelerated production of organic matter, particularly algae, in a water body. This increased growth can cause numerous adverse ecological effects and economic impacts, including nuisance algal blooms, dieback of underwater plants due to reduced light penetration, and toxic plankton blooms. Algal and plankton blooms can also reduce the level of dissolved oxygen, which can also adversely affect fish and shellfish populations.

Deposition of nitrogen from aircraft engines contributes to elevated nitrogen levels in waterbodies. The NO_X reductions from today's promulgated standards will help reduce the airborne nitrogen deposition that contributes to eutrophication of watersheds, particularly in aquatic systems where atmospheric deposition of nitrogen represents a significant portion of total nitrogen loadings.

3. Plant Damage From Ozone

Ground-level ozone can also cause adverse welfare or environmental effects.[59] Specifically, ozone enters the leaves of plants where it interferes with cellular metabolic processes. This interference can be manifest either as visible foliar injury from cell injury or death, and/or as decreased plant growth and yield due to a reduced ability to produce food. With fewer resources, the plant reallocates existing resources away from root storage, growth and reproduction toward leaf repair and maintenance. Plants that are stressed in these ways become more susceptible to disease, insect attack, harsh weather and other environmental stresses. Because not all plants are equally sensitive to ozone, ozone pollution can also exert a selective pressure that leads to changes in plant community composition.

As discussed earlier, aircraft engine emissions of NO_X contribute to ozone. The final standards will aid in the reduction of ozone and, therefore, help reduce crop damage and stress from ozone on vegetation.

4. Visibility

Visibility can be defined as the degree to which the atmosphere is transparent to visible light.[60] Fine particles with significant light-extinction efficiencies include organic matter, sulfates, nitrates, elemental carbon (soot), and soil.

Visibility is important because it directly affects people's enjoyment of daily activities in all parts of the country. Individuals value good visibility for the well-being it provides them directly, both in where they live and work, and in places where they enjoy recreational opportunities. Visibility is also highly valued in significant natural areas such as national parks and wilderness areas, because of the special emphasis given to protecting these lands now and for future generations.

As discussed previously, aircraft engine emissions of NO_X are precursors to $PM_{2.5}$. In 1997, EPA established the secondary (welfare-based) $PM_{2.5}$ NAAQS as equal to the primary (health-based) NAAQS of 15 ug/m^3 (based on a 3-year average of the annual mean) and 65 ug/m^3 (based on a 3-year average of the 98th percentile of the 24-hour average value) (62 FR 38669, July 18, 1997). EPA concluded that $PM_{2.5}$ causes adverse effects on visibility in various locations, depending on PM concentrations and factors such as chemical composition and average relative humidity. In 1997, EPA demonstrated that visibility impairment is an important effect on public welfare and that unacceptable visibility impairment is experienced throughout the U.S., in multi-state regions, urban areas, and remote federal Class I areas.[61]

Furthermore, in setting the $PM_{2.5}$ NAAQS, EPA acknowledged that levels of fine particles below the NAAQS may also contribute to unacceptable visibility impairment and regional haze problems in some areas, and section 169 of the Act provides additional authorities to remedy existing impairment and prevent future impairment in the 156 national parks, forests and wilderness areas labeled as mandatory Federal Class I areas (62 FR 38680–81, July 18, 1997).

Taken together with other programs, potential reductions from this final rule may help to improve visibility across the nation, including mandatory Federal Class I areas.

III. Aircraft Engine Standards

Under the authority of section 231 of the CAA, EPA today adopts standards equivalent to ICAO's February 1999 NO_X emission standards (these NO_X standards were adopted at CAEP/4 in 1998 and approved by the ICAO Council in 1999) and March 1997 test procedure amendments. Today's emission standards and test procedure amendments apply to commercial aircraft engines, and these standards do not apply to aircraft engines used only for general aviation or military applications.[62] (General aviation and military aircraft can use commercial aircraft engines subject to these standards—e.g., small regional jet engines are also utilized in executive general aviation aircraft and larger commercial aircraft engines may also be used in military transport aircraft). The

[58] Deposition of Air Pollutants to the Great Waters, Third Report to Congress, June 2000, EPA–453/R–00–005. This document can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0025. It is also available at *http://www.epa.gov/oar/oaqps/gr8water/3rdrpt/obtain.html.*

[59] U.S. EPA (1996). Air Quality Criteria for Ozone and Related Photochemical Oxidants, EPA/600/P–93/004aF. This document can be found in Docket No. OAR–2002–0030. Document Nos. OAR–2002–0030–0165 through OAR–2002–0030–0194. (U.S. EPA (2005), Air Quality Criteria for Ozone and Related Photochemical Oxidants (First External Review Draft), EPA/600/R–05/004aA—cA. This document can be found in Docket No. OAR–2002–0030, Document Nos. OAR–2002–0030–0202, –0210, and –0211.)

[60] National Research Council, 1993. Protecting Visibility in National Parks and Wilderness Areas. National Academy of Sciences Committee on Haze in National Parks and Wilderness Areas. National Academy Press, Washington, DC. This book can be viewed on the National Academy Press Web site at *http://www.nap.edu/books/0309048443/html/.* See also U.S. EPA Air Quality Criteria Document for Particulate Matter (2004). This document is available in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0129 and OAR–2002–0030–0130. See also Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, 2nd Draft. This document can be found in Docket No. OAR–2002–0030, Document Nos. OAR–2002–0030–0198 through—0201. It is also available electronically at *http://www.epa.gov/ttn/naaqs/standards/pm/data/pm_staff_paper_2nddraft.pdf.*

[61] A map that shows the current 8-hour ozone and $PM_{2.5}$ nonattainment areas, federal Class I areas, and a list of affected counties can be found in Docket No. OAR–2002–0030, Document No. OAR–2002–0030–0209.

[62] In the proposal, we stated that no general aviation or military engines are covered by the proposal; however, this statement may need some clarification in today's final rulemaking. See the Section 5.2 of the Summary and Analysis of Comments of this rulemaking for further discussion of general aviation and military aircraft.

commercial aircraft engines subject to today's NO_X standards are those gas turbine engines that are newly certified (and newly designed) after the effective dates of the regulations. (Newly manufactured engines of already certified models—i.e., those individual engines that are part of an already certified engine model, but are built after the effective date of the regulations for such engines and have never been in service—will not have to meet these standards).[63] The NO_X emission standards and their effective dates are described below in this section, and the test procedure amendments are discussed later in section IV.

A. What Are The NO_X Standards For Newly Certified Engines?

As discussed earlier in sections I and II of today's notice, section 231(a)(2)(A) of the CAA authorizes EPA to establish emission standards for aircraft engine emissions ''* * * which in his judgment causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare.'' The Administrator may revise such standards from ''time to time.'' 42 U.S.C. 7571(a)(2). CAA section 231(b) requires that any emission standards provide sufficient lead time ''to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.'' 42 U.S.C. 7571(b).

Today's rule adopts near-term standards that will go into effect December 19, 2005 to ensure future engines do not jeopardize recent or past technology gains. These standards are equivalent to the CAEP/4 NO_X international consensus emissions standards for aircraft engines adopted by ICAO's CAEP in 1998.[64] This final rule to promulgate aircraft engine NO_X standards equivalent to CAEP/4 standards is consistent with U.S. obligations under ICAO. By issuing standards that meet or exceed ICAO CAEP/4 standards, we satisfy these obligations. As indicated earlier in section I of today's rule, the implementation date, December 31, 2003, has already occurred for the CAEP/4 standards, and we need to promulgate the standards in accordance with U.S. obligations under ICAO. At the same time, EPA anticipates establishing more stringent NO_X standards in the future. In February 2004, CAEP/6 (sixth meeting of CAEP) agreed to establish more stringent international consensus emission standards for aircraft engines. Such standards will be a central consideration in a future EPA regulation of aircraft engine emissions.

We believe this approach is the most appropriate means to address emissions from aircraft engines in this rulemaking. It codifies current practice, with no significant lead time, as a near-term approach.[65] EPA has authority to revise emission standards from ''time to time.'' EPA intends to address more stringent emission standards requiring more lead time in a future rulemaking (see section III.A.5 for further discussion of future standards), as the ICAO and CAEP process develops progressively more stringent standards.

1. Today's NO_X Standards

EPA is adopting standards equivalent to ICAO's 1999 NO_X emission standards for newly certified aircraft gas turbine engines (turbofan and turbojet engines) of rated thrust or output greater than 26.7 kilonewtons (kN) with compliance dates as follows:[66]

For engines of a type or model of which that date of manufacture of the first individual production model was after December 31, 2003 (see below for further discussion on the effective date of these standards):

(a) For engines with a pressure ratio of 30 or less:

(i) For engines with a maximum rated output of more than 89.0 kN:

NO_X = (19 + 1.6(rated pressure ratio)) g/kN rated output

(ii) For engines with a maximum rated output of more than 26.7 kN but not more than 89.0 kN:

NO_X = (37.572 + 1.6(rated pressure ratio)—0.2087(rated output))g/kN rated output

(b) For engines with a pressure ratio of more than 30 but less than 62.5:

(i) For engines with a maximum rated output of more than 89.0 kN:

NO_X = (7 + 2.0(rated pressure ratio)) g/kN rated output

(ii) For engines with a maximum rated output of more than 26.7 kN but not more than 89.0 kN:

NO_X = (42.71 + 1.4286(rated pressure ratio)—0.4013(rated output) + 0.00642(rated pressure ratio × rated output))g/kN rated output

(c) For engines with a pressure ratio of 62.5 or more:

NO_X = (32 + 1.6(rated pressure ratio)) g/kN rated output.

The NO_X emission standards presented above are equivalent to the ICAO NO_X standards that have an implementation date of December 31, 2003.[67] However, since this date has passed, the NO_X emission standards prescribed above for newly certified engines shall take effect as prescribed beginning December 19, 2005.

2. NO_X Standards for Newly Certified Mid- and High-Thrust Engines

EPA is adopting NO_X standards for newly certified mid- and high-thrust engines (those engines designed and certified after the effective date of the regulations, which have a rated output or thrust greater than 89 kN) that generally represent about a 16 percent reduction (or increase in stringency) from the existing standard. (See section III.A.1(a)(i) and III.A.1(b)(i) above for the standards for mid- and high-thrust engines.) More specifically, at a rated pressure ratio of 30 the NO_X standards represent a 16 percent reduction from the existing standard. At rated pressure ratios of 10 and 20, the standards correspond to 27 and 20 percent reductions, respectively. In addition, at rated pressure ratios of 40 and 50, the NO_X standards signify 9 and 4 percent reductions, respectively. Also, today's and existing standards are equivalent at a rated pressure ratio of 62.5. See Figure III.B–1 in section III.B for a comparison of today's NO_X standards (equivalent to CAEP/4 standards) to the existing standards (equivalent to CAEP/2 standards) .

3. NO_X Standards for Newly Certified Low-Thrust Engines

For newly certified low-thrust engines (engines with a thrust or rated output of more than 26.7 kN but not more than 89.0 kN), EPA is adopting near-term

[63] Applying standards to newly manufactured engines of already certified models does not mean the re-certification or retrofit of existing in-use engines. Instead such a provision would require the ongoing production of engines that have already been certified to meet the new standards. However, we are not adopting this provision in today's rulemaking

[64] ICAO, CAEP, Fourth Meeting, Montreal, Quebec, April 6–8, 1998, Report, Document 9720, CAEP/4. Copies of this document can be obtained from the ICAO Web site located at *http://www.icao.int.*

[65] As described later, more information and greater lead time would be necessary to require more stringent standards.

[66] This includes standards for low-, mid-, and high-thrust engines (see below for further discussion of the different standards based on the thrust of the engines).

[67] ICAO's CAEP/4 NO_X standards became effective July 19, 1999, and applicable as of November 4, 1999. December 31, 2003 is the implementation date for these standards. However, for the purpose of this Notice the effective date is considered the implementation date. (ICAO, ''Aircraft Engine Emissions,'' International Standards and Recommended Practices, Environmental Protection, Annex 16, Volume II, Second Edition, July 1993—Amendment 4, July 19, 1999.)

NO_X standards that are equivalent to CAEP/4 standards for such engines, and these standards are different than today's standards for mid- and high-thrust engines (engines with thrust greater than 89.0 kN).[68] In addition to rated pressure ratio, the standards for low-thrust engines will also be dependent on an engine's thrust or rated output.[69] (See section III.A.1(a)(ii) and III.A.1(b)(ii) for a description of these different standards.) For example, at a rated pressure ratio of 30 and a thrust of 58 kN (thrust level in the middle of 26.7 kN and 89 kN), these standards are an 8 percent reduction (or increase in stringency) from the existing standard compared to a 16 percent reduction for the standards for mid- and high-thrust engines.[70]

The existing standards were not set at a stringency level that created a need for low-thrust engines to have different requirements, but at the level of NO_X stringency adopted today different requirements are considered necessary for such engines. Due to their physical size, it is difficult to apply the best NO_X reduction technology to low thrust or small engines. The difficulty increases progressively as size is reduced (from around 89 kN).[71] For example, the relatively small combustor space and section height of these engines creates constraints on the use of low NO_X fuel staged combustor concepts which inherently require the availability of greater flow path cross-sectional area than conventional combustors.[72] Also, fuel staged combustors need more fuel injectors, and this need is not compatible with the relatively lower total fuel flows of lower thrust engines. (Reductions in fuel flow per nozzle are difficult to attain without having clogging problems due to the small sizes of the fuel metering ports.) In addition, lower thrust engine combustors have an inherently greater liner surface-to-combustion volume ratio, and this requires increased wall cooling air flow. Thus, less air will be available to obtain acceptable turbine inlet temperature distribution and for emissions control.[73] Since the difficulties increase progressively as engine thrust size is reduced, EPA believes it is appropriate to make a graded change in stringency of today's NO_X standards for low-thrust engines.

4. Rationale for Today's NO_X Standards for Newly Certified Low-, Mid-, and High-Thrust Engines

Today's standards for low-, mid-, and high-thrust engines, which are equivalent to the CAEP/4 standards, ensure that new engine designs will incorporate the existing combustor technology and will not perform worse than today's current engines. This final rule to promulgate aircraft engine NO_X standards equivalent to CAEP/4 standards is consistent with U.S. obligations under ICAO. By issuing standards that meet or exceed the minimum stringency levels of ICAO CAEP/4 standards, we satisfy these obligations. (See section I.B for a discussion of the obligation of ICAO's participating nations). As indicated earlier, the implementation date, December 31, 2003, has already occurred for the CAEP/4 standards, and we need to promulgate the standards to meet our obligations for the CAEP/4 standards. Moreover, since we have already gone past the implementation date of the ICAO/CAEP/4 standards, there is not sufficient lead time to require more stringent emission standards in the very near term. As discussed later in section III.A.5 for future standards, we plan to address whether to take action on more stringent NO_X standards in the future because pursuant to section 231(b) of the CAA we need more time to better understand the cost of compliance with such standards (see section III.A.5 for further discussion regarding lead time). Also, see the Summary and Analysis of Comments for this rulemaking for further discussion of this near-term approach.

EPA believes that today's standards will not impose any additional burden on manufacturers, because manufacturers are already designing new engines to meet the ICAO international consensus standards by 2004 (see section VIII of today's action for further discussion of regulatory impact). Even though the U.S. did not immediately adopt the ICAO NO_X standards after 1999, engine manufacturers have continued to make progress in reducing these emissions. Today's standards are aimed at assuring that this progress is not reversed in the future.

We received a number of comments from state and local governments and environmental groups stating that the NO_X standards should be technology-forcing standards (a performance level that is beyond what sources are currently achieving). They stated that the standards are not technology forcing since 94 percent of all engine models currently in production already meet the standards (85 percent did in 1999 when the ICAO adopted the standards). Also, state and local governments and environmental groups stated that since the standards are not technology-forcing and most engines already meet the standards, aircraft engine NO_X will increase. They expressed concern the many states are facing air quality challenges with implementation of the new 8-hour ozone national ambient air quality standards (NAAQS). Decreases in ozone and its precursors, including NO_X, requires controls of emissions from all sectors, in addition to controls already implemented for 1-hour ozone NAAQS. For nonattainment areas, aircraft emissions are problematic, and the standards will not reduce aircraft emissions or address aircraft NO_X pollution.

Engine and airframe manufacturers and airlines supported the standards and opposed the concept of technology-forcing standards. Airlines indicated that the rulemaking would codify aircraft emission standards determined to be technologically feasible. In addition, airlines expressed that technology-forcing standards would be contrary to the CAA. Aircraft engine emission standards adopted according

[68] Today's NO_X standards for low thrust or small engines specify that engines with a rated output or thrust at 26.7 kN meet the existing standard, and engines with a rated output at 89 kN meet today's (or CAEP/4) standards. For engines with rated outputs or thrust levels between 26.7 and 89 kN, a linear interpolation was made between the low range of the existing standard and the high range of today's standard based upon the rated output to determine the NO_X limits for such engines. Thus, thrust dependent standards are being adopted for engines with rated output or thrust between 26.7 kN and 89 kN.

[69] The standards for mid- and high-thrust engines are dependent only on an engine's rated pressure ratio.

[70] Additional examples of the standards for low-thrust engines in comparison to the standards for mid- and high-thrust engines are provided below. At rated pressure ratios of 10 and 20 with a thrust of 58 kN, today's low-thrust engine standards are a 14 and 10 percent reduction from the existing standard, respectively. Whereas, at these same rated pressure ratios, today's standards for mid- and high-thrust engines are 27 and 20 percent reductions. In addition, at rated pressure ratios of 40 and 50 with a thrust of 58 kN, these low-thrust engine standards signify a 5 and 2 percent reduction from the existing standard, respectively. In comparison, at these same rated pressure ratios, today's standards for mid- and high-thrust engines are 9 and 4 percent reductions.

[71] ICAO/CAEP, Report of Third Meeting, Montreal, Quebec, December 5–15, 1995, Document 9675, CAEP/3.

[72] ''The burner section of an aircraft engine, which contains the combustion chamber, burns a mixture of fuel and air, and delivers the resulting gases to the turbine at a temperature which will not exceed the allowable limit at the turbine inlet.'' (United Technologies Pratt and Whitney, ''The Aircraft Gas Turbine Engine and Its Operation,'' August 1998.)

[73] ICAO/CAEP Working Group 3 (Emissions), ''Combined Report of the Certification and Technology Subgroups,'' section 2.3.6.1, Presented by the Chairman of the Technology Subgroup, Third Meeting, Bonn, Germany, June 1995. A copy of this paper can be found in Docket OAR–2002–0030.

section 231 of the CAA must be based on what is technologically feasible, and the standards cannot be amended if the change would significantly increase noise or adversely affect safety. They suggested that a technology-forcing NO_X standard could adversely affect noise and safety. In addition, they indicated that section 231 of the Act is different from other sections of the CAA that call for technology-forcing standards. Airlines expressed that section 231 requires that standards already be technologically feasible and not compromise noise and safety. In addition, airlines expressed that whether a ''standard is technologically feasible depends not just on whether it can be achieved in a laboratory setting, but whether it can be achieved on a range of actual aircraft engine and airframe combinations that are certified as airworthy, safe, and fully operable under flight conditions. Moreover, such demonstrated technology must be available for application over a sufficient range of newly certificated aircraft, not just on a few airframe/engine combinations.'' (See the Summary and Analysis of Comments of this rulemaking for further discussion of comments.)

In response to these comments, we refer to sections 231(a)(2)(B) and (b) of the CAA. Section 231(b) requires that any emission standards ''take effect after such period as the Administrator finds necessary (after consultation with the Secretary of Transportation) to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance during such period.'' 42 U.S.C. 7571(b). Section 231(a)(2)(B) provides that the Administrator shall consult with the Administrator of the FAA on standards, and ''shall not change the aircraft engine emission standards if such change would significantly increase noise and adversely affect safety.'' 42 U.S.C. 7571(a)(2)(B). Future aircraft emission standards will involve appropriate consultations between EPA and the FAA in applying these provisions of the CAA.

EPA also needs to have a technical basis for expecting the standards will be achievable in a specific period of time. While the statutory language of section 231 is not identical to other provisions in title II of the CAA that direct EPA to establish technology-based standards for various types of engines, EPA interprets its authority under section 231 to be somewhat similar to those provisions that require us to identify a reasonable balance of specified emissions reduction, cost, safety, noise, and other factors. *See, e.g., Husqvarna AB* v. *EPA,* 254 F.3d 195 (DC Cir. 2001) (upholding EPA's promulgation of technology-based standards for small non-road engines under section 213(a)(3) of the CAA). However, we are not compelled under section 231 to obtain the ''greatest degree of emission reduction achievable'' as per sections 213 and 202 of the CAA, and so EPA does not interpret the Act as requiring the agency to give subordinate status to factors such as cost, safety, and noise in determining what standards are reasonable for aircraft engines. Rather, EPA has greater flexibility under section 231 in determining what standard is most reasonable for aircraft engines, and is not required to achieve a ''technology-forcing'' result. The fact that most engines already meet standards would not in itself mean that the standard is inappropriate, provided the agency has a reasonable basis after considering all the relevant factors for setting the standard (with an appropriate period of lead time for that standard) at a level that results in no actual emissions reduction from the baseline.

By the same token, EPA does not agree that a technology-forcing standard would be precluded by section 231, in light of section 231(b)'s forward-looking language. Nor would EPA have to demonstrate that a technology is currently available universally or over a broad range of aircraft in order to base a standard on the emissions performance of such technology—the Agency is not limited in identifying what is ''technologically feasible'' as what is already technologically achieved. However, EPA would, after consultation with the Secretary of Transportation, need to provide manufacturers sufficient lead time to develop and implement requisite technology. As section 231 conveys, there is an added emphasis on the consideration of safety (*see, e.g.,* sections 231(a)(2)(B)(ii) (''The Administrator shall not change the aircraft engine emission standards if such change would [* * *] adversely affect safety''), 42 U.S.C. 7571(a)(2)(B)(ii), and 231(c) (''Any regulations in effect under this section [* * *] shall not apply if disapproved by the President, after notice and opportunity for public hearing, on the basis of a finding by the Secretary of Transportation that any such regulation would create a hazard to aircraft safety''), 42 U.S.C. 7571(c). Therefore, it is reasonable for EPA to give greater weight to considerations of safety in this context than it might in balancing emissions reduction, cost, and energy factors under other title II provisions.

EPA is aware that many states face air quality challenges in light of the new ozone NAAQS, and since section 233 of the CAA vests authority only in EPA to set aircraft emission standards, we understand their perspective regarding the importance of setting more stringent NO_X standards in the future. For these future standards, we expect to adopt standards developed through the CAEP process in ICAO. Further, federal agencies plan on working through the environmental Integrated Product Team for the Next Generation Air Transportation System (NGATS), to conduct a review of technology for aircraft engines and the resulting trend in aircraft emissions as well as interrelationships with noise (e.g., standards effect on projected aircraft emissions growth and expected effects on noise). See section III.A.5 below for further discussion of future NO_X standards. (See the Summary and Analysis of Comments of this rulemaking for further discussion of our responses to comments.)

5. Future NO_X Standards for Newly Certified Low-, Mid-, and High-Thrust Engines

More stringent standards for low-, mid-, and high-thrust engines will likely be necessary and appropriate in the future. As discussed earlier in section II, the growth in aircraft emissions is projected to occur at a time when other mobile source categories are reducing emissions.[74] The 1999 EPA study of commercial aircraft activity in ten cities projected that the aircraft NO_X emissions would double in some of these cities by 2010, and the aircraft component of the regional mobile source NO_X emissions in the ten cities would grow from a range of 1 to 4 percent that existed in 1990 to a range of 2 to 10 percent in 2010.[75] As

[74] The projected growth in aircraft emissions is not simply from the number of operations, but it could also be attributed to the change in the types of aircraft being operated. For example, regional aircraft activity is growing (regional aircraft are generally referred to as those aircraft with more than 19 but fewer than 100 seats—regional jets and turboprops). In the U.S., traffic flown by regional airlines increased about 20 percent in 1999 and is expected to grow approximately 7 percent annually during the next ten years, compared to 4 to 6 percent for the major airlines. In addition, regional jets comprised about 25 percent of the regional aircraft fleet in 2000, up from only 4.2 percent in 1996, and their fraction of the fleet is expected to increase to nearly 50 percent by 2011. (R. Babikian, S. P. Lukachko and I. A. Waitz, ''Historical Fuel Efficiency Characteristics of Regional Aircraft from Technological, Operational, and Cost Perspectives,'' Journal of Air Transport Management, Volume 8, No. 6, pp. 389–400, Nov. 2002.)

[75] U.S. EPA, ''Evaluation of Air Pollutant Emissions from Subsonic Commercial Jet Aircraft,'' April 1999, EPA420–R–99–013. This study is

indicated earlier, the above projections were made prior to the tragic events of September 11, 2001, and the economic downturn. A January 2003 report by the Department of Transportation indicated that the combination of the September 11, 2001 terrorist attacks and a cut-back in business travel had a significant and perhaps long-lasting effect on air traffic demand. While, the FAA expects the demand for air travel to recover, and then continue a long-term trend of annual growth in the United States, it will grow at a lower rate and from a lower base than originally forecast. More recently, as discussed earlier, FAA reports that flights (or activity) of commercial air carriers and commuters/air taxis will increase by 22 percent from 2000 to 2015, about 12 percent less than what was forecast before September 11th.[76] While flight activity, and thus NO_X emissions, will be lower than originally anticipated, the relative size of the contribution of aircraft to national NO_X levels may increase due to the potential decreased contribution from other mobile sources; hence, further action may be necessary in the future to reduce aircraft NO_X emissions in nonattainment areas.

Further stringency of the NO_X standards would reduce the expected growth in commercial aircraft NO_X emissions. The importance of controlling aircraft emissions has grown in many areas (especially areas not meeting the 1-hour and 8-hour ozone NAAQS) as controls on other sources become more stringent and attainment of the NAAQS's has still not been achieved. (Many airports in the U.S. are located in nonattainment areas.[77]) As activity increases, aircraft would emit increasing amounts of NO_X in many nonattainment areas, and thus, aircraft NO_X emissions would further aggravate the problems in these areas (either by emitting pollutants directly within a nonattainment area or by contributing to regional transport emissions in an area upwind of a nonattainment area). More stringent aircraft engine NO_X standards may assist in alleviating these problems in nonattainment areas, and they may aid in preventing future concerns in areas currently designated as attainment (or maintenance) areas. In addition, attainment or maintenance of the NAAQS may depend upon aircraft engines being subject to a program of control compatible with their significance as pollution sources. (See the Summary and Analysis of Comments for this rulemaking for further discussion of future standards and the environmental need for control.)

EPA, therefore, is considering the exploration of more stringent future standards, beyond today's standards. Earlier this year, the ICAO Council adopted more stringent international consensus NO_X emission standards for newly certified aircraft engines (implementation date of after December 31, 2007).[78] The CAEP/6 NO_X standards generally represent about a 12 percent increase in stringency from the standards promulgated in this final rule (or the CAEP/4 NO_X standards).[79] (These standards were accompanied by more stringent standards for low-thrust engines). Moreover, CAEP agreed to review the stringency of the NO_X standards again during the work program for the eighth meeting of CAEP, which will commence in early 2007 and is expected to culminate in early 2010. Such standards will be a central consideration in a future EPA regulation of aircraft engine emissions. Thus, it will be important that the U.S. continue to actively participate in the technical emissions work activity that will endeavor to establish the technological basis for any increase in stringency that CAEP will contemplate. We believe this ongoing phased approach is the most appropriate means to address emissions from aircraft engines.

As we discussed in the proposal, activity is also underway in CAEP to identify and assess the potential for long-term technology goals to be established for further emission reductions, including implementing a CAEP-approved process to set and review these goals.[80] [81] The aim of the goal setting activity is to complement the ICAO CAEP standard setting process with information to aid the engine and airframe manufacturer's design process. The goals are expected to take into account the results of recently completed emissions reduction technology programs such as those conducted by National Aeronautics and Space Administration (NASA) and the European Commission and the timeline necessary to carry those technologies from the research phase through commercialization.[82] We support this CAEP work item for establishing goals. However, this should not be interpreted as agreement on our part that the CAEP process is the exclusive appropriate process for setting aircraft emissions reduction goals or for encouraging the development of better performing technology. For example, the Next Generation Air Transportation System

available at *http://www.epa.gov/otaq/aviation.htm.* It can also be found in Docket No. OAR–2002–0030.

[76] U.S. FAA, ''APO Terminal Area Forecast Summary Report,'' Aircraft Operations, June 30, 2005. The flight forecast data is based on FAA's Terminal Area Forecast System (TAFS). TAFs is the official forecast of aviation activity at FAA facilities. This includes FAA-towered airports, federally-contracted towered airports, nonfederal towered airports, and many non-towered airports. For detailed information on TAFS and the air carrier activity forecasts see the following FAA website: *http://www.apo.data.faa.gov/main/taf.asp.* The June 30, 2005 aviation forecasts contained in TAFS for Fiscal Years 2002–2020 included the impact of the terrorists' attacks of September 11, 2001 and the recent economic downturn. Currently, the aviation industry is undergoing significant structural and economic changes. These changes may necessitate revisions to forecasts for a number of large hub airports prior to the update of the entire TAF next year. A copy of the June 30, 2005 forecast summary report can also be found in Docket No. OAR–2002–0030.

[77] For information on the geographic location of airports, see the following U.S. Department of Transportation (Bureau of Transportation Statistics) website: *http://www.bts.gov/oai.* The report or database provided on the website entitled, ''Airport Activity Statistics of Certificated Air Carriers: Summary Tables 2000,'' lists airports by community. In addition, see the following EPA website for information on nonattainment areas for criteria pollutants: *http://www.epa.gov/oar/oaqps/greenbk.*

[78] ICAO News Release, ''ICAO Council Adopts New Standards for Aircraft Emissions,'' PIO 03/05, March 2, 2005. Copies of this document can be obtained at the ICAO website located at *http://www.icao.int.*

[79] ICAO, CAEP, Sixth Meeting, Montreal, Quebec, February 2–12, 2004, Report, Letter of Transmittal to the President of the Council From the Chairman of the Sixth Meeting of CAEP, CAEP/6–WP/57 (Report on Agenda Item 1). Copies of this document can be obtained from ICAO (*http://www.icao.int*). It can also be found in Docket No. OAR–2002–0030.

[80] ICAO, CAEP, Sixth Meeting, Montreal, Quebec, February 2–12, 2004, Report, Letter of Transmittal to the President of the Council From the Chairman of the Sixth Meeting of CAEP, CAEP/6–WP/57 (Report on Agenda Item 4). Copies of this document can be obtained from ICAO (*http://www.icao.int*). It can also be found in Docket No. OAR–2002–0030.

[81] For the purposes of setting long-term technology goals for aircraft emission reductions, the CAEP/6 (occurred in February 2004) future work program included the following items:

(a) Implement a CAEP-approved process to set, periodically review and update technology goals and identify environmental benefits, taking into account progress in ongoing research and development efforts toward reducing aircraft emissions, environmental interdependencies and trade-offs, and scientific understanding of the effects of aircraft engine emissions;

(b) Support and monitor development and methods for understanding the inter-relationship of technology goals targeting individual emissions performance improvements; and

(c) Develop the inputs appropriate for use of air quality and climate impact models to be used by CAEP to quantify the value of emissions reduction and to estimate the benefit from long-term goals.

ICAO, CAEP, Sixth Meeting, Montreal, Quebec, February 2–12, 2004, Report, Letter of Transmittal to the President of the Council From the Chairman of the Sixth Meeting of CAEP, CAEP/6–WP/57 (Appendix A to the Report on Agenda Item 4—Revised Work Program for CAEP, page 4A–7). Copies of this document can be obtained from ICAO (*http://www.icao.int*). It can also be found in Docket No. OAR–2002–0030.

[82] ICAO, CAEP, Fourth Meeting, Montreal, Quebec, April 6–8, 1998, Report, Document 9720, CAEP/4, see Appendix A to the Report on Agenda Item 4 (page 4–A–1). Copies of this document can be obtained from ICAO (*http://www.icao.int*).

(NGATS) plan was released in December 2004—a Congressionally chartered and Administration endorsed activity to develop research and plans to transform the air transportation system. Efforts there will include assessment of various technological and operational procedures to reduce aircraft emissions, including NO_X, as well as a thorough assessment of interrelationships between noise and emissions and amongst emissions to enable maximizing environmental benefit derived from mitigating actions. Further, in EPA's long history of mobile source regulation, we have found that performance-based standards have been successfully used to stimulate technological development resulting in cleaner, cost-effective, and safe engines.

Manufacturers should be able to achieve additional reductions with more lead time than is provided by today's action. As we discussed in the proposal, in the future we intend to assess, in coordination with the NGATS Environmental Integrated Product Team (IPT) whether or not the new international consensus and longer-term standards, CAEP/6 NO_X standards, would be stringent enough to protect the U.S. public health and welfare. If so, we would plan to propose to adopt the CAEP/6 NO_X standards. EPA in consultation with the Secretary of Transportation retains the discretion to adopt more stringent NO_X standards in the future if the international consensus standards ultimately prove insufficient to protect U.S. air quality. As discussed earlier, the implementation date, December 31, 2003, has already occurred for the CAEP/4 standards, and we need to promulgate today's standards to meet our obligations for the CAEP/4 standards. This final rule to promulgate aircraft engine NO_X standards equivalent to CAEP/4 standards is consistent with U.S. obligations under ICAO. We would not be able to quickly adopt a more stringent standard. However, we intend to consider further stringency in a future rulemaking. In addition, we have not yet assessed the costs (and emission benefits) of more stringent standards, but we anticipate doing so in the future for such standards.

Consideration of more stringent NO_X standards in the future will allow us to obtain important additional information on the costs of such standards.[83] As described earlier, section 231 of the CAA authorizes EPA from ''time to time'' to revisit emission standards, and it requires that any standards' effective dates permit the development of necessary technology, giving appropriate consideration to the cost. We did not propose more stringent NO_X standards primarily because we needed more time to better understand the cost of compliance of such standards. Cost data is now available from CAEP/6 (meeting occurred in February 2004), but we need to first adopt the standards equivalent to CAEP/4 today since we have already gone past the CAEP/4 implementation date. Although, as we described earlier, the CAEP/6 NO_X standards will be a central consideration in a future aircraft engine emission standards, other levels of further stringency would also be under consideration, and additional cost information for such standards would need to be evaluated.

As we discussed in the proposal, producing (and/or developing) new engines or engine technologies requires significant financial investments from engine manufacturers, which takes time to recoup (the amount of time depends upon sales of engines, replacement parts, etc.). After evaluating additional cost information for future standards as well as other emissions reduction approaches, we would then be better situated to make decisions on an appropriate level of stringency and implementation timing that maximizes NO_X reductions from aircraft engines, taking into consideration cost, safety, and noise.

B. Newly Manufactured Engines of Already Certified Models

We requested comment on whether the NO_X standards would apply to newly manufactured engines of already certified models (*i.e.*, those individual engines that are part of an already certified engine model, but are built after the effective date of the regulations for such engines and have never been in service),[84] but after careful consideration and reviewing comments from stakeholders, we have decided not to include such engines in today's final rulemaking. It is important to mention that CAEP/6 did not adopt provisions to apply the CAEP/4 NO_X standards to newly manufactured engines of already certified models (a production cut-off). CAEP/6 noted the industry view that market forces are the primary drivers of the development and incorporation of new technology (asserting voluntary compliance would suffice), and an understanding at CAEP/4 that a production cut-off would not be introduced in the future. CAEP/6, after reviewing that commitment, decided that ''* * *this should not be interpreted as meaning that production cut-offs would not be introduced in the future if the situation so warranted.''[85] [86] (As we discussed in the proposal, CAEP's Forecasting and Economic Analysis Support Group (FESG) further analyzed applying CAEP/4 NO_X standards to newly manufactured engines of already certified models for CAEP/6, and assessed effective dates of 2, 4, and 6 years after December 31, 2003, which is the implementation date for newly certified engines.[87] FESG estimated that the cost per ton of NO_X reduced would range from $3,800 to $11,200 for the three effective dates.[88] The emission benefits and costs of this provision are discussed further below.)

1. What Is the Status of Engines?

According to the ICAO Aircraft Engine Exhaust Emissions Data Bank,[89] nearly all already certified engine models (95 percent of already certified

[83] For low-thrust engines, deferring regulatory action on more stringent future standards until after CAEP/6 would also enable us to obtain additional information on the technological feasibility of such standards.

[84] This provision does not mean the re-certification or retrofit of existing in-use engines. Instead the provision would require the ongoing production of engines that have already been certified to meet the new standards, rather than following CAEP/4 and merely applying today's standards to future engine designs and allowing currently produced engine models to meet the previous standards.

[85] ICAO, CAEP, Sixth Meeting, Montreal, Quebec, February 2–12, 2004, Report, Letter of Transmittal to the President of the Council From the Chairman of the Sixth Meeting of CAEP, CAEP/6–WP/57 (Report on Agenda Item 1). A copy of this document can be found in Docket No. OAR–2002–30.

[86] CAEP/6 noted that industry ''pointed out that introduction of a production cut-off now would cause the manufacturer to modify engines to meet the CAEP/4 standards, whereas if no cut-off were imposed it was likely that they could be modified to meet the new standards agreed at this meeting.'' (ICAO, CAEP, Sixth Meeting, Montreal, Quebec, February 2–12, 2004, Report, Letter of Transmittal to the President of the Council From the Chairman of the Sixth Meeting of CAEP, CAEP/6–WP/57, Report on Agenda Item 1, pages 1–13.)

[87] ICAO, CAEP/6, Information Paper 28—Appendix B, ''FESG Economic Assessment of Applying a Production Cut-off to the CAEP/4 NO_X Standard'' Presented by the FESG Rapporteur, January 29, 2004 (Same as CAEP–SG20031–IP/9, which was presented at June 10, 2003 CAEP Steering Group Meeting). A copy of this document can be found in Docket No. OAR–2002–30.

[88] ICAO, CAEP/6, Information Paper 28—Appendix B, ''FESG Economic Assessment of Applying a Production Cut-off to the CAEP/4 NO_X Standard'' Presented by the FESG Rapporteur, January 29, 2004 (Same as CAEP–SG20031–IP/9, which was presented at June 10, 2003 CAEP Steering Group Meeting). A copy of this document can be found in Docket No. OAR–2002–30.

[89] International Civil Aviation Organization (ICAO), Aircraft Engine Exhaust Emissions Data Bank, July 26, 2004. This data bank is available at *http://www.caa.co.uk/default.aspx?categoryid=702&pagetype=90*. In addition, a copy of a table including data of engine NO_X emissions from the ICAO data bank and their margin to today's NO_X standards can be found in Docket OAR–2002–0030.

and in-production engine models in the Data Bank) currently meet or perform better than the standards we are adopting today.[90] (See Figure III.B–1 below for a comparison of the NO_X emission levels of current in-production engines to the CAEP/4 NO_X standards.[91]) At the time the CAEP/4 NO_X standards were adopted in 1998, all but 11 in-production engines and 5 newly designed engine models (these 5 engines were in the design and development process in 1998) had NO_X emission levels that would perform better than the CAEP/4 standards.[92] Today, nearly all of the engines that did not meet the CAEP/4 NO_X standard in 1998 now comply, except for the JT8D–200 engine family.[93] The other engine models have either, through additional testing or modifications, been improved to meet the standards or the engines are no longer in-production. Although, as described earlier, the ICAO Data Bank shows that eight engine models or three different Pratt and Whitney engine types or families do not meet the NO_X standards, we now know that except for the JT8D–217 and JT8D–219, six of the engine models or two of the engine types are compliant.

(The above reference for the fleet fraction is BACK Aviation Solutions, *http://www.backaviation.com/Information_Services/default.htm.*

The domestic flight information is based on SAGE, the System for Assessing Aviation Emissions. SAGE is an FAA model that estimates aircraft emissions through the full flight profile using non-proprietary input data, such as BACK, FAA's Enhanced Traffic Management System (ETMS), and the Official Airline Guide (OAG). The year 2000 air traffic movements database portion of SAGE was used to estimate the number of flights using the subject engines.)

The PW4090 family of engines (PW4077D, PW4084D, and PW4090) now has the means to eventually meet the standards utilizing technology that would meet the lower ranges of stringency options for the NO_X standards considered at CAEP/6, although the manufacturer has projected it would be some years before it expects to meet CAEP/6 levels (the manufacturer has not provided us with a projected necessary lead-time to meet CAEP/4). The engine family that includes the PW4164, PW4168 and PW4168A engines is now certified with the PW 4168 Technologically Affordable Low NO_X (Talon) II engine combustor technology, which performs significantly better than the CAEP/4 standards. Also, the JT8D–200 engine powers the MD–80 aircraft, which is no longer in production. Yet, the JT8D–200 engine (JT8D–217C and JT8D–219 in-production engines) could potentially apply to future supersonic business jets. As stated in the proposal, the resulting NO_X emission benefits of applying the standards to the JT8D–200 (for these possible supersonic business jets) would be expected to be very small, and the costs would also likely be relatively small on an industry wide basis, although as discussed further below we do not feel we have a sufficient record at this point—nor have we presented it for public comment—to state our definitive views on these issues. However, the direct (development) costs would most likely be borne by one engine manufacturer.[94] As discussed in the proposal, there is only one remaining newly designed engine model—out of the five identified in 1998—that would be certified after 2003, and it also has been made compliant with today's or CAEP/4 NO_X standards.[95]

In addition, as we indicated in the proposal, if an already certified engine design meets the standards that we are adopting today, then it is unlikely that either existing or future engine designs built to that design or type (derivatives or thrust variants with the same build standard) would not meet these standards. However, we may have been imprecise by stating in the proposal that when design modifications are made to an existing engine type, then this engine type would likely need to be recertified. Derivative versions of engines are not typically required to meet new standards for newly certified (and newly designed) engines, but they usually need to comply with the same standards as were applied to the original engine model.[96] [97] Thus, derivative versions of engines typically do not need to be recertified. However, an engine type that does need to recertified will be required to comply with the CAEP/4 and today's NO_X standards.

[90] Based on the ICAO Data Bank, 151 out of 159 (95 percent) engine models that are currently in production perform better than the CAEP/4 NO_X standards. The 8 engine models (which are mid- and high-thrust engines) that are not achieving the CAEP/4 NO_X standards are from three different Pratt and Whitney (PW) engine types or families (engines and their thrust variants with the same build standard). These engines are the following: (1) JT8D–217C E-kit and JT8D–219 E-kit; (2) PW4077D, PW4084D, and PW4090; and (3) PW4164, PW4168, and PW4168A. (See Figure III.B–1 below that specifically shows these 8 in-production models in relation to the CAEP/4 or proposed NO_X standards.) For the year 2000, these 8 engine models were found on approximately 751 out of 20,137 (3.7 percent) aircraft owned by U.S. carriers and accounted for approximately 1,541,172 out of 11,505,063 (13.4 percent) of U.S. domestic flights.

[91] For Figure III.B–1, the Allison, Pratt and Whitney (does not include JT8D–217C E-kit and JT8D–219 E-kit), Rolls-Royce, and Textron Lycoming engines with rated pressure ratios less than or equal to 20 and NO_X levels above the CAEP/4 NO_X standards actually perform better than the standards, since there are different CAEP/4 NO_X standards for these low-thrust engines (see section III.A.3 for further discussion of NO_X standards for low thrust engines). (47 of the 159 engines, 30 percent of engine models in production, in Figure IV.B–1 and the ICAO Aircraft Engine Exhaust Emissions Data Bank are low-thrust engines—engines with thrust greater than 26.7 kN but not more than 89 kN.)

[92] ICAO, CAEP/4, Working Paper 4, ''Economic Assessment of the EPG NO_X Stringency Proposal,'' March 12, 1998, Presented by the Chairman of Forecasting and Economic Analysis Support Group (FESG), Agenda Item 1: Review of proposals relating to NO_X emissions, including the amendment of Annex 16, Volume II, See Table 3.1 of paper. A copy of this paper can be found in Docket OAR–2002–0030.

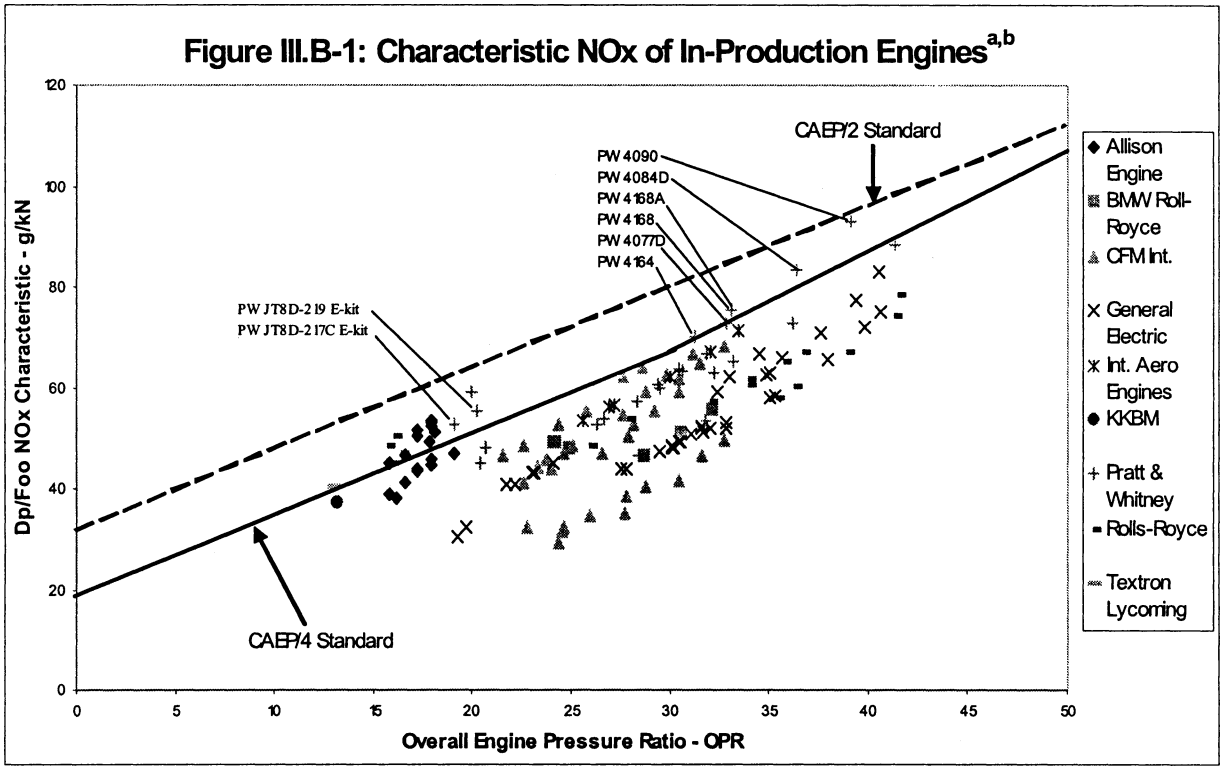
[93] ICAO, CAEP/6, Working Paper 34, ''NO_X Production Cut-off Consideration,'' Presented by the International Coordinating Council of Aerospace Industries Associations (ICCAIA), January 6, 2004. A copy of this document can be found in Docket No. OAR–2002–30.

[94] ICAO, CAEP/6, Information Paper 28—Appendix B, ''FESG Economic Assessment of Applying a Production Cut-off to the CAEP/4 NO_X Standard'' Presented by the FESG Rapporteur, January 29, 2004 (Same as CAEP–SG20031–IP/9, which was presented at June 10, 2003 CAEP Steering Group Meeting). A copy of this document can be found in Docket No. OAR–2002–30.

[95] The PW Canada growth engines are the one remaining type of newly designed engines. The ICAO Aircraft Engine Exhaust Emissions Data Bank currently does not have emissions certification data for such an engine, but Working Paper 34 presented at CAEP/6 indicated it would be compliant. (ICAO, CAEP/6, Working Paper 34, ''NO_X Production Cut-off Consideration,'' Presented by the International Coordinating Council of Aerospace Industries Associations (ICCAIA), January 6, 2004. A copy of this document can be found in Docket No. OAR–2002–30.)

[96] ICAO, CAEP/4, Information Paper 3, ''Clarification of the Definition of Derivative Version,'' Agenda Item 4—Future Work, Presented by United States, April 3, 1998. A copy of this document can be found in Docket No. OAR–2002–30.

[97] Chapter 1 of Part I of the ICAO Annex 16, Volume II, Aircraft Engine Emissions, defines derivative version as follows: ''an aircraft gas turbine engine of the same generic family as an originally type-certificated engine and having features which retain the basic core engine and combustor design of the original model and for which other factors, as judged by the certificating authority, have not changed.''



2. What Are the Issues With Applying Today's NO_X Standards to Newly Manufactured Engines of Already Certified Models?

One commenter expressed that EPA conceded in the proposed rule that it has historically applied aircraft emission standards to newly manufactured engines of already certified models, and doing so this time would prohibit the indefinite continued production of aircraft engines that would meet only the previous standards. ''EPA does not explain why it is proposing a sudden departure from the past practice of regulating already certified, newly manufactured engines—*i.e.*, what is different about this particular rulemaking that justifies the exemption of such engines.'' With the long life of aircraft engines and the availability of newly manufactured engines of already certified models in the future, there is a need to apply the proposed NO_X standards to this category of aircraft engines.

State and local governments recommended that the standards for newly manufactured engines of already certified models should be implemented one year after the effective date of the final rulemaking. At a minimum, EPA should have an implementation date that prohibits engine manufacturers from selling already certified engines unless the engines were recertified or redesigned to meet the proposed standards. Such a provision would be consistent with a stated objective of the rulemaking, which is to assure that progress in reducing aircraft engine emissions is not reversed in the future. Without such standards high-emitting engines can continue to be produced and brought into service, further adding to the long-term growth in aircraft emissions that is anticipated without a more aggressive approach to regulating this source.

Airlines commented that as the proposal acknowledges, market incentives lead manufacturers to bring their engines to the levels of the CAEP/4 NO_X standards as soon as possible once the standards take effect. Airlines investing in costly, long-lasting assets prefer to buy engines that meet the latest standards, and demand engines that perform better than the standard without regulatory intervention of a production cut-off (applying standards to newly manufactured engines of already certified models). Such market forces together with EPA's four-year delay in proposing to adopt the CAEP/4 NO_X standards, account for the fact that 94 percent of in-production engines already meet the standard.

In addition, airlines expressed that for the same reasons that the Agency should generally align with ICAO standards, it should be consistent with ICAO on whether to apply CAEP/4 standards to newly manufactured engines of already certified models. If EPA differed from ICAO on this provision, there would be the very inconsistency between domestic and international practice that aligning with ICAO requirements avoids. Furthermore, if EPA adopts such a provision prior to ICAO, such action would potentially place U.S. manufacturers and airlines at a competitive disadvantage for what EPA acknowledges to be minimal environmental benefit.

In addition, one airline expressed that it presently has the JT8D–219 engine on some of its commercial jets. The proposal indicated that the JT8D–219 would be used in supersonic business jets, which the airline does not operate; however, it (and maybe other domestic airlines) operates this engine in our commercial aircraft fleet. Therefore, the implication of these provisions has not been fully investigated by EPA as mandated by the CAA. (See the Summary and Analysis of Comments for this rulemaking for further discussion of comments.)

In response, as indicated earlier, the implementation date applicable to newly designed and certified engines under CAEP/4, December 31, 2003, has already occurred for the CAEP/4 standards, and at this late date to promulgate a provision to apply today's standards to newly manufactured engines of already certified models (a production cut-off) could be disruptive to the production planning of engine

manufacturers. EPA and ICAO (as we mentioned in the proposal and as one commenter noted in its comments) have historically adopted production cut-offs for previous standards, but in today's unique case the lateness of the rule may not provide manufacturers enough lead time for such planning. However, as we discussed earlier, we intend to consider more stringent NO_X standards in a future rulemaking, and similar to CAEP/6's future plans described above, we also intend to consider applying more stringent standards to newly manufactured engines of already certified models for such a future rulemaking. This provision is an important issue that we expect to fully consider for future standards.

While we solicited comment on extending the CAEP/4 standards to newly manufactured engines of already certified models, we did not develop a record that fully analyzes the emissions benefits (if any) and the implementation costs of going beyond CAEP in this manner. Therefore, the public has not been provided an opportunity to analyze and comment upon these important factors. We believe that our analysis of these factors would need to be weighed through a notice-and-comment process in determining whether a production cut-off, with a specific lead-time period, would be appropriate under CAA section 231 in this case. Particularly regarding the cost of compliance within necessary lead-time issue, we are concerned that there is insufficient data that specifically addresses the appropriate lead time for subjecting the few remaining in-production engine models to the CAEP/4 standards, and that our selection of a production cut-off date could therefore be viewed as arbitrarily chosen.

Since we have not yet provided that opportunity for public comment on our analysis of this issue, and since attempting to do so now would in our view unacceptably slow down this rulemaking, in the interests of expediency and of bringing U.S. domestic law into conformity with our obligations under the Chicago Convention (albeit tardily), we have decided that the most appropriate course for now, under CAA section 231 (a), is to simply update our regulations to track CAEP/4 in terms of both stringency levels and scope of applicability. Similarly, without having developed the necessary record and analysis, at this time we are unable to respond to the substantive comments offered by commenters regarding the production-cutoff issue, and our decision today should in no way be viewed as either endorsing or rejecting the concept of a production cut-off. Given the need to quickly promulgate standards that are at least as stringent as CAEP/4, we must decline to resolve the numerous issues raised either in favor of or in opposition to applying the CAEP/4 standards to newly manufactured engines of already certified models.

IV. Amendments to Criteria on Calibration and Test Gases for Gaseous Emissions Test and Measurement Procedures

In today's rulemaking, EPA will incorporate by reference ICAO's 1997 amendments to the criteria on calibration and test gases for the test procedures of gaseous emissions (ICAO International Standards and Recommended Practices Environmental Protection, Annex 16, Volume II, ''Aircraft Engine Emissions,'' Second Edition, July 1993; Amendment 3, March 20, 1997, Appendices 3 and 5) in 40 CFR 87.64. ICAO's amendments, which became effective on March 20, 1997, apply to subsonic (newly certified and newly manufactured engines [98]) and supersonic gas turbine engines. The technical changes will correct a few inconsistencies between the specifications for carbon dioxide (CO_2) analyzers (Attachment B of Appendices 3 and 5) and the calibration and test gases (Attachment D of Appendices 3 and 5) of gaseous emissions. The test procedure amendments incorporated by reference will be effective 30 days after the publication of the final rule.

For CAEP/3 in 1995, the Russian Federation presented a working paper entitled, ''Corrections to Annex 16, Volume II,'' that stated the following: [99]

> According to CAEP/2 recommendations, in the list of calibration and test gases (see the table in Attachment of Appendices 3 and 5) ''CO_2 in N_2'' was replaced with ''CO_2 in air'' gas. At the same time the following sub-paragraph was newly introduced into Attachment B (Appendices 3 and 5) :
>
> (g) The effect of oxygen (O_2) on the CO_2 analyzer response shall be checked. For a change from 0 percent O_2 to 21 percent O_2 the response of a given CO_2 concentration shall not change by more than 2 per cent of reading. If this limit cannot be met an appropriate correction factor shall be applied.
>
> Since the best way to carry out this checking procedure is to calibrate the analyzer first with CO_2 in nitrogen and then with CO_2 in air, both ''CO_2 in N_2'' and ''CO_2 in air'' gases have to be retained in the list. It seems then that ''CO in air,'' ''CO_2 in air,'' ''NO in N_2'' and now ''CO_2 in N_2'' have to be replaced with ''CO in zero air,'' ''CO_2 in zero air,'' ''CO_2 in zero nitrogen'' and ''NO in zero nitrogen'' just by analogy with the gaseous mixtures of different hydrocarbons diluted by zero air and listed in the same table.

In addition, at CAEP/3 the United Kingdom then presented a working paper on this same issue.[100] They indicated that CAEP's Working Group 3 (Emissions Working Group) had accepted the above proposals of the Russian Federation paper on correcting inconsistencies in the list of calibration and test gases specified in Annex 16, Volume II, Attachment D to Appendices 3 and 5, and Working Group 3 had recommended that these proposals be presented at CAEP/3. The United Kingdom also recommended the adoption of these Russian Federation proposals—to utilize CO_2 in nitrogen gas mixture to check the effect of oxygen on CO_2 analyzers. In addition, they recommended the specification of all calibration and test gases required for all the gaseous emissions tests required in Annex 16.

At CAEP/3, the CAEP members agreed that the above amendments to the calibration and test gases were justified, and thus, these amendments were then adopted.[101] Today, EPA will incorporate by reference the amendments to the criteria on calibration and test gases for the test procedures of gaseous emissions, because the changes improve the test procedures by correcting inconsistencies and distinguishing between calibration and test gases. The amendments will include the following: (1) Listing all calibration gases separately from test gases for HC, CO_2, CO and NO_X analyzers, (2) changing ''N_2'' to ''zero nitrogen'' in relation to the test gases for the HC and NO_X analyzers, (3) adding ''CO_2 in zero nitrogen'' as a test gas for CO_2 analyzer, (4) changing ''air'' to ''zero air'' in relation to the test gas for CO and CO_2 analyzers, (5) revising the accuracy to ''± 1 percent'' for the ''propane in zero air''

[98] Such engines include newly manufactured engines of already certified models.

[99] Russian Federation, ''Corrections to Annex 16, Volume II,'' Agenda Item 2: Review of reports of working groups relating to engine emissions and the development of recommendations to the Council thereon, Working Paper 19, Presented by A.A. Gorbatko, November 11, 1995 (distributed November 30, 1995), CAEP/3, Montreal, December 5 to 15, 1995. A copy of this paper can be found in Docket OAR–2002–0030.

[100] United Kingdom, ''Amendments to Annex 16, Volume II, Attachment D to Appendices 3 and 5 (Calibration and Test Gases),'' Agenda Item 2: Review of reports of working groups relating to engine emissions and the development of recommendations to the Council thereon, Working Paper 20, Presented by M.E. Wright, November 14, 1995 (distributed November 30, 1995), CAEP/3, Montreal, December 5 to 15, 1995. A copy of this paper can be found in Docket OAR–2002–0030.

[101] ICAO/CAEP, Report of Third Meeting, Montreal, Quebec, December 5–15, 1995, Document 9675, CAEP/3. Copies of this document can be obtained from ICAO (*http://www.icao.int*).

test gas of HC analyzer, (6) amending the accuracy to ''± 1 percent'' for the ''CO_2 in zero air'' test gas of CO_2 analyzer, (7) adding the accuracy ''± 1 percent'' for the ''CO_2 in zero nitrogen'' test gas of CO_2 analyzer, (8) changing accuracy to ''± 1 percent'' for test gas of CO analyzer, and (9) revising accuracy to ''± 1 percent'' for test gas of NO_X analyzer.

Manufacturers are already voluntarily complying with ICAO's 1997 amendments to the criteria on calibration and test gases for the test procedures of gaseous emissions. Thus, formal adoption of these ICAO test procedure amendments will require no new action by manufacturers. In addition, the existence of ICAO's requirements will ensure that the costs of compliance (as well as the air quality impact) with these test procedures will be minimal. (In the 1982 and 1997 final rules on aircraft engine emissions (47 FR 58462, December 30, 1982 and 62 FR 25356, May 8, 1997, respectively), EPA incorporated by reference the then-existing ICAO testing and measurement procedures for aircraft engine emissions (ICAO International Standards and Recommended Practices Environmental Protection, Annex 16, Volume II, ''Aircraft Engine Emissions,'' First and Second Editions, Appendices 3 and 5 were incorporated by reference in 40 CFR 87.64) in order to eliminate confusion over minor differences in procedures for demonstrating compliance with the U.S. and ICAO standards.)

V. Correction of Exemptions for Very Low Production Models

Because of an editorial error, the section in the aircraft engine emission regulations regarding exemptions for very low production models is incorrectly specified (see section 40 CFR 87.7(b)(1) and (2)). In the October 18, 1984 final rulemaking (49 FR 41000), EPA intended to amend the low production engine provisions of the aircraft regulations by revising paragraph (b) and deleting paragraphs (b)(1) and (b)(2) in order to eliminate the maximum annual production limit of 20 engines per year. In the revisions to paragraph (b), EPA retained the maximum total production limit of 200 units for aircraft models certified after January 1, 1984.[102] For § 87.7(b), today, EPA will correct this editorial error by eliminating paragraph (b)(1) and (b)(2).

As discussed further in the 1984 final rulemaking, this action will provide more flexibility for engine manufacturers in scheduling during the last few engine production years. Also, the air quality impact of eliminating the annual production limit will be very small.

VI. Coordination With FAA

The requirements contained in this action are being promulgated after consultation with the Federal Aviation Administration (FAA). Section 231(a)(2)(B)(i) of the CAA requires EPA to ''consult with the Administrator of the [FAA] on aircraft engine emission standards'' 42 U.S.C. 7571(a)(2)(B)(i), and section 231(a)(2)(B)(ii) indicates that EPA ''shall not change the aircraft engine emission standards if such change would significantly increase noise * * *.'' 42 U.S.C. 7571(a)(2)(B)(ii). Section 231(b) of the CAA states that ''[a]ny regulation prescribed under this section (and any revision thereof) shall take effect after such period as the Administrator finds necessary (after consultation with the Secretary of Transportation) to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.'' 42 U.S.C. 7571(b). Section 231(c) provides that any regulation under section 231 ''shall not apply if disapproved by the President * * * on the basis of a finding by the Secretary of Transportation that any such regulation would create a hazard to aircraft safety.'' 42 U.S.C. 7571(c). Under section 232 of the CAA, the Department of Transportation (DOT) has the responsibility to enforce the aircraft emission standards established by EPA under section 231.[103] As in past rulemakings and pursuant to the above referenced sections of the CAA, EPA has coordinated with the FAA of the DOT with respect to today's action.

Moreover, FAA is the official U.S. delegate to ICAO. FAA agreed to the 1997 and 1999 amendments at ICAO's Third and Fourth Meetings of the Committee on Aviation Environmental Protection (CAEP/3 and CAEP/4) after advisement from EPA.[104] FAA and EPA were both members of the CAEP's Working Group 3 (among others), whose objective was to evaluate emissions technical issues and develop recommendations on such issues for CAEP/3 and CAEP/4. After assessing emissions test procedure amendments and new NO_X standards, Working Group 3 made recommendations to CAEP on these elements. These recommendations were then considered at the CAEP/3 and CAEP/4 meetings, respectively, prior to their adoption by ICAO in 1997 and 1999.

In addition, as discussed above, FAA will have the responsibility to enforce today's requirements. As a part of its compliance responsibilities, FAA conducts the emission tests or delegates that responsibility to the engine manufacturer, which is then monitored by the FAA. Since the FAA does not have the resources or the funding to test engines, FAA selects engineers at each plant to serve as representatives (called designated engineering representatives (DERs)) for the FAA while the manufacturer performs the test procedures. DERs' responsibilities include evaluating the test plan, the test engine, the test equipment, and the final testing report sent to FAA. DERs' responsibilities are determined by the FAA and today's rulemaking will not affect their duties.

VII. Possible Future Aviation Emission Reductions (EPA/FAA Voluntary Aviation Emissions Reduction Initiative)

As discussed in the proposal, there is growing interest, particularly at the state and local level, in addressing emissions from aircraft and other aviation-related sources. Such interest is often related to plans for airport expansion which is occurring across the country. It is possible that other approaches may provide effective avenues to achieve additional aviation emission reductions, beyond EPA establishing aircraft engine emission standards.

Concerns by state and local air agencies and environmental and public health organizations about aviation emissions, led to EPA and FAA signing a memorandum of understanding (MOU) in March 1998 agreeing to work to identify efforts that could reduce aviation emissions.[105] FAA and EPA participated in a national stakeholder initiative led by states and industry whose goal was to develop a voluntary program to reduce pollutants from aircraft and other aviation sources that

[102] This action was taken in 1984 to provide greater flexibility to manufacturers for scheduling engine production rates during the final years.

[103] The functions of the Secretary of Transportation under part B of title II of the Clean Air Act (§§ 231–234, 42 U.S.C. 7571–7574) have been delegated to the Administrator of the FAA. 49 CFR 1.47(g).

[104] The Third Meeting of CAEP (CAEP/3) occurred in Montreal, Quebec from December 5 through 15 in 1995. CAEP/4 took place in Montreal from April 6 through 8, 1998.

[105] FAA and EPA, ''Agreement Between Federal Aviation Administration and Environmental Protection Agency Regarding Environmental Matters Relation to Aviation,'' signed on March 24, 1998 by FAA's Acting Assistant Administrator for Policy, Planning, and International Aviation, Louise Maillet, and EPA's Acting Assistant Administrator for Air and Radiation, Richard Wilson. A copy of this document can be found in Docket OAR–2002–0030.

contribute to local and regional air pollution in the United States. The major stakeholders that participated in this initiative included representatives of the aviation industry (passenger and cargo airlines and engine manufacturers), airports, state and local air pollution control officials, environmental organizations, and NASA.

Initially, the discussions with stakeholders focused on the prospect of aircraft engine emission reduction retrofit kits, which might be applied to certain existing aircraft engines.[106] However, as the initiative evolved, the focus was expanded by the stakeholders to identify strategies for various types of ground service equipment (GSE) in use at airports,[107] in addition to strategies to reduce aircraft emissions.[108] (At the same time, FAA developed a program, with Congressional approval, to fund conversion of airport infrastructure and ground support vehicles to alternative fuels technologies.[109]) Unfortunately, the state and industry stakeholders did not reach consensus on a national aviation emissions reduction program. The Agencies are currently contemplating next steps following from the national stakeholder initiative and discussions of potential voluntary programs.

In addition, in the proposal EPA invited comment on the national stakeholder initiative and any other approaches for aviation emission reductions, and we received many suggestions from commenters. We may consider these suggested approaches during our current reflection on the stakeholder initiative and for future voluntary programs.

Finally, FAA has two other initiatives that will assist in addressing concerns with respect to emissions from aircraft. First, in September 2003 it created a Center of Excellence—Partnership for Reduction of Air Transportation Noise and Emissions Reduction (PARTNER)—a consortium of 8 universities, 29 industry representatives as well as NASA and Transport Canada-to develop new approaches and solutions to reduce aviation's environmental impacts. Second, with the assistance of the National Academy of Sciences, FAA is developing the next generation of aviation noise and emissions models and analytical tools improve measurement, understanding, and targeted solutions. See the Summary and Analysis of Comments for further discussion of approaches to additional aviation emission reductions.

VIII. Regulatory Impacts

Aircraft engines are international commodities, and thus, they are designed to meet international standards. Today's action will have the benefit of establishing consistency between U.S. and international emission standards and test procedures. Thus, an emission certification test which meets U.S. requirements will also be applicable to all ICAO requirements. Engine manufacturers are already developing improved technology in response to the ICAO standards that match standards promulgated here, and EPA does not believe that the costs incurred by the aircraft industry as a result of the existing ICAO standards should be attributed to today's regulations. Also, the test procedure amendments (revisions to criteria on calibration and test gases) necessary to determine compliance are already being adhered to by manufacturers during current engine certification tests. Therefore, EPA believes that today's regulations will impose no additional burden on manufacturers.

The existence of ICAO's requirements results in minimal cost as well as air quality benefits from today's requirements.[110] Since aircraft and aircraft engines are international commodities, there is commercial benefit to consistency between U.S. and international emission standards and control program requirements. Also, the adoption of the ICAO standards and related test procedures is consistent with our treaty obligations.

IX. Public Participation

A number of interested parties participated in the rulemaking process that culminates with this final rule. This process provided opportunity for submitting written public comments following the proposal that we published on September 30, 2003 (68 FR 56226). We considered these comments in developing the final rule. In addition, we held a public hearing on the proposed rulemaking on November 13, 2003, and we have considered comments presented at the hearing.

We have prepared a detailed Summary and Analysis of Comments document, which describes comments we received on the proposal and our response to each of these comments. The Summary and Analysis of Comments is available in the e-docket for this rule, as well as on the Office of Transportation and Air Quality homepage (*http://www.epa.gov/otaq/aviation.htm*). In addition, comments and responses for key issues are included throughout this preamble.

X. Statutory Provisions and Legal Authority

The statutory authority for today's proposal is provided by sections 231 and 301(a) of the Clean Air Act, as amended, 42 U.S.C. 7571 and 7601(a). See section II of today's rule for discussion of how EPA meets the CAA's statutory requirements.

XI. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether this regulatory action is ''significant'' and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

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[106] Two engine models were indeed certificated with emissions retrofit kits, and a number of these engines have been purchased for aircraft with the retrofit kits installed in their stock configuration. However, retrofit kits have not to date provided widescale emissions improvements because it seems they may have limited applicability to certain engine types, small emission benefits, and cost issues.

[107] The stakeholders considered the impact, operation and design of GSE at airports, and whether to undertake projects at several airports to reduce overall emissions.

[108] Operational strategies, such as reducing the time in which aircraft are in idle and taxi modes and the impact of auxiliary power units (APUs) were also considered.

[109] The Vision 100-Century of Aviation Reauthorization Act, signed into law on December 12, 2003 (Pub. L. 108–176), directs the FAA to establish a national program to reduce airport ground emissions at commercial service airports located in air quality nonattainment and maintenance areas. The new Voluntary Airport Low Emissions (VALE) program will allow airport sponsors to use the Airport Improvement Program (AIP) and Passenger Facility Charges (PFCs) to finance low-emission vehicles, refueling and recharging stations, gate electrification, and other airport air quality improvements. *See* the FAA website located at *http://www.faa.gov/arp/environmental/vale.*

[110] CAEP's Forecasting and Economic Analysis Support Group (FESG) concluded at CAEP/4 that their assessment of these new NO_X standards indicates that the direct costs of the standards would be minimal, and the benefits would be modest. (ICAO, CAEP/4, Working Paper 4, ''Economic Assessment of the EPG NO_X Stringency Proposal,'' March 12, 1998, Presented by the Chairman of FESG, Agenda Item 1: Review of proposals relating to NO_X emissions, including the amendment of Annex 16, Volume II. A copy of this paper can be found in Docket OAR–2002–0030.

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, OMB has notified EPA that it considers this a ''significant regulatory action'' within the meaning of the Executive Order. EPA has submitted this action to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

B. Paperwork Reduction Act

This action does not impose an information collection burden under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* Any reporting and recordkeeping requirements associated with these standards would be defined by the Secretary of Transportation in enforcement regulations issued later under the provisions of section 232 of the Clean Air Act. Since most if not all manufacturers already measure NO_X and report the results to the FAA, any additional reporting and record keeping requirements associated with FAA enforcement of today's regulations would likely be very small.

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 EPA's regulations in 40 CFR are listed in 40 CFR part 9.

C. Regulatory Flexibility Analysis

EPA has determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule.

For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) A small business as defined by SBA size standards; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; or (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. The following Table XI–C–1 provides an overview of the primary SBA small business categories potentially affected by this regulation.

TABLE XI–C–1.—PRIMARY SBA SMALL BUSINESS CATEGORIES POTENTIALLY AFFECTED BY THIS REGULATION

Industry	NAICS [a] codes	Defined by SBA as a small business if: [b]
Manufacturers of new aircraft engines	336412	< 1,000 employees.
Manufacturers of new aircraft	336411	< 1,500 employees.

[a] North American Industry Classification System (NAICS).

[b] According to SBA's regulations (13 CFR part 121), businesses with no more than the listed number of employees or dollars in annual receipts are considered ''small entities'' for purposes of a regulatory flexibility analysis.

After considering the economic impacts of today's rule on small entities, EPA has concluded that this action will not have a significant economic impact on a substantial number of small entities. This rule will not impose any requirements on small entities. Our review of the list of manufacturers of commercial aircraft gas turbine engines with rated thrust greater than 26.7 kN and manufacturers of aircraft with such engines indicates that there are no U.S. manufacturers that qualify as small businesses. We are unaware of any foreign manufacturers with a U.S.-based facility that will qualify as a small business.

As discussed earlier, today's action will codify emission standards that manufacturers currently adhere to (nearly all in-production engines already meet the standards). These standards are equivalent to the ICAO international consensus standards. Today's emission standards will not impose any additional burden on manufacturers because they are already designing engines to meet the ICAO standards. Also, the test procedure amendments (revisions to criteria on calibration and test gases) necessary to determine compliance are already being adhered to by manufacturers during current engine certification tests.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory

proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditure of $100 million or more for State, local, or tribal governments, in the aggregate or the private sector in any one year. This rule contains no regulatory requirements that might significantly or uniquely affect small governments. Today's action will codify emission standards that manufacturers currently adhere to (nearly all in-production engines already meet the standards). These standards are equivalent to the ICAO international consensus standards. Today's emission standards will not impose any additional burden on manufacturers because they are already designing new engines to meet the ICAO standards. Thus, the annual effect on the economy of today's standards will be minimal. Today's rule is not subject to the requirements of sections 202 and 205 of the UMRA.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Today's rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. As discussed earlier, section 233 of the CAA preempts states from adopting or enforcing aircraft engine emission standards that are not identical to our standards. This rule merely modifies existing EPA aircraft engine emission standards and test procedures and therefore will merely continue an existing preemption of State and local law. Thus, Executive Order 13132 does not apply to this rule.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicited comment on the proposed rule from State and local officials.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 6, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.''

This rule does not have tribal implications, as specified in Executive Order 13175. The promulgated emission standards and other related requirements for private industry in this rule have national applicability and therefore do not uniquely affect the communities of Indian Tribal Governments. As discussed earlier, section 233 of the CAA preempts states from adopting or enforcing aircraft engine emission standards that are not identical to our standards. This final rule merely modifies existing EPA aircraft engine emission standards and test procedures and therefore will merely continue an existing preemption of State and local law. In addition, today's rule will be implemented at the Federal level and impose compliance obligations only on engine manufacturers. Thus, Executive Order 13175 does not apply to this rule.

G. Executive Order 13045: Protection of Children From Environmental Health & Safety Risks

Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that (1) is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, Section 5–501 of the Order directs the Agency to evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This rule is not subject to Executive Order 13045 because the Agency does not have reason to believe the environmental health risks or safety risks addressed by this action present a disproportionate risk to children. EPA believes that the NO_X emission reductions (NO_X is a precursor to the formation of ozone and PM) from this rulemaking will further improve air quality and will further improve children's health.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This rule is not a ''significant energy action'' as defined in Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. As discussed earlier, today's action will codify emission standards that manufacturers currently adhere to (nearly all in-production engines already meet the standards). These standards are equivalent to the ICAO international consensus standards. The final standards will have no likely adverse energy effects because manufacturers are already designing engines to meet the ICAO standards. Also, the test procedure amendments (revisions to criteria on calibration and test gases) necessary to determine compliance are already being adhered to by manufacturers during current engine certification tests. Thus, we have concluded that this rule is not likely to have any adverse energy effects.

I. National Technology Transfer Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This final rulemaking involves technical standards for testing emissions for commercial aircraft gas turbine engines. EPA will use test procedures contained in ICAO International Standards and Recommended Practices Environmental Protection, with the modifications contained in this

rulemaking.[111] These procedures are currently used by all manufacturers of commercial aircraft gas turbine engines (with thrust greater than 26.7 kN) to demonstrate compliance with ICAO emissions standards.

J. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2). This rule will be effective December 19, 2005.

List of Subjects in 40 CFR Part 87

Environmental protection, Air pollution control, Aircraft, Incorporation by reference.

Dated: November 9, 2005.

Stephen L. Johnson,

Administrator.

■ For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is amended as follows:

PART 87—CONTROL OF AIR POLLUTION FROM AIRCRAFT AND AIRCRAFT ENGINES

■ 1. The authority citation for part 87 continues to read as follows:

Authority: Secs. 231, 301(a), Clean Air Act, as amended (42 U.S.C 7571, 7601(a)).

Subpart A—[Amended]

■ 2. Section 87.7 is amended by removing paragraphs (b)(1) and (b)(2).

■ 3. A new § 87.8 is added to read as follows:

§ 87.8 Incorporation by reference.

We have incorporated by reference the documents listed in this section. The Director of the Federal Register approved the incorporation by reference as prescribed in 5 U.S.C. 552(a) and 1 CFR part 51. Anyone may inspect copies at the U.S. EPA, Air and Radiation Docket and Information Center, 1301 Constitution Ave., NW., Room B102, EPA West Building, Washington, DC 20460 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*.

(a) *ICAO material.* Table 1 of § 87.8 lists material from the International Civil Aviation Organization that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the sections of this part where we reference it. Anyone may purchase copies of these materials from the International Civil Aviation Organization, Document Sales Unit, 999 University Street, Montreal, Quebec, Canada H3C 5H7. Table 1 follows:

TABLE 1 OF § 87.8.—ICAO MATERIALS

Document number and name	Part 87 reference
International Civil Aviation Organization Annex 16, Environmental Protection, Volume II, Aircraft Engine Emissions, Second Edition, July 1993, Including Amendment 3 of March 20, 1997 (as indicated in footnoted pages.).	87.8, 87.64, 87.71, 87.82, 87.89.

(b) [Reserved]

Subpart C—[Amended]

■ 4. Section 87.21 is amended by adding paragraphs (d)(1)(vi) and (d)(1)(vii) to read as follows:

§ 87.21 Standards for exhaust emissions.

* * * * *

(d) * * *

(1) * * *

(vi) Engines of a type or model of which the date of manufacture of the first individual production model was after December 31, 2003:

(A) Engines with a rated pressure ratio of 30 or less:

(*1*) Engines with a maximum rated output greater than 89 kilonewtons:

Oxides of Nitrogen: (19 + 1.6(rPR)) grams/kilonewtons rO.

(*2*) Engines with a maximum rated output greater than 26.7 kilonewtons but not greater than 89 kilonewtons:

Oxides of Nitrogen: (37.572 + 1.6(rPR) − 0.2087(rO)) grams/kilonewtons rO.

(B) Engines with a rated pressure ratio greater than 30 but less than 62.5:

(*1*) Engines with a maximum rated output greater than 89 kilonewtons:

Oxides of Nitrogen: (7 + 2(rPR)) grams/kilonewtons rO.

(*2*) Engines with a maximum rated output greater than 26.7 kilonewtons but not greater than 89 kilonewtons:

Oxides of Nitrogen: (42.71 + 1.4286(rPR) − 0.4013(rO) + 0.00642(rPR × rO)) grams/kilonewtons rO.

(C) Engines with a rated pressure ratio of 62.5 or more:

Oxides of Nitrogen: (32 + 1.6(rPR)) grams/kilonewtons rO.

(vii) The emission standards prescribed in paragraph (d)(1)(vi) of this section shall apply as prescribed beginning December 19, 2005.

* * * * *

Subpart G—[Amended]

■ 5. Section 87.64 is revised to read as follows:

§ 87.64 Sampling and analytical procedures for measuring gaseous exhaust emissions.

The system and procedures for sampling and measurement of gaseous emissions shall be as specified by Appendices 3 and 5 to ICAO Annex 16 (incorporated by reference in § 87.8).

■ 6. Section 87.71 is revised to read as follows:

§ 87.71 Compliance with gaseous emission standards.

Compliance with each gaseous emission standard by an aircraft engine shall be determined by comparing the pollutant level in grams/kilonewton/thrust/cycle or grams/kilowatt/cycle as calculated in § 87.64 with the applicable emission standard under this part. An acceptable alternative to testing every

[111] ICAO International Standards and Recommended Practices Environmental Protection, Annex 16, Volume II, ''Aircraft Engine Emissions,'' Second Edition, July 1993—Amendment 3, March 20, 1997. Copies of this document can be obtained from ICAO (*http://www.icao.int*).

engine is described in Appendix 6 to ICAO Annex 16 (incorporated by reference in § 87.8). Other methods of demonstrating compliance may be approved by the Secretary with the concurrence of the Administrator.

Subpart H—[Amended]

■ 7. Section 87.82 is revised to read as follows:

§ 87.82 Sampling and analytical procedures for measuring smoke exhaust emissions.

The system and procedures for sampling and measurement of smoke emissions shall be as specified by Appendix 2 to ICAO Annex 16 (incorporated by reference in § 87.8).

■ 8. Section 87.89 is revised to read as follows:

§ 87.89 Compliance with smoke emission standards.

Compliance with each smoke emission standard shall be determined by comparing the plot of SN as a function of power setting with the applicable emission standard under this part. The SN at every power setting must be such that there is a high degree of confidence that the standard will not be exceeded by any engine of the model being tested. An acceptable alternative to testing every engine is described in Appendix 6 to ICAO Annex 16 (incorporated by reference in § 87.8).

[FR Doc. 05–22704 Filed 11–16–05; 8:45 am]

BILLING CODE 6560–50–U

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

43 CFR Part 1820

[WO 630–1610–EI–25–2Z]

RIN 1004–AD77

Application Procedures, Execution and Filing of Forms: Correction of State Office Address for Filings and Recordings, Proper Offices for Recording of Mining Claims

AGENCY: Bureau of Land Management, Interior.

ACTION: Final rule.

SUMMARY: This final rule amends the regulations pertaining to execution and filing of forms in order to reflect the new address of the Arizona State Office of the Bureau of Land Management (BLM), which moved on October 5, 2005. All filings and other documents relating to public lands in Arizona must be filed at the new address of the State Office.

EFFECTIVE DATE: November 17, 2005.

FOR FURTHER INFORMATION CONTACT: Diane Williams, Regulatory Affairs Group, (202) 452–5030. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339, 24 hours a day, 7 days a week.

ADDRESSES: You may send inquiries or suggestions to Director (630), Bureau of Land Management, Eastern States Office, 7450 Boston Boulevard, Springfield, Virginia 22153; Attention: RIN 1004–AD77.

SUPPLEMENTARY INFORMATION:

I. Background

This final rule reflects the administrative action of changing the address of the Arizona State Office of the BLM. It changes the street address for the personal filing of documents relating to public lands in Arizona, but makes no other changes in filing requirements. The BLM has determined that it has no substantive impact on the public, imposes no costs, and merely updates a list of addresses included in the Code of Federal Regulations for the convenience of the public. The Department of the Interior, therefore, for good cause finds under 5 U.S.C. 553 (b)(B) and 553 (d)(3) that notice and public comment procedures are unnecessary and that the rule may take effect upon publication.

II. Procedural Matters

Regulatory Planning and Review (Executive Order 12866)

This final rule is an administrative action to change the address for one BLM State Office. This rule was not subject to review by the Office of Management and Budget under Executive Order 12866. It imposes no costs, and merely updates a list of addresses included in the Code of Federal Regulations for the convenience of the public.

National Environmental Policy Act

This final rule is a purely administrative regulatory action having no effect upon the public or the environment, it has been determined that the rule is categorically excluded from review under section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(C)).

Regulatory Flexibility Act

Congress enacted the Regulatory Flexibility Act of 1980 (5 U.S.C. 601, *et seq.*) to ensure that Government regulations do not unnecessarily or disproportionately burden small entities. This final rule is a purely administrative regulatory action having no effects upon the public or the environment, it has been determined that the rule will not have a significant effect on the economy or small entities.

Small Business Regulatory Enforcement Fairness Act

This final rule is a purely administrative regulatory action having no effects upon the public or the economy. This is not a major rule under Small Business Regulatory Enforcement Fairness Act (5 U.S.C. 804(2)). It should not have an annual effect on the economy of $100 million or more. The rule will not cause a major increase in costs of prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions. It will not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of United States-based enterprises to compete with foreign-based enterprises.

Unfunded Mandate Reform Act of Act

The BLM has determined that the final rule is not significant under the Unfunded Mandates Reform Act of 1995 because it will not result in the expenditure by State, local, and tribal governments, in the aggregates, or by the private sector, of $100 million or more in any one year.

Further, the final rule will not significantly or uniquely affect small governments. It does not require action by any non-federal government entity. Therefore, the information required by the Unfunded Mandates Reform Act (2 U.S.C. 1531 *et. seq.*), is not required.

Executive Order 12630, Government Action and Interference With Constitutionally Protected Property Rights (Takings)

As required by Executive Order 12630, the Department of the Interior has determined that the rule would not cause a taking of private property. No private property rights would be affected by a rule that merely reports an address change for the Arizona State Office. The Department therefore certifies that this final rule does not represent a governmental action capable of interference with constitutionally protected property rights.