Order Code RL33949

CRS Report for Congress

Environmental Impacts of Airport Operations, Maintenance, and Expansion

April 5, 2007

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Prepared for Members and Committees of Congress

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Summary

Funding authorization for Federal Aviation Administration (FAA) programs set forth in the Vision 100 — Century of Aviation Reauthorization Act (P.L. 108-176, hereafter referred to as Vision 100) are set to expire at the end of FY2007. During the current reauthorization process, methods to address the environmental impacts associated with airport operations and expansion are likely to be debated. This issue is important to various stakeholders, particularly those whose health, property values, and quality of life may be affected by such impacts. The concerns of community members and local, state, and tribal agencies regarding environmental impacts have led to the delay and cancellation of some airport expansion projects.

To address these concerns, airports may be required to implement projects that would minimize the environmental impacts of their operations. Some of these projects qualify for federal funding. For example, in its FY2008 budget, the FAA requested $354 million to meet its "Environmental Stewardship" goals. Projects funded under this category address the environmental impacts of airports, primarily to abate airport noise (e.g., soundproofing homes, purchasing noise barriers and monitors, and relocating persons or businesses). Among other uses, funds may be spent on projects to minimize water quality impacts (e.g., funding projects that would control the discharge of deicing chemicals) and to reduce airport-controllable air emissions (e.g., purchasing alternative fuel vehicles to replace the airport's ground services equipment). Funds also are authorized for researching new aircraft technology that would reduce noise and air emissions.

The anticipated growth in air travel has heightened the significance and complexity of some environmental regulatory issues. Also, several new requirements are expected to affect airport operations (in terms of procedural changes and potential investment in infrastructure). The most significant issues include changes to Environmental Protection Agency (EPA) standards applicable to deicing operations and oil spill prevention procedures, as well as state and local agency directives to monitor and control air pollution, particularly toxic air pollutants.

On February 14, 2007, the FAA proposed legislation to reauthorize FAA funding (H.R. 1356, the Next Generation Air Transportation System Financing Reform Act of 2007). Environment-related provisions of the proposal would fund projects intended to minimize environmental impacts or help airports comply with regulatory obligations; fund environment-related research, such as new technology that would produce quieter, more fuel-efficient aircraft; and amend existing environmental regulatory requirements.

To better understand the need for funding environment-related airport projects and research, this report provides an overview of the main environmental impacts associated with airport operations: noise, water quality, and air quality. Also discussed are the environmental review requirements of the National Environmental Policy Act of 1969 (NEPA) and the environmental provisions in proposed legislation to reauthorize FAA programs.

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In its FY2008 budget, the FAA requested $354 million to meet the agency's "Environmental Stewardship" goals.[1] Projects funded under this category address the environmental impacts of airports, primarily aircraft noise. Among other uses, those funds may be spent on projects to abate airport noise impacts (e.g., soundproofing residential homes, purchasing noise barriers and monitors, and relocating persons or businesses); to minimize water quality impacts (e.g., funding projects that would control the discharge of deicing chemicals); and to reduce airport-controllable air emissions (e.g., purchasing alternative fuel vehicles). Funds also are authorized for researching new aircraft technology that would reduce noise and air emissions.

To illustrate how airports would potentially utilize these funds,[2] this report provides an overview of the main environmental impacts associated with airport operations: noise, water quality, and air quality. Also discussed are the environmental review requirements of the National Environmental Policy Act of 1969 (NEPA, 42 U.S.C. §§ 4321-4347) and an overview of environmental provisions in proposed legislation to reauthorize FAA programs.

This report does not discuss the national or international environmental impacts of aviation in general. Therefore, a discussion of the aviation industry's potential

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[1] See FAA "Budgets in Brief," available at [http://www.faa.gov/about/budget/].

[2] Airports rely on various funding sources, some public and some private, to finance their capital development. For information about federal funding available to airports, see CRS Report RL33913, *Aviation Finance: Federal Aviation Administration (FAA) Reauthorization and Related Issues*, by John Fischer. For information about all funding sources (public and private), see General Accounting Office (GAO, now called the Governmental Accountability Office) report GAO/RCED-98-7, *Airport Financing: Funding Sources for Airport Development*, March 1998, and GAO-03-497T, *Airport Finance: Past Funding Levels May Not Be Sufficient to Cover Airports' Planned Capital Development*, February 2003.

contribution to global warming is not discussed. However, information about this issue is included in the "For Additional Information" section below.

Overview of Airport Environmental Issues

In the next 15 years, air travel is projected to grow significantly.[3] As a result, airport development and expansion projects will likely become increasingly important. A potential challenge to the completion of these projects is community concern regarding airport environmental impacts. Airport operations involve a range of activities that affect the environment, including

- the operation of aircraft;
- the operation of airport and passenger vehicles, and airport ground service equipment (GSE);
- cleaning and maintenance of aircraft, GSE, and motor vehicles;
- deicing and anti-icing of aircraft and airfields;
- fueling and fuel storage of aircraft and vehicles;
- airport facility operations and maintenance; and
- construction.

The environmental impacts of these activities may intensify if an airport is undergoing expansion. In some cases, before a state or local agency will allow an airport to move forward with an expansion project, the airport authority must agree to implement certain environmental mitigation projects. Community concern regarding environmental impacts has caused projects to be delayed or cancelled.

All airports, regardless of size or location, are regulated to some degree under local, state, tribal, or federal environmental requirements. Many of the environmental regulatory requirements applicable to noise, water, and air quality have been in effect for years — airport managers are accustomed to their compliance requirements. However, the anticipated growth in air travel has heightened the significance and complexity of some environmental regulatory issues. Also, several new requirements are expected to result in potentially significant changes to airport operations (in terms of procedural changes and potential investment in infrastructure). The most significant issues include

- continuing community concern about noise,

- changes to Environmental Protection Agency (EPA) regulations applicable to aircraft and airfield deicing operations,

- changes to EPA regulations applicable to oil spill prevention planning, and

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[3] See CRS Report RL32707, *Avoiding Gridlock in the Skies: Issues and Options for Addressing Growth in Air Traffic*, by Bart Elias.

- state and local agency directives to monitor and control air pollution, particularly toxic air pollutants.

Each of these issues is discussed below within the context of requirements applicable to noise, water quality, and air quality issues. Primarily, the issues discussed in this report involve activities that are unique to airport operations (e.g., deicing and aircraft noise). Environmental compliance requirements commonly applicable to all industrial operations (e.g., waste management, pesticide use, chemical use reporting) are not discussed in this report.[4]

Noise Issues

Aviation noise may have a negative impact on the quality of life and property values of members of a surrounding community. (Direct health impacts of noise are more difficult to determine.) Although the percentage of people affected by aircraft noise has been significantly reduced during the past 35 years by advancements in aircraft technology and noise abatement efforts,[5] aircraft noise is often the principal focus for community groups and larger non-governmental organizations that oppose runway expansion.

Despite improvements, noise continues to be a significant problem because

- the amount of air traffic is growing,
- the number of airliners and corporate jets is increasing, and
- airline traffic and noise is concentrated at a small number of airports that are also likely to be among the largest airports.[6]

An airport may use various approaches to address airport noise issues. Selected approaches, and challenges to implementing them, are summarized in **Table 1**. Each approach is potentially eligible for federal funding.[7]

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[4] For a full characterization of federal statutes and regulations likely to apply to airports, see the EPA's, Office of Enforcement and Compliance Assurance, "EPA Office of Compliance Sector Notebook Project: Air Transportation Industry," EPA Document Number EPA/310-R-97-001, October 1998, available at [http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/airtrans.pdf].

[5] GAO, *Aviation and the Environment: Airport Operations and Future Growth Present Environmental Challenges*, GAO/RCED-00-153, Aug. 30, 2000.

[6] National Academy of Sciences (NAS), National Research Council (NRC), Committee on Aeronautics Research and Technology for Environmental Compatibility, *For Greener Skies: Reducing Environmental Impacts of Aviation* (2002), p. 11.

[7] See CRS Report RL33891, *Airport Improvement Program: Issues for Congress*, by Robert Kirk.

Table 1. Selected Approaches To Addressing Airport Noise

Approach	Description	Challenges to Implementation
Mitigation	Includes mechanisms for accommodating/living with existing noise levels in certain areas adjacent to an airport, such as the installation of sound-proofing materials at nearby homes, schools, and hospitals and purchasing land "buffers" around the airport.	This approach addresses immediate needs of a community affected by high levels of aircraft noise. However, some mitigation efforts (e.g., soundproofing) do not address issues associated with outdoor noise. Further, the use of limited funds for short-tem benefits detracts from investments in long-term noise reduction technology.
Land use restrictions	Involves accommodating existing noise levels by establishing land use/ development restrictions based on noise exposure levels in certain areas adjacent to an airport.	Airport authorities are often able only to recommend such restrictions, not impose them on a local zoning or land use planning commission (federal *guidelines* exist, but the federal government has no authority to set or enforce standards) . Local land use decisions take many factors into account, including, but not limited to, considerations of aviation noise. Further, land use restrictions are only as strong as the local agency's interest in enforcing them. Also, this is not an option in areas where heavy development around the airport already exists.
Operational	Includes the implementation of airport/aircraft restrictions that will decrease or eliminate noise exposure, such as restrictions on the use of certain runways, limits on hours of airport operation, implementation of certain departure and landing procedures (e.g., continuous descent approaches (CDA)), or the use of specific flight paths to avoid populated areas.	Many operational noise abatement procedures may be easily implemented and require limited funding. However, operational restrictions may limit an airport's capacity, further contributing to airport congestion and travel delays, and to higher airline operating costs. The FAA's process for approving of operational procedures (at 40 C.F.R. 161, referred to as the Part 161 process) is complex; legal challenges and judicial review of the process may significantly slow the process.
Technological advancements	Involves research into quieter aircraft technology.	Implementation of quieter aircraft technology would minimize the need for funding mitigation measures or operational restrictions. Also, increased fuel costs may make options that increase fuel efficiency, and incidently decrease noise, more attractive. However, incremental advancements in noise reduction are costly and have long lead times, both as a result of the time it takes to make improvements in aircraft noise levels and the long lifetimes of existing aircraft in the fleet.

Source: Table prepared by the Congressional Research Service (CRS) based on a review of various sources, including *For Greener Skies: Reducing Environmental Impacts of Aviation* (National Academy of Sciences [NAS], National Research Council, Committee on Aeronautics Research and Technology for Environmental Compatibility, 2002).

Ultimately, decisions regarding mitigation measures and operational changes are made by the airport authority in accordance with requirements of the state or local government; land use restrictions can be suggested by the airport authority, but are implemented entirely at the discretion of local government.[8] The federal role is primarily to fund those efforts, establish aircraft noise limits,[9] and fund research.[10]

Interested stakeholders have debated for a long time how funding dollars should be allocated. Airports are likely to prefer funding short-term operational and mitigation strategies to address immediate needs. Others argue that an increased proportion of federal funding should be directed toward research. For example, according to the NAS, the National Aeronautical and Space Administration (NASA) has set technically feasible noise reduction goals, but the level of funding for its research programs is too low to achieve the current goals on schedule or to remove noise as an impediment to the growth of aviation.[11]

For more information on airport noise requirements, see the "Mitigating Aircraft Noise Through Policy and Technology" section of CRS Report RL33698, *Reauthorization of the Federal Aviation Administration: Background and Issues for Congress*, coordinated by Bart Elias and CRS Report RS20531, *Noise Abatement and Control: The Federal Role*, by David Bearden.

Water Quality Issues

Airport operations include many activities likely to result in the discharge of pollutants to adjacent water bodies. Those activities include aircraft and airfield deicing and anti-icing,[12] fuel storage and refueling, aircraft and vehicle cleaning and maintenance, and construction. These activities are regulated under provisions of the Clean Water Act (CWA).

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[8] For examples of methods used by airports to address noise issues, see the FAA's "Noise Exposure and Land Use Information" Web page, provided pursuant to requirements specified under Vision 100, at [http://www.faa.gov/airports_airtraffic/airports/environmental/airport_noise/noise_exposure_maps/].

[9] The Airport Noise and Capacity Act of 1990 (ANCA; P.L. 101-508) required the phaseout of certain older, louder aircraft. In 2005, the FAA established more stringent aircraft noise standards applicable to all new airplane types designed on or after January 1, 2006 (it does not require a phaseout of existing aircraft). See Federal Aviation Administration, "Stage 4 Aircraft Noise Standards; Final Rule," *Federal Register*, 70(127), 38741-38750, July 5, 2005.

[10] Research and development is primarily carried out by the National Aeronautical and Space Administration (NASA). The FAA focuses on assessing noise compatibility, aircraft certification, and regulatory issues, although some development of aircraft noise modeling and assessment tools occurs within the FAA.

[11] NAS, *For Greener Skies*, p. 15.

[12] *Deicing* involves the removal of frost, snow, or ice from aircraft surfaces or from paved areas, including runways, taxiways, and gate areas. *Anti-icing* refers to the prevention of the accumulation of frost, snow, or ice on these same surfaces.

The CWA prohibits any "point source" (a discrete conveyance such as a drainage ditch, pipe, or other outfall) from discharging pollutants into waters of the United States. The primary mechanism for controlling pollutant discharges is through the administration of the National Pollutant Discharge Elimination System (NPDES) permit program, which is implemented, in most cases, by individual states.[13] The NPDES permit program regulates discharges of stormwater[14] and wastewater. Due to the nature of their outdoor operations and because airports are included in one of the industrial categories regulated under the NPDES stormwater permitting program (under the Standard Industrial Classification code "Transportation by Air"), all airports are required to have a stormwater permit.[15] Airports that discharge other wastewater, such as from equipment maintenance and cleaning operations, require an additional NPDES wastewater permit.

Discharges associated with stormwater often pose the greatest challenge to airport managers, because airports may be spread out over a wide surface area, with a majority of operations exposed to the elements. For example, the Dallas Forth Worth International Airport encompasses 18,000 square acres and has 62 stormwater outfalls. Controlling or monitoring every outfall is difficult.

The primary method for controlling stormwater discharges is the implementation of best management practices (BMPs) that prevent or minimize the discharge of pollutants into a water body (e.g., construction of a stormwater retention pond to prevent stormwater drainage directly into receiving waters). BMPs appropriate for one airport are not necessarily appropriate for another. Factors that may affect permit requirements (i.e., appropriate BMPs), include

- the local climate (dry versus rainy/wet, cold versus warm);
- the type or size of adjacent water bodies — pollutants are diluted depending on the size of the water body receiving the discharge (e.g., a creek or stream versus a river or ocean);
- the water quality of adjacent water bodies — local permitting authorities consider existing pollutant levels when controlling airport discharges; and
- airport size.

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[13] For more information about the NPDES Permit Program , see EPA's Web page "NPDES Permit Program Basics," at [http://cfpub.epa.gov/npdes/home.cfm?program_id=45].

[14] Stormwater discharges are generated by runoff from land and impervious areas such as paved streets, parking lots, and building rooftops during rainfall and snow events. By running over contaminated surfaces, stormwater becomes polluted. Most stormwater discharges are considered point sources and require coverage by an NPDES permit.

[15] For more information, see EPA's "Stormwater Program" Web page, at [http://cfpub.epa.gov/npdes/home.cfm?program_id=6], and CRS Report 97-290, *Stormwater Permits: Status of EPA's Regulatory Program*, by Claudia Copeland.

To comply with the Clean Water Act, most airport operators are particularly concerned about managing deicing chemicals and preventing oil spills.

Deicing and Anti-icing Activities

With regard to water quality compliance issues, the management of deicing and anti-icing chemicals poses the greatest challenge to many airport operators. The deicing and anti-icing of aircraft and airfield surfaces is required by the FAA to ensure the safety of passengers. However, when performed without discharge controls in place, airport deicing operations can result in environmental impacts.[16]

Discharges from deicing operations have the potential to cause fish kills, algae blooms, and contamination to surface or ground waters. In addition to potential aquatic life and human health impacts from the toxicity of deicing and anti-icing chemicals, the biodegradation of propylene glycol or ethylene glycol (i.e., the base chemical of deicing fluid) in surface waters (e.g., lakes, rivers) can greatly impact water quality, including significant reduction in dissolved oxygen levels.[17]

Studies have also shown toxicological effects of deicer solutions that cannot be attributed to either propylene glycol or ethylene glycol.[18] This has led to concern that these effects are attributable to unknown, proprietary additives.[19] The environmental route and impact of these additives is not yet understood.

Typically, *airlines* are responsible for aircraft deicing and anti-icing operations, and *airports* are responsible for the deicing and anti-icing of airfield pavement. The airport is ultimately responsible for managing the resulting wastewater. This responsibility is typically outlined in the airport's stormwater permit.

As discussed above, significant differences exist among airport NPDES permits. For example, a local permitting authority may impose specific requirements, such as restrictions as to where deicing operations may occur, a requirement to use deicing collection units to vacuum deicing fluid prior to entering the storm water system, or requirements to use monitoring equipment to ensure compliance with the permit. Other permits may simply allow the airport to discharge deicing fluids directly into an adjacent water body.

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[16] The EPA estimates that airports discharge approximately 21 million gallons of aircraft deicing fluids each year. See EPA, Office of Water, "Preliminary Data Summary: Airport Deicing Operations," August 2000, available at [http://www.epa.gov/waterscience/guide/airport/airport.pdf]

[17] EPA, Office of Water, "Preliminary Data Summary."

[18] Steven Corsi, "Snowbanks harbor toxic remains of aircraft deicers: New research shows that aircraft deicer additives can remain in airport snowbanks far longer than deicer backbone glycol," *Science News,* Apr. 12, 2006, available at [http://pubs.acs.org/subscribe/journals/esthag-w/2006/apr/science/as_snowbanks.html].

[19] Steven Corsi, U.S. Geological Survey, "USGS Examines Environmental Impacts of Aircraft De-Icers," Jan. 10, 2007, available at [http://www.usgs.gov/newsroom/article.asp?ID=1603].

According to the EPA, the disparity in airport permitting requirements has led the agency to consider implementing national standards in the form of effluent limitation guidelines (ELGs) for airport deicing and anti-icing operations.[20] ELGs are national regulations for controlling wastewater discharges to surface waters. ELGs are technology-based and specific to an industry. ELGs applicable to airport deicing would be designed to provide uniform guidance for NPDES permit writers across the country, thereby establishing a baseline standard for all airports.[21]

In 2004, the EPA began to develop ELGs for airport deicing operations. Initial estimates from the EPA indicate that treatment technology and pollution prevention practices could potentially reduce deicing discharges from the current level of 21 million gallons a year to 4 million gallons a year.[22]

As stated previously, many airports have strict permit provisions that specify the management of deicing chemicals. Others have few controls. Those with few controls may be required to make capital improvements to comply with new permitting requirements. At this stage, cost estimates for the aviation industry as a whole are not available.

The EPA is currently collecting survey data from airports and air carriers and conducting detailed sampling programs. The current work will be used to identify the best available technology that is economically achievable for treatment and discharge of spent deicing liquids. The EPA currently plans to publish a proposed rule in December 2007 and to take final action by September 2009.

Fuel Storage

Because airports need to store fuel onsite to refuel aircraft and airport ground service equipment, most airports are required to develop a Spill Prevention, Control, and Countermeasure (SPCC) plan.[23] These requirements are designed to ensure that facilities that store oil have planned for and taken measures to prevent environmental damage resulting from oil spills. An SPCC plan is required to include

- operating procedures intended to *prevent* oil spills, such as procedures to inspect tanks and associated piping for leaks;
- *control* measures installed to prevent a spill from reaching navigable waters, such as the construction of a dike, containment curb, or pit around a tank or tank farm; and

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[20] See the EPA's Web page "Airport Deicing Effluent Guidelines," at [http://www.epa.gov/waterscience/guide/airport/].

[21] Currently, there are no ELGs applicable to the air transportation industry.

[22] EPA, "Preliminary Data Summary" (see footnote 15), p. 1-4.

[23] SPCC planning requirements, at 40 C.F.R. 112 (referred to as the SPCC Rule), are authorized under the Oil Pollution Act of 1990, an amendment to § 311 of the Clean Water Act.

- *countermeasures* to contain, clean up, and mitigate the effects of an oil spill that reaches navigable waters, such as the presence of a spill clean-up kit with sorbent booms or wipes.

As listed above, one of the primary control measures required under the SPCC requirements is the use of a secondary containment system for oil storage containers. Such a system must be large enough to temporarily hold the entire contents of the largest oil tank in the oil storage area, in the event of a breach in the system.[24] For example, if a tank farm had four 12,000-gallon tanks and two 5,000-gallon tanks, and was the storage location for 10 mobile refueling trucks with 500-gallon tanks, the tank farm would be required to have secondary containment sufficient to hold the contents of the largest tank — 12,000 gallons.

When the EPA proposed new SPCC requirements in 2002, airport operators and the EPA disagreed about the secondary containment requirements applicable to mobile airport refueling trucks.[25] In particular, airport operators argued that it was impractical to require mobile refuelers to provide secondary containment equal to the size of the tank because, during refueling operations, they would be expected to move to various areas of the airfield that could not be fitted with secondary containment systems.

To address these concerns, the EPA amended the SPCC Rule to exempt mobile refuelers from specifically sized containment requirements.[26] However, mobile refuelers remained subject to the general secondary containment requirements of the SPCC Rule (e.g., periodic testing of the container and piping).[27]

The EPA has extended the compliance date applicable to mobile refuelers (and for other new SPCC requirements) to October 31, 2009. This pending regulation may require airport operators to install necessary secondary containment mechanisms to comply with the regulation, in addition to meeting other SPCC requirements applicable to that facility.

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[24] Required under 40 C.F.R. 112.8.

[25] *Airport mobile refuelers* are vehicles that have a bulk storage container on board or towed by the vehicle, designed or used solely to store and transport fuel for transfer into or from an aircraft, ground service equipment, or other oil storage container.

[26] Final Rule, 71 *Federal Register* 77266-77293, Dec. 26, 2006. For additional information on new and existing SPCC requirements, see the EPA's "Oil Program" Web page at [http://epa.gov/oilspill].

[27] Regulations regarding general secondary containment requirements are listed under 40 C.F.R. §112.7(c)-(d). Also see "SPCC Rule Amendments: Streamlined Requirements for Mobile Refuelers," December 2006, at [http://www.epa.gov/oilspill/SPCCFactsheetMobileRefuelersDec06.htm].

Air Quality Issues

Airport emissions affecting local air quality come from both mobile and stationary sources, including the following:

- Aircraft.
- Motor vehicles (e.g., cars and buses for airport operations, and passenger, employee, and rental agency vehicles).
- Ground service equipment (GSE) (e.g., aircraft tugs, baggage and belt loaders, generators, lawn mowers, snow plows, loaders, tractors, air-conditioning units, and cargo moving equipment).
- Stationary sources (e.g., boilers, space heaters, emergency generators, incinerators, fire training facilities, aircraft engine testing facilities, painting operations, and solvent degreasers).[28]

Airport operations may produce various regulated pollutants, including volatile organic compounds (VOCs), carbon monoxide (CO), particulate matter (PM), lead, sulphur oxides (SOx), and nitrogen oxides (NOx), known collectively as "criteria" pollutants. They also may produce a complex array of toxic or hazardous air pollutants (HAPs).[29]

Emissions of Criteria Pollutants

The Clean Air Act (CAA) directs the EPA to regulate emissions of air pollutants. Under the CAA, the EPA is authorized to establish emission standards,[30] based on certain health and environmental criteria, for NOx (the primary pollutant associated with aircraft emissions), ozone,[31] CO, SOx, lead, and particulates. The National Ambient Air Quality Standards (NAAQS), subsequently established by the EPA, specify allowable concentrations and exposure limits for each of these criteria pollutants. A geographic area that meets the standard is considered to be in "attainment" for a particular NAAQS; areas that do not meet a standard are in

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[28] For a complete list of potential sources of airport air emissions and methods that airports must undertake to monitor and control them, see "Air Quality Procedures for Civilian Airports & Air Force Bases," at [http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Handbook.PDF].

[29] For information regarding air pollutant emissions from commercial aviation, see EPA's "Aircraft" web page, available at [http://www.epa.gov/oms/aviation.htm].

[30] See EPA's "Regulatory Announcement: New Emission Standards for New Commercial Aircraft Engines," available at [http://www.epa.gov/oms/regs/nonroad/aviation/420f05015.htm].

[31] Ozone is not directly emitted from vehicles or aircraft but is formed by the reaction of nitrogen oxides (NOx), volatile organic compounds (VOCs), and sunlight.

"nonattainment."[32] A "maintenance" area is one that was previously in nonattainment but is currently attaining the NAAQS subject to a maintenance plan.[33]

The CAA requires states to develop a State Implementation Plan (SIP) to demonstrate how they will implement, maintain, and enforce the NAAQS.[34] According to the Government Accountability Office (GAO), the aviation industry as a whole makes a limited contribution to all criteria pollutant emissions nationwide.[35] However, individual airports (particularly large airports in urban areas) may contribute significantly to local criteria pollutant levels. If an airport is located in a nonattainment or maintenance area, it may be required to change its infrastructure or operations to conform with provisions of the SIP, particularly if the airport is undergoing an expansion that requires approval from a state or local agency.

Because aircraft emissions are a significant source of emissions at an airport, and largely outside the control of the airport, emission reductions will likely have to be made in operations or processes that the airport *does* control. For example, the airport ground vehicles may be changed to alternative fuel vehicles, some GSE may be converted to electrified systems, or older boilers and chillers may be replaced with more energy-efficient systems.

Vision 100 included several provisions intended to reduce airport ground emissions at commercial service airports located in air quality nonattainment and maintenance areas.[36] The FAA is implementing the Vision 100 airport emission provisions in a single program called the Voluntary Airport Low Emission program (VALE).[37] The VALE program allows airport sponsors to use Airport Improvement Program (AIP) and the Passenger Facility Charges (PFCs) to finance low-emission vehicles, refueling and recharging stations, gate electrification, and other air quality improvements. Participation in the VALE program is voluntary for airport sponsors and state air quality agencies.

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[32] For information on areas currently designated as being in nonattainment, see the EPA's "Green Book Nonattainment Areas for Criteria Pollutants," available at [http://www.epa.gov/oar/oaqps/greenbk/index.html].

[33] For an extended discussion of issues regarding NAAQS, see CRS Report RL30853, *Clean Air Act: A Summary of the Act and Its Major Requirements*, by coordinated James E. McCarthy.

[34] 42 U.S.C. § 7410.

[35] GAO, A*viation and the Environment: Strategic Framework Needed to Address Challenges Posed by Aircraft Emissions*, GAO-03-252, February 2003, p. 39. GAO's data were obtained from the EPA.

[36] See Subtitle B-Passenger Facility Fees, § 121 (Low-Emission Airport Vehicles and Ground Support Equipment); Subtitle C-AIP Modifications, § 151 (Increase in Apportionment for, and Flexibility of, Noise Compatibility Planning Programs), § 158 (Emission Credits for Air Quality Projects), and § 159 (Low-emission Airport Vehicles and Infrastructure).

[37] See the FAA's "Voluntary Airport Low Emissions (VALE) Program" Web page at [http://www.faa.gov/airports_airtraffic/airports/environmental/vale/].

Emissions of Toxic Air Pollutants

Increasingly, airports and the FAA are asked by various agencies and communities surrounding airports to analyze the health impacts of aircraft and other airport-related sources of air toxics, also known as hazardous air pollutants (HAPs). This information is needed primarily when conducting an environmental review pursuant to National Environmental Policy Act (NEPA; see discussion below) and at the request of local or state agencies.

Ten HAPs comprise the majority reported to occur in aircraft and/or GSE exhaust: lead (also a criteria pollutant), formaldehyde, 1,3-butadiene, acetaldehyde, xylene, benzene, toluene, naphthalene, acrolein, and propionaldehyde.[38] Unlike information on criteria air pollutants, information on emission levels, transformation, and transport of aircraft and other airport-related HAPs and their health impacts is not currently well-developed.[39]

Environmental Reviews Under NEPA

If an airport project receives federal funding or requires some federal decision (e.g., permit or approval), an environmental review of that project is required before it can move forward. The term "environmental review" is used broadly, but usually refers to the requirement that a federal agency review or consider the environmental impacts of its actions pursuant to the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. § 4321 et seq).[40] A review under NEPA results in one of the following:

- Preparation of an environmental assessment (EA) if the significance of environmental impacts is *uncertain*, followed by the issuance of a Finding of No Significant Impact (FONSI) if the impacts are not found to be significant.

- Preparation of an Environmental Impact Statement (EIS) if it is certain that a project's environmental impacts *are significant*.

- A determination that a project is categorically excluded from the requirement to prepare an EIS or an EA, if it has *no significant* environmental impact.

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[38] See "Select Resource Materials and Annotated Bibliography on the Topic of Hazardous Air Pollutants (HAPs) Associated with Aircraft, Airports, and Aviation," prepared for the FAA's Office of Environment and Energy, by URS Corportation, July 2003, available at [http://epa.gov/ttn/atw/aircrafthaps/aircrafthaps_rpt.pdf].

[39] Transportation Research Board, "Aircraft and Airport-Related Hazardous Air Pollutants: Research Needs and Analysis," description of current research project, available at [http://www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=131].

[40] For more information about NEPA, see CRS Report RL33152, *The National Environmental Policy Act: Background and Implementation*, by Linda Luther.

As the proponent of the airport project or improvement, the airport authority is responsible for identifying all environmental issues that must be addressed in the NEPA documentation. Part of that effort includes analyzing all reasonable alternatives that would meet a project's purpose and need.

For projects requiring an EIS, the FAA documents the final project decision by issuing a public Record of Decision (ROD). In addition to documenting the final decision, the ROD documents any mitigation efforts that the airport operator is required to implement as a condition for moving the project forward. The mitigation actions may be stipulated be provisions of local, state, tribal or federal requirements.[41]

Although the ROD may specify mitigation measures, mitigation is not required *under NEPA.* NEPA specifies a process that the agency must complete to analyze a project's environmental impacts, but it does not dictate the outcome. That is, NEPA does not require an airport to chose the project alternative with the least environmental impacts. However, within the context of the NEPA process, the environmental review may identify environmental compliance requirements that would dictate a certain outcome (e.g., it may identify Clean Water Act requirements that specify that the least environmentally harmful alternative be selected). Further, the ROD may specify mitigation measures that an airport authority agreed to implement as a condition of gaining local agency or community acceptance of a project — not necessarily a measure required by local, state, tribal, or federal law.

To streamline the NEPA process, Vision 100 directed the FAA to develop an "expedited, coordinated environmental review process" applicable to the aviation project review process for airport capacity enhancement projects at congested airports, aviation safety projects, and aviation security projects. The coordinated process provides that any environmental review, analysis, opinion, permit, license, or approval issued or made by a federal agency or airport sponsor for such a project must be completed within a time period established by the Secretary of Transportation, in cooperation with the agencies that participate in the process. The coordinated process may be delineated in a memorandum of understanding between the Secretary and the heads of other federal and state agencies who participate in the process. Further, the act authorizes the FAA to define the scope and content of a project's EIS and requires all participating agencies to be bound by the purpose and need and project alternatives analysis determined by the Secretary of Transportation.

On April 28, 2006, FAA issued Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*.[42] The order delineates the agency's new NEPA policies and procedures, including the streamlining requirements specified in Vision 100.

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[41] NEPA Records of Decisions are available at [http://www.faa.gov/airports_airtraffic/airports/environmental/records_decision/]. For an example of mitigation requirements, see the ROD for Logan International Airport, p. 16, Aug. 2, 2002.

[42] Available at [http://www.faa.gov/airports_airtraffic/airports/resources/publications/orders/environmental_5050_4/].

Proposed FAA Legislation

Generally, legislation regarding airport environmental impacts falls into one of the following broad categories: funding for projects that would minimize environmental impacts or help airports meet their regulatory compliance obligations; funding for environment-related research, such as new technology that would produce quieter, more fuel efficient aircraft; and amendments to existing environmental regulatory requirements.

On February 14, 2007, the FAA proposed legislation to reauthorize funding for FAA functions and related aviation programs. The FAA's proposed bill (H.R. 1356), the Next Generation Air Transportation System Financing Reform Act of 2007, includes various provisions intended to address the environmental impacts associated with airport operations. The proposed legislation would authorize

- funding for research into technology or processes that would reduce noise, air emissions, and water quality impacts (§§ 102, 601, and 606);
- grants for programs and projects intended to mitigate or minimize regulated environmental impacts (§ 604); and
- grants or specify regulatory procedures to help airports comply with environmental requirements (§§ 602, 603, and 605).

Research Funding

Section 601 of the proposed legislation would permanently authorize the Airport Cooperative Research Program (ACRP).[43] The proposed legislation would increase funding from $10 million to $15 million per year (§ 102). Five million dollars per year of the ACRP funds would be set aside for research activities related to the airport environment, including reducing community exposure to aviation noise, reducing air emissions, or addressing water quality issues.

Section 606 would require the FAA to enter into a consortium with the Partnership for Air Transportation Noise and Emissions Reduction (PARTNER)[44] to develop Continuous Low Energy, Emissions and Noise (CLEEN) engine and airframe technology. Performance objectives for this technology would include a 25% increase in aircraft fuel efficiency; a 50% reduction in nitrogen oxide emissions associated from aircraft landings and takeoffs; a reduction of 10 decibels, compared with 1997 levels, in subsonic aircraft noise; a feasability determination regarding the

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[43] The ACRP was authorized as a four-year pilot program under Vision 100 (49 U.S.C. 44511(f)). Current funding for the program would be from the Airport and Airway Trust Fund, under "Airport Planning and Development and Noise Compatibility Planning and Programs."

[44] PARTNER is an aviation cooperative research organization sponsored by FAA, NASA, and Transport Canada, operating out of the Massachusetts Institute of Technology.

use of alternative fuels in aircraft systems; and a determination regarding the ability to retrofit or re-engine aircraft to use new engine technologies. Funding for this program would be authorized under the Next Generation Air Transportation System program at "sums as necessary to carry out [the program]."

Mitigation Grants

Section 604 would provide grants for up to six environmental mitigation demonstration pilot projects. Eligible projects would include those designed to reduce or mitigate aviation impacts on noise, air quality, or water quality. The federal share of the projects would be 50% of the project costs, up to $2.5 million, and would be apportioned under the Airport Improvement Program (AIP).

Grants and Procedural Changes To Assist Environmental Compliance

Section 602 would amend the state block grant program for airport improvement programs[45] by specifying that federal environmental requirements would apply to the program. The proposal also specifies that any federal agency that must grant any approval (e.g., permit or license) for a proposed airport improvement project must consult with the state participating in the airport improvement block grant program during the approval process. Further, the federal agency would be required to use any state-prepared environmental analysis associated with that approval.

Sections 603 and 605 address methods of implementing and expediting NEPA requirements[46] and airport noise compatibility planning requirements (14 C.F.R. 150, also known as Part 150 requirements). Section 603 would amend current requirements that allow FAA to accept funds from an airport sponsor to hire additional staff or obtain the services of consultants to expedite the processing, review, and completion of environmental activities associated with an airport development project.[47] The proposal would allow FAA to accept funds to hire additional staff to: conduct "special environmental studies" related to a federally funded airport project; conduct studies or reviews to support noise compatibility measures approved under the Part 150 requirements; or implement environmental mitigation efforts specified in a project's final decision and delineated at the completion of the NEPA process.

Section 605 would amend the existing noise compatibility program requirements[48] to allow grants to airport operators to help them meet environmental review requirements applicable to proposals to implement flight procedures. Further, § 605 would allow a project sponsor to provide the FAA with funds to hire additional

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[45] 49 U.S.C. § 47128.

[46] For more information, see "NEPA Implementing Instructions for Airport Projects," Order 5050.4B, April 2006, at [http://www.faa.gov/airports_airtraffic/airports/resources/publications/orders/environmental_5050_4/].

[47] 49 U.S.C. § 47173.

[48] 49 U.S.C. § 47504.

staff, as necessary, to expedite completion of the environmental review required to implement flight procedures.

For Additional Information

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Minnesota Pollution Control Agency, "Minneapolis/St. Paul International Airport Environmental Activities and the MPCA," at [http://www.pca.state.mn.us/hot/airport.html]. (For general information about the environmental compliance process at a specific airport.)

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CRS Report RL33891, *Airport Improvement Program: Issues for Congress*, by Robert Kirk.

CRS Report RL32707, *Avoiding Gridlock in the Skies: Issues and Options for Addressing Growth in Air Traffic*, by Bart Elias.

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