

# CRS Report for Congress

## Environmental Impacts of Airport Operations, Maintenance, and Expansion

Updated September 5, 2007

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Prepared for Members and  
Committees of Congress

# Environmental Impacts of Airport Operations, Maintenance, and Expansion

## Summary

Funding authorization for Federal Aviation Administration (FAA) programs set forth in the Vision 100 — Century of Aviation Reauthorization Act (P.L. 108-176, hereinafter referred to as “Vision 100”) is 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 being 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 or purchasing noise barriers). 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.

The FAA has proposed legislation to reauthorize FAA funding (H.R. 1356 and S. 1076, the Next Generation Air Transportation System Financing Reform Act of 2007, introduced by request). Proposals have also been introduced in the House (H.R. 2881, the FAA Reauthorization Act of 2007, and H.R. 2698, the Federal Aviation Research and Development Reauthorization Act of 2007) and the Senate (S. 1300, the Aviation Investment and Modernization Act of 2007). The bills include provisions that would fund environment-related research; fund grant programs to mitigate environmental impacts; fund grant programs to help airports with environmental regulatory compliance; and amend existing noise requirements.

To better understand the need for funding for environment-related airport projects, this report provides an overview of noise, water quality, and air quality issues associated with airport operations. 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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# Environmental Impacts of Airport Operations, Maintenance, and Expansion

## Introduction

The operation of an airport involves many activities that can affect the environment. In addition to potential impacts to local air and water quality, aircraft noise levels may affect property values or the quality of life of residents in nearby communities. Certain activities or projects to address airport environmental impacts may qualify for federal funding.<sup>1</sup> For example, in its FY2008 budget, the Federal Aviation Administration (FAA) requested \$354 million to meet the agency's "Environmental Stewardship" goals.<sup>2</sup> Among other uses, those funds may be spent on projects to abate airport noise impacts (e.g., soundproofing of residential homes, purchases of noise barriers and monitors, and relocation of persons or businesses); to minimize water quality impacts (e.g., funding of projects that would control the discharge of deicing chemicals); and to reduce airport-controllable air emissions (e.g., purchases of alternative fuel vehicles). Funds also are authorized for research into new aircraft technology that would reduce noise and air emissions.

Funding authorization for FAA programs set forth in Vision 100 — Century of Aviation Reauthorization Act (P.L. 108-176, hereinafter referred to as "Vision 100") will expire at the end of FY2007. On February 14, 2007, the FAA's reauthorization proposal, entitled the Next Generation Air Transportation System Financing Reform Act of 2007 (H.R. 1356 and S. 1076, hereinafter referred to as "the FAA proposal"), was introduced by request. Subsequently, reauthorization proposals have been introduced by the House (H.R. 2881, the FAA Reauthorization Act of 2007) and the Senate (the Aviation Investment and Modernization Act of 2007, (S. 1300; S.Rept. 110-144).<sup>3</sup> Each bill includes environment-related provisions that would fund projects intended to minimize environmental impacts or help airports comply with regulatory obligations; fund research, such as new technology that would produce quieter, more fuel-efficient aircraft; and amend existing environmental regulatory requirements. Environmental and energy-related research provisions have also been

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<sup>1</sup> 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.

<sup>2</sup> See FAA "Budgets in Brief," available at [<http://www.faa.gov/about/budget/>].

<sup>3</sup> For a summary and analysis of major legislative provisions of each bill, see CRS Report RL33920, *Federal Aviation Administration Reauthorization: An Overview of Selected Provisions in Proposed Legislation*, coordinated by Bart Elias.

proposed by the House in the Federal Aviation Research and Development Reauthorization Act of 2007 (H.R. 2698).

To illustrate why airports may need these funds and how they could potentially utilize them, 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 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.<sup>4</sup> 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

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<sup>4</sup> See CRS Report RL32707, *Avoiding Gridlock in the Skies: Issues and Options for Addressing Growth in Air Traffic*, by Bart Elias.

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
- 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.<sup>5</sup>

## 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,<sup>6</sup> 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.<sup>7</sup>

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.

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<sup>5</sup> 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>].

<sup>6</sup> GAO, *Aviation and the Environment: Airport Operations and Future Growth Present Environmental Challenges*, GAO/RCED-00-153, August 30, 2000.

<sup>7</sup> 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.

**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 soundproofing 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-term 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 <i>guidelines</i> 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.<sup>8</sup> The federal role is primarily to fund those efforts, establish aircraft noise limits,<sup>9</sup> and fund research.<sup>10</sup>

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.<sup>11</sup>

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,<sup>12</sup> 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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<sup>8</sup> 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/](http://www.faa.gov/airports_airtraffic/airports/environmental/airport_noise/noise_exposure_maps/)].

<sup>9</sup> 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.

<sup>10</sup> 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.

<sup>11</sup> NAS, *For Greener Skies*, p. 15.

<sup>12</sup> *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.<sup>13</sup> The NPDES permit program regulates discharges of stormwater<sup>14</sup> 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.<sup>15</sup> 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 Fort 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.

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

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<sup>13</sup> 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](http://cfpub.epa.gov/npdes/home.cfm?program_id=45)].

<sup>14</sup> 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.

<sup>15</sup> For more information, see EPA’s “Stormwater Program” Web page, at [[http://cfpub.epa.gov/npdes/home.cfm?program\\_id=6](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.

**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.<sup>16</sup>

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 affect water quality, including significant reduction in dissolved oxygen levels.<sup>17</sup>

Studies have also shown toxicological effects of deicer solutions that cannot be attributed to either propylene glycol or ethylene glycol.<sup>18</sup> This has led to concern that these effects are attributable to unknown, proprietary additives.<sup>19</sup> 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.

According to the EPA, the disparity in airport permitting requirements has led the agency to consider implementing national standards in the form of effluent

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<sup>16</sup> 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>].

<sup>17</sup> EPA, Office of Water, "Preliminary Data Summary."

<sup>18</sup> 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*, April 12, 2006, available at [[http://pubs.acs.org/subscribe/journals/esthag-w/2006/apr/science/as\\_snowbanks.html](http://pubs.acs.org/subscribe/journals/esthag-w/2006/apr/science/as_snowbanks.html)].

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

limitation guidelines (ELGs) for airport deicing and anti-icing operations.<sup>20</sup> 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.<sup>21</sup>

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.<sup>22</sup>

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.<sup>23</sup> 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
- *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.

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

<sup>21</sup> Currently, there are no ELGs applicable to the air transportation industry.

<sup>22</sup> EPA, "Preliminary Data Summary" (see footnote 15), p. 1-4.

<sup>23</sup> 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.

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.<sup>24</sup> 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.<sup>25</sup> 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.<sup>26</sup> However, mobile refuelers remained subject to the general secondary containment requirements of the SPCC Rule (e.g., periodic testing of the container and piping).<sup>27</sup>

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.

## 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).

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<sup>24</sup> Required under 40 C.F.R. 112.8.

<sup>25</sup> *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.

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

<sup>27</sup> 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>].

- 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).<sup>28</sup>

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).<sup>29</sup>

**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,<sup>30</sup> based on certain health and environmental criteria, for NOx (the primary pollutant associated with aircraft emissions), ozone,<sup>31</sup> 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 “nonattainment.”<sup>32</sup> A “maintenance” area is one that was previously in nonattainment but is currently attaining the NAAQS subject to a maintenance plan.<sup>33</sup>

The CAA requires states to develop a State Implementation Plan (SIP) to demonstrate how they will implement, maintain, and enforce the NAAQS.<sup>34</sup> According to the Government Accountability Office (GAO), the aviation industry as

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<sup>28</sup> 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](http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Handbook.PDF)].

<sup>29</sup> For information regarding air pollutant emissions from commercial aviation, see EPA’s “Aircraft” web page, available at [<http://www.epa.gov/oms/aviation.htm>].

<sup>30</sup> 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>].

<sup>31</sup> 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.

<sup>32</sup> 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>].

<sup>33</sup> 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.

<sup>34</sup> 42 U.S.C. § 7410.

a whole makes a limited contribution to all criteria pollutant emissions nationwide.<sup>35</sup> 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.<sup>36</sup> The FAA is implementing the Vision 100 airport emission provisions in a single program called the Voluntary Airport Low Emission program (VALE).<sup>37</sup> 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.

**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.<sup>38</sup> Unlike

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<sup>35</sup> GAO, *Aviation 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.

<sup>36</sup> 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).

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

<sup>38</sup> 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 Corporation, July 2003, available at (continued...)

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.<sup>39</sup>

## 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).<sup>40</sup> 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.

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.<sup>41</sup>

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<sup>38</sup> (...continued)

[[http://epa.gov/ttn/atw/aircrafthaps/aircrafthaps\\_rpt.pdf](http://epa.gov/ttn/atw/aircrafthaps/aircrafthaps_rpt.pdf)].

<sup>39</sup> 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>].

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

<sup>41</sup> NEPA Records of Decisions are available at [[http://www.faa.gov/airports\\_airtraffic/airports/environmental/records\\_decision/](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, August 2, 2002.

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 choose 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*.<sup>42</sup> The order delineates the agency's new NEPA policies and procedures, including the streamlining requirements specified in Vision 100.

## **Environmental Provisions in FAA Funding Proposals**

To address issues associated with air quality, water quality, and community noise impacts, and to assist airport operators with complying with local, state, and federal regulations related to those impacts, the FAA proposal and bills under consideration in the Senate (S. 1300) and the House (H.R. 2881 and H.R. 2698) include similar proposals that would

- provide funding for research into technology or processes that would reduce noise, air emissions, water quality impacts, and energy use;
- provide grants for programs or projects intended to mitigate or minimize regulated environmental impacts; and

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<sup>42</sup> Available at [[http://www.faa.gov/airports\\_airtraffic/airports/resources/publications/orders/environmental\\_5050\\_4/](http://www.faa.gov/airports_airtraffic/airports/resources/publications/orders/environmental_5050_4/)].



- provide grants or specify regulatory procedures to assist airports in complying with environmental requirements.

S. 1300 and H.R. 2881 also include provisions that would establish certain requirements to reduce noise. H.R. 2881 (§ 509) includes a unique provision that would require FAA, to the maximum extent possible, to implement “sustainable practices” in the construction and major renovation of air traffic control facilities in order to reduce energy use and improve environmental performance at those facilities.

## Research Funding

**FAA Proposal.** Section 601 would permanently authorize the Airport Cooperative Research Program (ACRP).<sup>43</sup> Under § 601, the FAA proposes to increase funding from \$10 million to \$15 million for FYs 2008-2010 (specified under § 102). Five million dollars per year of the ACRP funds would be set aside for research activities related to the airport environment, including reductions in noise and air emissions and addressing water quality issues.

The FAA proposal would also create a consortium to research aircraft technologies that would produce lower energy, air emissions, and noise. The FAA proposal (§ 606, “Research Consortium for Lower Energy, Emissions, and Noise Technology Partnership”) would create the consortium by requiring FAA to work with the existing Partnership for Air Transportation Noise and Emissions Reduction (PARTNER)<sup>44</sup> to develop Continuous Low Energy, Emissions and Noise (CLEEN) engine and airframe technology. The proposal would establish the following performance objectives for the consortium:

- a 25% increase in aircraft fuel efficiency;
- a 50% reduction in nitrogen oxide emissions associated with aircraft landings and takeoffs;
- a 10 decibel (dB) reduction, compared to 1997 levels, in subsonic aircraft noise;
- a feasibility determination regarding the use of alternative fuels in aircraft systems; and
- a determination regarding the ability to retrofit or re-engine aircraft to use new engine technologies.

Under the FAA proposal, funding would be authorized under the Next Generation Air Transportation System program at “sums as necessary to carry out [the program].”

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<sup>43</sup> The ACRP was authorized as a four-year pilot program under Vision 100 (49. U.S.C. 44511(f)). Funds for the program are authorized under the Airport and Airway Trust Fund Authorizations, under the Airport Planning and Development and Noise Compatibility Planning and Programs.

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

**Senate Proposal.** Provisions regarding the ACRP (§ 601) are essentially identical to the FAA proposal, except that S. 1300 would also include \$15 million in funding for FY2011 (§ 601(b)). The bill also includes a proposal similar to FAA's that would create a research consortium (§ 602, "Reduction of Noise, Emissions, and Energy Consumption from Civilian Aircraft"). Funding for the research consortium would be made available from the Airport and Airway Trust Fund Authorizations for research and development.<sup>45</sup> The bill directs the FAA Administrator to designate an institution as a "Consortium for Aviation Noise, Emissions, and Energy Technology Research" to conduct research with NASA and other relevant industries. The performance objectives the consortium is directed to accomplish are the same as those in the FAA proposal.

Unique to S. 1300 is a provision regarding clean coal fuel technology. Section 603 would require the Department of Transportation to establish a research grant program to develop synthetic jet fuel from clean coal. (However, the bill does not provide a definition of "clean coal.") Funds would be authorized from the Airport and Airway Trust Fund. Section 603 would also require the FAA Administrator to designate an institution as a "Center of Excellence for Coal-to-Jet Research."

**House Proposals.** H.R. 2881 includes a provision (§ 505, CLEEN Engine and Airframe Technology Partnership) that is similar to the FAA proposal that would create a consortium to develop Continuous Low Energy, Emissions and Noise (CLEEN) engine and airframe technology. H.R. 2881 does not specify that the FAA must work with PARTNER to achieve the established performance goals. However, the goals are the same as those specified in the FAA proposal and S. 1300. H.R. 2881 specifies that from FY2008 through FY2011 not more than \$111 million may be appropriated from the Airport and Airway Trust Fund Authorizations for this program.

H.R. 2881 would also promote the development of alternative jet fuels (§511). Unlike the proposal in S. 1300, which would just support coal research, H.R. 2881 would require research on alternative fuels from various sources, including coal, natural gas, biomass, ethanol, butanol, and hydrogen.

Environmental and energy-related research provisions have also been proposed by the House in the Federal Aviation Research and Development Reauthorization Act of 2007 (H.R. 2698). This bill would amend the Airport and Airway Trust Fund Authorizations for research and development for FYs 2008 through 2011 by authorizing a total of \$18 million for ACRP "environment" projects and approximately \$125 million for "environment and energy" projects (§ 3). Also, § 9 of H.R. 2698 proposes to permanently authorize the ACRP.

H.R. 2968 requires the Director of the Joint Planning and Development Office to establish environmental requirements for noise, emissions, and energy consumption that must be met in the Next Generation Air Transportation System (§ 4(h)). The environmental requirements must be met through a combination of technological and operational procedures. Responsibility for the research,

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<sup>45</sup> 49 U.S.C. § 48102(a).

development, and demonstration of the *technological* procedures shall be assigned to NASA. Responsibility to demonstrate optimized *operational* procedures will be assigned to FAA.

H.R. 2698 would require an interagency study (headed by the FAA Administrator in coordination with NASA and the U.S. Global Climate Change Science Program) on the effects of aviation on climate and the potential for mitigating those effects (§5). The bill would authorize \$2 million for FY2008 and \$5 million annually for FY2009 through FY2011 for this research.

H.R. 2968 would also require the FAA to study technologies that would allow the use of unleaded gasoline in piston-engine aircraft (§13). Currently, piston-engine aircraft — mostly general aviation aircraft — use leaded gasoline. H.R. 2698 would also require the FAA to contract with the National Research Council to assess 1) the adequacy of FAA's energy- and environment-related research programs (§14(a)), and 2) the impact of space weather on aviation (§14(b)).

## Mitigation Grants

**FAA Proposal.** Section 604 would provide grants for up to six environmental mitigation demonstration pilot projects. Eligible projects would include those that would reduce or mitigate aviation impacts on noise, air quality, or water quality in the vicinity of the airport. The federal share of the projects would be 50% of the project costs, up to \$2.5 million, and would be apportioned under the AIP.

**Senate Proposal.** Section 215 of S. 1300 includes provisions that are essentially identical to the FAA proposal providing grants for environmental mitigation pilot programs.

**House Proposal.** Section 507 of H.R. 2881 includes provisions that are essentially identical to the FAA proposal and those in S. 1300 providing grants for environmental mitigation pilot programs.

## Grants and Procedural Changes to Assist with Environmental Compliance

The FAA proposal and provisions in S. 1300 include almost identical proposals that would amend the state block program, address methods of implementing and/or expediting requirements of the National Environmental Protection Act (NEPA), and amend certain noise compatibility program requirements.

**FAA Proposal.** Section 602 would amend the state block grant program<sup>46</sup> by specifying that federal environmental requirements would apply to the program. Both proposals also specify that any federal agency that must grant any approval (i.e., permit or license) to a state must consult with that state during the approval process.

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<sup>46</sup> 49 U.S.C. § 47128.

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/or expediting requirements of the National Environmental Protection Act (NEPA)<sup>47</sup> and airport noise compatibility planning requirements (Title 14 Code of Federal Regulations (CFR), Part 150, commonly referred to 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.<sup>48</sup> 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<sup>49</sup> to allow grants to airport operators to assist them with meeting environmental review requirements applicable to proposals to implement flight procedures. Further, the proposal would allow a project sponsor to provide FAA with funds to hire additional staff as necessary to expedite completion of the environmental review necessary to implement flight procedures.

**Senate Proposal.** Section 210 of the S. 1300 is essentially identical to § 602 of FAA’s proposal regarding the state block grant program. Unique to S. 1300 is a provision that would establish a pilot program for up to three states that do not already participate in the block grant program.

Sections 211 and 212 of S. 1300 are essentially identical to §§ 603 and 605 of FAA’s proposal regarding methods of implementing and/or expediting requirements of NEPA.

**House Proposal.** Section 502 of the H.R. 2881 is essentially identical to the FAA proposal and S. 1300 (except for pilot program proposal in S. 1300) regarding the state block grant program.

Sections 503 and 504 of the H.R. 2881 are similar to the FAA proposal and S. 1300 provisions regarding methods of implementing and/or expediting NEPA requirements.

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<sup>47</sup> Among other provisions, NEPA requires airport operators to consider the environmental impact of any proposed action that may require federal funding or approvals. It also requires them to look at all reasonable alternatives to meet a given project’s purpose and need, before final decisions are made. For more information, see FAA’s “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/](http://www.faa.gov/airports_airtraffic/airports/resources/publications/orders/environmental_5050_4/)].

<sup>48</sup> 49 U.S.C. § 47173.

<sup>49</sup> 49 U.S.C. § 47504.

Unique to H.R. 2881 is a requirement to fund an “aircraft departure queue management pilot program” (§ 508) at five public-use airports. The programs would be required to develop and test new air traffic flow management technologies to better manage the flow of aircraft on the ground and reduce ground holds and idling times for aircraft to decrease emissions and increase fuel savings.

Also unique to H.R. 2881 is a directive to review the current regulatory responsibilities of FAA and EPA with regard to establishing engine noise and emission standards (§ 510). The review would be required to consider, among other factors, the degree to which those standards could be evaluated and addressed in an integrated manner.

## Requirements to Address Noise Issues

In 1990, Congress mandated a phase out of non-Stage 3 aircraft over 75,000 pounds by December 31, 1999.<sup>50</sup> This has allowed Stage 1 and Stage 2 aircraft *under* 75,000 pounds, primarily corporate and private-use aircraft, to continue to operate. In 2006, such aircraft represented a relatively small number of all operational turbojet aircraft under 75,000 pounds (approximately 1,330, or 13%). However, at some airports, particularly smaller commercial and general aviation airports, their use makes a disproportionate contribution to noise exposure contours. For example, the Massachusetts Port Authority (Massport) reported that at the L.G. Hanscom Field in Bedford, MA, non-Stage 3 aircraft accounted for less than 1% of the airport’s annual traffic in 2005, yet were responsible for 23% of the noise energy produced by civil aircraft.<sup>51</sup> Also, some airport operators have reported that between 50% and 80% of noise complaints lodged with the airport have been related to non-Stage 3 aircraft.<sup>52</sup> As a result, several airports have sought to ban or restrict access to such aircraft. Those efforts have generally been prohibited by FAA.

**Senate Proposal.** Section 711 of S. 1300 would address this issue by prohibiting the operation of aircraft under 75,000 pounds, with certain exceptions, unless it complies with Stage 3 noise levels. The prohibition would take effect five years after the bill’s enactment.

Section 714 of the bill proposes the creation of an exploratory program for the redevelopment of property purchased with noise mitigation funds or passenger facility charge funds, to encourage airport-compatible land uses. The trial program would involve up to four airport operators that have submitted a noise compatibility

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<sup>50</sup> Airport Noise and Capacity Act of 1990 (P.L. 101-508).

<sup>51</sup> Massport December 19, 2006 press release: “Massport Endorses Congressional Efforts To Ban Stage 2 Aircraft; Less than one percent of Hanscom Field’s traffic accounts for 23 percent of aircraft noise,” available online at [[http://www.massport.com/about/press\\_news\\_hanst.html](http://www.massport.com/about/press_news_hanst.html)].

<sup>52</sup> See the statement of Mr. Robert L. Bogan, Deputy Director of the Morristown Municipal Airport on behalf of “The Sound Initiative,” presented to the House Transportation and Infrastructure Committee’s Subcommittee on Aviation hearing on “The FAA’s Airport Improvement Program,” March 28, 2007, available online at [<http://transportation.house.gov/hearings/hearingdetail.aspx?NewsID=59>].

program to FAA. Provisions in this section would also amend the list of allowable noise compatibility measures<sup>53</sup> to include land use planning that will prevent the introduction of additional incompatible land uses.

Section 214 of the bill would expand passenger facility fee eligibility for noise compatibility projects at Los Angeles International Airport (LAX). The section specifies that the funds may be used for a project for the Lennox School District, adjacent to LAX, pursuant to a settlement agreement reached between the airport and the school district in February 2005.<sup>54</sup>

**House Proposal.** Section 506 of H.R. 2881 would also prohibit the operation of aircraft under 75,000 pounds, unless it complies with Stage 3 noise levels. The prohibition would take effect, with generally the same exceptions specified in S. 1300, after January 1, 2013.

## For Additional Information

Federal Aviation Administration, *Workshop on the Impacts of Aviation on Climate: A Report of Findings and Recommendations*, August 2006, at [[http://www.faa.gov/regulations\\_policies/policy\\_guidance/envir\\_policy/](http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/)].

General Accounting Office (now the Government Accountability Office), *Aviation and the Environment: Airport Operations and Future Growth Present Environmental Challenges*, GAO/RCED-00-153, August 2000.

General Accounting Office, Report to the Subcommittee on Aviation, House Committee on Transportation and Infrastructure, *Aviation Infrastructure: Challenges Related to Building Runways and Actions to Address Them*, GAO-03-164, January 2003.

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.)

National Academy of Sciences, National Research Council, Committee on Aeronautics Research and Technology for Environmental Compatibility, *For Greener Skies: Reducing Environmental Impacts of Aviation*, 2002, at [[http://books.nap.edu/openbook.php?record\\_id=10353&page=R1](http://books.nap.edu/openbook.php?record_id=10353&page=R1)].

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<sup>53</sup> 49 U.S.C. 47504(a)(2).

<sup>54</sup> LAX and the Lennox School District are not specifically identified in the bill. However, the bill refers to a settlement agreement that involved these parties. For more information, see Representative Jane Harman’s March 28, 2007 press release: “Harman, Feinstein Introduce Bill to Reduce Aircraft Noise in Lennox Schools,” available online at [[http://www.house.gov/list/press/ca36\\_harman/03\\_27.shtml](http://www.house.gov/list/press/ca36_harman/03_27.shtml)].

Partnership for Air Transportation Noise and Emissions Reduction (PARTNER), Massachusetts Institute of Technology, Report to the United States Congress, *Aviation and the Environment: A National Vision Statement, Framework for Goals and Recommended Actions*, December 2004, at [[http://web.mit.edu/aerastro/partner/reports/congrept\\_aviation\\_envirn.pdf](http://web.mit.edu/aerastro/partner/reports/congrept_aviation_envirn.pdf)].

Transportation Research Board, “Special Report 272 — Airport Research Needs: Cooperative Solutions,” 2003, [[http://www.trb.org/news/blurb\\_detail.asp?ID=1266](http://www.trb.org/news/blurb_detail.asp?ID=1266)].

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

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

CRS Report RL33920, *Federal Aviation Administration Reauthorization: An Overview of Selected Provisions in Proposed Legislation*, coordinated by Bart Elias.