

## Guidebook of Practices for Improving Environmental Performance at Small Airports

### DETAILS

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**ACRP REPORT 43**

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**Guidebook of Practices for  
Improving Environmental  
Performance at Small Airports**

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2011

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# FOREWORD

By **Marci A. Greenberger**

Staff Officer

Transportation Research Board

*ACRP Report 43: Guidebook of Practices for Improving Environmental Performance at Small Airports* is a resource for operators of small airports and/or those with limited staff, which outlines federal environmental regulations and requirements, and identifies activities in which operators can be proactive in promoting environmental stewardship. As a quick reference, summary graphics provide information pertaining to the cost and savings as well as the necessary knowledge and amount of time to implement a particular activity. In addition, there are five case studies that discuss environmental initiatives already undertaken at airports that can serve as a guide for other airports.

While the audience was intended to be operators of small airports with limited resources and staff, managers of larger airports and other aviation professionals will also find this to be a valuable resource.

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Airports and their governing boards strive to be good neighbors in their communities by enhancing environmental efforts to go above and beyond environmental compliance. This is more difficult for smaller airports that have limited resources and staffing that usually do not have an environmental practitioner on staff who is intimately knowledgeable in the environmental arena. Currently no one resource is available to airport managers, boards, or staff to guide them on environmental compliance issues.

Gresham, Smith and Partners was retained under ACRP Project 02-13 to compile and analyze the federal environmental regulations as they pertain to airports, identify practices that go above and beyond regulatory compliance, and present case studies to illustrate successful implementation of environmental programs at small airports. The result of their efforts is *ACRP Report 43: Guidebook of Practices for Improving Environmental Performance at Small Airports*, a resource that will benefit airport staffs at airports of all sizes as well as the consultant community.

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Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at [www.trb.org](http://www.trb.org)) retains the color versions.

## Introduction

Small airports and their governing boards are committed to being good neighbors, enhancing environmental efforts, and increasing public awareness of their initiatives. However, they have limited resources and staffing and, as a result, usually do not have a full-time staff environmental practitioner with intimate knowledge of the environmental arena. Additionally, there are limited technical resources available to small airports that summarize in a single document applicable federal environmental compliance requirements and opportunities to improve environmental performance.

The objective of this *Guidebook of Practices for Improving Environmental Performance at Small Airports* is to promote environmental awareness, identify applicable federal environmental compliance requirements, outline practices that proactively enhance environmental stewardship, and identify resources and tools that small airports can use to be proactive. For the purposes of this Guidebook, “small airports” include small hub, non-hub, reliever, and general aviation airports. However, most, if not all of the Guidebook topics are applicable to an expanded aviation industry audience including the following:

- Airport managers
- Airport governing boards
- Airport operators
- Fixed-base operators
- Airport tenants
- Airport consultants
- National and state aviation associations
- Federal and state aviation agencies
- Federal and state environmental organizations

### 1.1 Guidebook Content

The Guidebook is a reference document presenting information on environmental regulatory applicability, attaining compliance, and pursuing proactive environmental stewardship. Chapter 2 describes how a small airport can use this information to establish or build upon an existing environmental program. In Chapter 2 and each subsequent chapter, the Guidebook provides web-based links to internet sites and documents that further describe the subject matter or provide supporting information.

Chapters 3 through 8 provide regulatory summaries grouped by similar subject matter. The summaries consist of high-level overviews of federal environmental compliance requirements including laws, regulations, and other directives. Citations to federal laws, regulations, and other directives are provided should a reader need to locate and review the actual text. Following each federal environmental regulatory summary is a description of general applicability to small airports. Readers should be aware that the regulatory summaries do not address environmental requirements of state and local governments, as these are beyond the Guidebook’s designated scope. Readers can use the federal environmental regulatory program summaries to assess

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applicability and establish a general understanding of each program's scope, purpose, and typical compliance requirements applicable to small airports.

The Guidebook also presents compliance attainment strategies for small airport consideration. These strategies are drawn from good industry practices and the authors' experience consulting within the aviation industry on the various topics. Additionally, the Guidebook defines commonly used key terms and acronyms. Key terms are highlighted by bold type, defined the first time they are used in each chapter, and are then presented in bold type in subsequent sections within that chapter. Key terms and acronyms are also defined in the Glossary of Terms, and the Acronyms and Abbreviations list, respectively.

While the concept of proactive environmental stewardship is referenced throughout the Guidebook, Chapter 9 focuses exclusively on stewardship initiatives applicable to small airports that go beyond regulatory compliance. For the purposes of this Guidebook, "proactive environmental stewardship" is defined as a commitment to continuously and purposefully work toward reducing negative operational and development impacts on natural resources. Environmental stewardship, when considered with efforts to optimize social well-being and economic performance, generally represent the three elements of sustainability, and are often accounted for in industry with "triple bottom line" accounting methods.

Appendix A presents numerous proactive environmental stewardship practices grouped by common topics. These practices may be associated with a regulatory requirement, yet they provide a definable environmental benefit; or they may not be associated with any regulatory requirement. Practices included in the Guidebook consider the unique attributes and constraints of small airports and should be selected, prioritized, and implemented based on individual circumstances. Benefits of and considerations for implementing the practices are included to assist in the selection process. The Guidebook also presents as Appendix B case studies of proactive environmental programs implemented by other airports. The case studies offer readers greater insight into the real life experiences of implementing proactive environmental stewardship practices.

### 1.2 Guidebook Organization

The Guidebook is organized to allow the chapters and appendices to be utilized on an as-needed basis rather than requiring the text to be read in sequential order. For readers unfamiliar with environmental programs, compliance requirements, or stewardship practices, the Guidebook provides basic information and frequent cross-referencing of content to facilitate faster identification and location of desired content. This cross-referencing is centered on Table 1, which presents a matrix of common activities that could potentially result in environmental impacts at small airports and applicable environmental topics presented by chapter.



**Table 1. Associated activities matrix.**

	Aircraft Deicing/Anti-icing	Aircraft Operation	Aircraft Lavatory Service	Airport Layout Plan (ALP) Changes	Auxiliary Power Unit Operation	Building Operation/Maintenance	Bulk Fuel and Oil Storage/Handling	Cargo Handling	Chemical Storage/Handling	Degreasing	Demolition/Construction/Development	Fire Fighting Training/Testing/Flushing	Ground Service Equipment Operation	Grounds Maintenance/Landscaping	Incinerator Operation	Motor Vehicle Operation	On-airport Power Generation	Painting	Pavement Deicing	Property Acquisition	Refueling	Runway Rubber Removal	Spill Response	Vehicle/Equipment/Aircraft Maintenance	Washing	Waste Generation/Disposal
<b>Chapter 3 Air Quality</b>																										
3.1 Jurisdictional Authority																										
3.2 General Regulations	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•
3.3 Air Pollutant Regulations	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•		•	•	•
3.4 General Conformity Regulations	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•					•
3.5 Mobile Source Regulations		•	•		•		•			•		•	•	•		•					•			•	•	
3.6 Stationary Source Regulations	•					•	•		•	•		•			•		•	•	•					•	•	•
3.7 Regulations on Ozone Depleting Substances						•			•															•		
3.8 Airports and Greenhouse Gases	•	•	•		•	•		•	•		•	•	•	•	•	•	•	•	•		•					•
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4.1 Community Emergency Planning, Storage, and Release Reporting	•					•	•	•	•	•			•						•		•		•	•		
4.2 Spill Prevention, Control, and Countermeasure					•	•	•					•				•	•				•		•	•		
4.3 Pesticide Application, Certification, and Disposal						•		•	•					•									•			•

(continued on next page)

**Table 1. (Continued)**

	Aircraft Deicing/Anti-icing	Aircraft Operation	Aircraft Lavatory Service	Airport Layout Plan (ALP) Changes	Auxiliary Power Unit Operation	Building Operation/Maintenance	Bulk Fuel and Oil Storage/Handling	Cargo Handling	Chemical Storage/Handling	Degreasing	Demolition/Construction/Development	Fire Fighting Training/Testing/Flushing	Ground Service Equipment Operation	Grounds Maintenance/Landscaping	Incinerator Operation	Motor Vehicle Operation	On-airport Power Generation	Painting	Pavement Deicing	Property Acquisition	Refueling	Runway Rubber Removal	Spill Response	Vehicle/Equipment/Aircraft Maintenance	Washing	Waste Generation/Disposal	
4.4 Underground Storage Tanks						•	•		•								•			•	•		•	•			
4.5 Hazardous Material Transport	•					•		•	•	•	•			•				•	•		•		•	•		•	
<b>Chapter 5 Noise</b>																											
5.1 Part 150 Programs				•																•							
5.2 Part 161 Access Restrictions																				•							
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6.2 Environmental Protection											•									•							
6.3 Property Transfer											•									•						•	
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7.2 Universal Waste Requirements						•			•		•			•									•	•		•	
7.3 Used Oil and Used Oil Filters		•				•	•		•				•			•	•						•	•		•	



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The following two examples demonstrate a step-wise process for how readers can use Table 1 to locate information of interest within the Guidebook.

- **Example 1**
  1. **Identify Need:** What potentially applicable federal air quality regulations are associated with my planned installation of a new diesel fuel tank and dispenser?
  2. **Identify Activities from Matrix:** Bulk Fuel and Oil Storage/Handling
  3. **Identify Applicable Chapter(s) and Section(s):** 3.2 General Regulations, 3.3 Air Pollutant Regulations, 3.4 General Conformity Regulations, and 3.6 Stationary Source Regulations
  
- **Example 2**
  1. **Identify Need:** What common small airport activities are associated with universal waste generation?
  2. **Identify Applicable Chapter(s) and Section(s):** 7.2 Universal Waste
  3. **Identify Activities from Matrix:** Building Operation/Maintenance, Chemical Storage/Handling, Demolition/Construction/Development, Grounds Maintenance/Landscaping, Spill Response, Vehicle/Equipment/Aircraft Maintenance, and Waste Generation/Disposal

The proactive environmental stewardship practices presented in Appendix A are also cross-referenced with federal environmental regulatory programs, where applicable. This enables readers to quickly locate and review regulatory information when considering practices that facilitate or go beyond regulatory requirements.

## Establishing an Effective Environmental Program

Establishing an effective environmental program can be accomplished within the typical capabilities, financial resources, and environmental expertise of most small airports. With a clear vision, proper organization, and persistence, small airports can implement effective environmental programs as diverse as those at much larger facilities. However, taking on too much and expecting perfection at the onset will almost certainly result in frustration and disappointment.

How to begin is a frequent question posed by small airports seeking to improve upon their environmental programs. Following the “Plan-Do-Check-Act” (P-D-C-A) cycle, illustrated in Figure 1 made popular as a business process improvement strategy by Dr. W. Edwards Deming is one demonstrated approach. In the environmental arena, P-D-C-A is commonly associated with the



**Figure 1.** The “Plan-Do-Check-Act” Deming cycle.

International Organization for Standardization (ISO) 14001 Environmental Management System (EMS) standard. The EMS standard prescribes the implementation of specific management system elements within each of the four P-D-C-A phases. While similarities exist, the suggested environmental program improvement tasks presented by phase in this chapter are not intended to conform to the ISO 14001 standard or result in a functional EMS. The suggestions represent key iterative tasks commonly found in effective airport environmental programs.

### 2.1 Plan

The “Plan” phase of the P-D-C-A cycle is where an airport’s overall environmental program should be defined or refined. Questions that must be answered include:

- What are the guiding principles of the environmental program (i.e., how does the airport want to be viewed environmentally)?
- Which environmental laws and regulations are applicable to airport operations?
- What are the objectives of the environmental program (i.e., what must the airport do to achieve and maintain its desired environmental image)?
- How will the environmental program be structured to meet its environmental objectives and maintain consistency with its guiding principles (i.e., who is responsible for doing what)?

#### Preparing a Clear Environmental Policy

While a seemingly insignificant task, setting the guiding principles of an airport’s environmental program is a challenging and sometimes time-consuming process. The guiding principles, often documented in a mission statement or



#### Helpful Hint

For more information on EMS implementation, refer to the Westchester County Airport Case Study in Appendix B-2.

“A good plan today is better than a perfect plan tomorrow.”

*George S. Patton*



### Helpful Hint

Refer to the Northeast Florida Regional Airport at St. Augustine Case Study in Appendix B-1 on how to garner support within a small airport organization to initiate proactive environmental stewardship practices.

environmental policy, establish what is environmentally important to an airport and how it wants to be seen by its employees, business partners, and the general public. Therefore, drafting an environmental policy often requires the participation of and approval by the airport's management and board of directors. This may be a challenge, especially where there are diverse opinions as to how environmental considerations fit into airport operational and development decision-making. Ultimately, a well-crafted environmental policy should be a reference for operational and development decision-making and shape the establishment of environmental program objectives.

## Identifying Applicable Environmental Laws and Regulations

Achieving and maintaining environmental compliance should be an underlying tenet of airport environmental programs. To accomplish this, an airport must first identify the laws and regulations applicable to its operations. This Guidebook and referenced resource materials can assist by breaking down the universe of environmental regulatory programs into manageable pieces. It begins by understanding how common airport activities may be regulated.

Familiarity with common airport activities is the critical starting point for identifying applicable environmental regulatory programs. Table 1, which presents a matrix of common airport activities and Guidebook chapters, can facilitate quick location of a regulatory program summary applicable to a listed activity.

The regulatory summaries offer a high-level overview of federal environmental compliance requirements including laws, regulations, and other directives. This information can be used to assess regulatory applicability and establish a general understanding of each program's scope and purpose. The Guidebook does not restate the text of the federal environmental requirements or provide step-by-step descriptions of methodologies for compliance, as these are beyond its intended scope. However, for most of the programs described in the Guidebook, web-based links to the regulatory text, regulatory guidance, and other additional resources are provided.

Many state governments have been authorized or delegated the responsibility to promulgate, administer, and enforce federal environmental laws and regulations. Because state-led and, in some cases, local government-led environmental programs are equivalent or more stringent than their federal counterparts, the Guidebook's regulatory summaries remain relevant. However, to establish a truly effective environmental program, airport operators should use their understanding of the applicable federal environmental laws, regulations, and other directives to identify and assess the applicability of state and locally administered environmental programs.

## Setting Environmental Objectives

Environmental objectives should describe what an airport must do to achieve and maintain compliance with applicable environmental laws and regulations and conform to its environmental policy. Example program objectives may include consistently meeting airport storm water permit requirements, minimizing



### Helpful Hint

Developing relationships with contacts at various state and federal agencies may facilitate staying abreast of new and changing local, state and federal regulations.

landfilled waste, or conserving potable water. Objectives may also have indirect environmental benefits such as implementing an employee environmental awareness and training program.

For each environmental objective, one or more implementation strategies and performance measures should be established to help an airport understand how it can achieve the objective, when the objective has been met, or what progress has been made toward achieving it. Using the earlier example objectives, the following are example implementation strategies and performance measures:

- **Example 1**  
*Objective:* Consistently meet airport storm water permit requirements.  
*Implementation Strategy:* Provide routine training for an airport-wide storm water pollution prevention (SWPP) team and conduct periodic inspections.  
*Performance Measure:* No violations identified during storm water inspections.
- **Example 2**  
*Objective:* Minimize landfilled waste.  
*Implementation Strategy:* Institute a recycling program targeting readily separable and recyclable waste streams.  
*Performance Measure:* Capture and recycle 80 percent of cardboard and 90 percent of office paper within two years of program implementation.
- **Example 3**  
*Objective:* Implement an employee environmental awareness and training program.  
*Implementation Strategy:* Hire a consultant to develop initial training materials and conduct initial training; airport conducts subsequent annual and new hire training sessions.  
*Performance Measure:* 100 percent of airport employees trained within one year; all new employees trained within one month of hire.

### Assigning and Communicating Program Roles and Responsibilities

To avoid key environmental program roles and responsibilities from going unfilled, airports should develop an environmental organizational chart that clearly assigns roles and responsibilities to airport staff, or in some cases, non-airport entities (e.g., fire department, contractors, vendors, etc.). This organizational chart should touch each airport function (e.g., management, legal, properties, planning, engineering, operations, maintenance, communications, etc.) and should be accompanied by a detailed description of the roles and responsibilities within the environmental program. For example, airports should clearly assign responsibility for the following:

- Establishing or modifying the organization's environmental policy
- Determining applicable environmental laws and regulations
- Establishing or modifying program objectives
- Assigning and enforcing environmental roles and responsibilities
- Identifying the needs and committing the resources necessary to implement the program objectives
- Identifying potential environmental implications of planned facility and infrastructure improvements



“The single biggest problem in communication is the illusion that it has taken place.”

*George Bernard Shaw*

- Informing consultants and contractors of environmental performance expectations and ensuring the expectations are met
- Managing employee, tenant, and contractor training programs
- Identifying the need for and applying for environmental permits
- Coordinating with regulators
- Conducting routine facility inspections
- Reviewing and retaining environmental documents and records
- Responding to, containing, cleaning up, and disposing of spills occurring on airport property
- Communicating environmental program successes, or if necessary, reporting failures

An effective environmental program relies upon clearly defined and assigned roles and responsibilities. However, the inability of an environmental program to achieve its intended objectives is less likely due to inadequately *defined* roles and responsibilities, but rather inadequately *communicated* roles and responsibilities. Airports of all sizes have experienced situations where employees make wrong decisions having potentially serious environmental consequences simply because they were not familiar with their assigned responsibilities. Therefore, environmental roles and responsibilities should be reviewed with assigned individuals periodically, and as program components and staff are added or change.

## 2.2 Do

The “Do” phase of the P-D-C-A cycle represents the culmination of environmental program planning efforts. During this phase, the program objectives and strategies should be fully implemented by the individuals and entities assigned specific roles and responsibilities. Airports should give special attention to the timing of regulatory compliance requirements, especially when there is routine inspection, monitoring, reporting, training, or advance notification requirements. Developing a compliance calendar and distributing it electronically or in hardcopy is an effective strategy for ensuring compliance deadlines are not overlooked.

### Conducting Integrated Environmental Training

Environmental training resides in the “Do” phase because it is often a regulatory requirement that must occur at a predetermined frequency. Training is also a beneficial method for increasing awareness of an airport’s environmental policy and program objectives, and reinforcing roles and responsibilities. Training attendees should include airport staff with the potential to impact the environment, as well as airport tenants, contractors, and vendors.

Ongoing effort will be required to maintain current training materials and to train new staff and tenants, as needed. Environmental training sessions should be a positive experience for attendees, and while past issues should be reviewed, it should be done in a way that avoids placing blame and emphasizes what should be done to prevent future occurrences. Training should also be an opportunity to reward employees and tenants for environmental success (e.g., no violations

identified during storm water inspections, successful implementation of new initiatives, increased participation in voluntary no fly curfews, etc.) and to get feedback on environmental policies and initiatives. The best ideas for environmental conservation, protection, and improvement may come from staff attending environmental training.

To reduce the operational and financial burdens presented by training programs, airports should consider opportunities to integrate regulatory training programs. Presenting one 1-hour integrated program rather than two 30-minute programs can help attendees “connect the dots” between related regulatory programs. For example, SWPP training and spill prevention, control and countermeasure (SPCC) training are often combined because both regulatory programs target the protection of storm water runoff quality and nearby surface waters.

## 2.3 Check

The “Check” phase of the P-D-C-A cycle provides airports the opportunity to monitor environmental program performance and assess if observed results align with the environmental policy, achieve program objectives, and meet internal and external airport stakeholder expectations. If the results are not as expected, the information gathered may help to understand why. This phase should also be used to maintain awareness of an ever-changing regulatory landscape.

### Monitoring Environmental Program Performance

Identifying environmental program gaps is an integral step toward improving program performance. Gaps commonly result from one or more of the following:

- Staff turnover without reassignment of roles and responsibilities
- Incomplete regulatory reviews
- Changed facility operations or infrastructure without consideration of the regulatory implications
- Promulgation of new regulations for previously unregulated operations or infrastructure
- Changed expectations without associated changed objectives

Identifying gaps before they result in potential costly enforcement actions or negative publicity can be accomplished by completing the following activities:

- Maintaining a list of applicable environmental regulatory programs, as well as those that could reasonably become applicable (e.g., by adding a new activity or increasing the scale of an existing activity)
- For each environmental regulatory program, creating a checklist of key actions required for compliance (e.g., permit applications and renewals, plans, inspections, record keeping, training, etc.)
- Conducting an environmental compliance applicability review for planned operational changes or facility improvements utilizing the compliance checklist
- Periodically (e.g., quarterly, semi-annually, or annually depending upon level of risk) conducting environmental compliance audits for existing activities

utilizing the compliance checklist to ensure the environmental program is meeting objectives

Airports must monitor and respond to pressure from within and outside of the organization to meet changing environmental expectations. Examples of external pressures include local government environmental commitments or a growing environmental concern from the general public. An example of internal pressure is an airport board's commitment to adopt more sustainable practices as part of a proactive environmental stewardship initiative. Identifying opportunities for increasing proactive environmental stewardship is presented in the later discussion of the "Act" phase of the P-D-C-A cycle.

### **Tracking a Changing Regulatory Landscape**

Identifying applicable environmental laws, regulations, and other directives is a continuous process requiring routine monitoring for new and changing requirements. Airports can stay abreast of regulatory changes by actively participating in state or national aviation trade organizations. Many trade organizations have established programs for monitoring proposed legislation and new regulatory initiatives, and they alert their membership through digital communications and conference presentations. Additionally, active membership networks enable near real-time knowledge and information sharing.

Establishing and maintaining proactive and positive relationships with state environmental regulators is another effective method to stay informed of regulatory changes. Airports should approach regulators about anticipated future regulations and seek guidance on compliance challenges that may significantly and adversely impact airport operations. These established relationships may pay dividends in the event an unanticipated compliance issue arises.

## **2.4 Act**

The "Act" phase of the P-D-C-A cycle provides airports the opportunity to assess elements within their environmental programs that may require improvement (e.g., identified as gaps during the "Check" phase). Airports should assess where in the preceding phases the problems originate and commit to a plan to improve the deficient environmental program components.

### **Identifying Opportunities for Proactive Environmental Stewardship**

Small airports have a number of opportunities to proactively enhance environmental stewardship through careful selection of practices that meet stewardship goals while catering to the needs and constraints specific to the airport. The practices presented in Appendix A of this Guidebook may be implemented to effectively meet and/or exceed the requirements of the environmental regulations. In addition to these practices, small airports have the opportunity to address environmental stewardship in areas that are not directly regulated, as described in further detail in Chapter 9.

### *Additional Resources*

In addition to the numerous regulatory resources identified in the following Guidebook chapters, and practice-specific resources identified in Appendix A, small airports should become familiar with the general content of the following resources while developing and expanding their environmental programs:

- FAA Website  
<http://www.faa.gov/>
- FAA Airport Regional Offices  
[http://www.faa.gov/about/office\\_org/headquarters\\_offices/arp/regional\\_offices/](http://www.faa.gov/about/office_org/headquarters_offices/arp/regional_offices/)
- FAA Airport Environmental Program  
<http://www.faa.gov/airports/environmental/>
- EPA Website  
<http://www.epa.gov/>
- EPA Website A-Z Index  
<http://www.epa.gov/epahome/quickfinder.htm>
- Sustainable Aviation Guidance Alliance (SAGA) Guidebook and Database  
[www.airportsustainability.org](http://www.airportsustainability.org)
- Joint Service Pollution Prevention and Sustainability Library  
<http://205.153.241.230/>
- ISO 14000  
[http://www.iso.org/iso/iso\\_14000\\_essentials](http://www.iso.org/iso/iso_14000_essentials)
- EMS Peer Center  
[www.peercenter.net](http://www.peercenter.net)
- EPA EMS resources  
<http://cfpub.epa.gov/compliance/resources/publications/incentives/ems/>

## Air Quality

Airports are comprised of a complex and diverse array of air pollutant emissions sources associated both with normal operations and maintenance, as well as development projects constructed in support of short- and long-term improvements. These emissions sources are broadly categorized as mobile emissions sources and stationary emissions sources.

Mobile emissions sources emit air pollutants as a product of fuel combustion associated with transportation, and include aircraft, ground support equipment (GSE), auxiliary power units (APU), motor vehicles, and construction equipment.

Stationary emissions sources emit air pollutants as a product of either fuel combustion from fixed sources, or through evaporation of fuels and chemicals during refueling, storage, and maintenance practices. Examples of stationary sources at an airport include fuel tanks, refueling facilities, emergency generators, boilers, space heaters, paint booths, and deicing facilities.

Some air pollutants occurring from these mobile and stationary sources are heavily regulated on a federal level, while others are not. This chapter identifies compliance and other air quality concerns that are common to small airports, describes existing federal regulations for these air pollutants and their sources, and suggests how the management of these emissions can be enhanced.

The federal requirements applicable to air quality include the following:

- Airport and Airway Improvement Act of 1982
- Clean Air Act of 1970, as amended (CAA)

The topics presented in Chapter 3 include the following:

- Jurisdictional Authority
- General Regulations
- Air Pollutant Regulations
- General Conformity Regulations
- Mobile Source Regulations
- Stationary Source Regulations
- Regulations on Ozone Depleting Substances
- Airports and Greenhouse Gases
- Airports and Ultrafine Particulate Matter

In addition, other specific proactive measures an airport can undertake to both facilitate and surpass compliance with federal air quality regulations are detailed in Appendices A-1 through A-5 of this Guidebook.

### 3.1 Jurisdictional Authority

**Associated Activities**

- None

Airports typically represent a wide and diverse array of air emissions sources. As such, many federal, state, and local level agencies participate in the regulation and enforcement of aviation-related air quality issues.

Often, airport operators cannot explicitly regulate air quality environmental issues at their airport, especially if it is a public use airport. For example, EPA and FAA jointly develop emissions standards for aircraft engines, and FAA is charged with enforcing the standards. However, airport operators may not prohibit engines in violation of federal standards from operating at their facility. Instead they must report violations to FAA.

To assist airport operators in determining which agencies are responsible for regulation and enforcement of air quality matters at their airport, Table 2 provides a generalized overview of the agencies involved in air quality management and environmental issues, and denotes their specific roles and responsibilities.

**Table 2. Federal, state and local agencies involved in air quality management.**

Level	Agency	Roles and Responsibilities
Federal	Environmental Protection Agency	Approves state air quality plans
		Develops regulations and policies pertaining to air pollution
		Designates areas with respect to attainment of outdoor air quality standards
		Enforces violations of federal air quality regulations
		Sets air emissions standards for engines, fuels and other emissions sources (in consultation with FAA with respect to aircraft)
		Sets outdoor air quality standards for air pollutants
	Federal Aviation Administration	Certifies aircraft engines, fuels, pilots, and airports
		Conducts research on aviation related environmental issues
		Enforces violations of aircraft environmental practices and standards
		Serves as lead federal agency on many environmental assessments of airport-related developments, improvements, and other actions
State	Air Quality Agency	Coordinates with other state and local agencies to develop emissions budgets for sources in their jurisdiction
		Develops air quality management and implementation plans
		Enforces violations of state and federal air quality laws
		Installs and maintains outdoor air monitoring networks
		Issues permits on select sources of air emissions, if required by state or federal law
	Department of Transportation	Assists in enforcing aviation-related regulatory issues at the state and local levels
		Develops motor vehicle emissions budgets used in regional air quality planning, including those vehicles that may travel on airport roadways
Local	Metropolitan Planning Organizations / Regional Planning Organizations	Assists state agencies in regional air quality planning, especially with respect to transportation

## 3.2 General Regulations

### Airport and Airway Improvement Act of 1982

The Airport and Airway Improvement Act of 1982 applies to many airport regulatory requirements, including those related to air quality. Generally, the Airport and Airway Improvement Act of 1982 regulates the award of grant funding to airport development projects involving the airport location, runways or runway extension(s), to ensure that the development projects conform to all necessary environmental regulations. Section 47106(c)(1)(B) specifically notes that projects with air quality impacts can only receive funding and approval if:

1. There exists no reasonable alternative to the project that would circumvent the environmental impact; and
2. Reasonable **mitigation** measures have been applied to account for the adverse effects.

#### *Small Airport Applicability*

Small airports are often eligible for federal funding to assist with infrastructure improvements such as runway and taxiway extension and resurfacing, installation of runway safety areas, and terminal or hangar expansions. The Airport and Airway Improvement Act of 1982 requires that the project sponsors of federally funded improvements, including the airport, should apply all reasonable measures to mitigate the air quality impacts from implementing these improvements. The construction air emissions source practices outlined in Appendix A-3 may be considered mitigation measures that satisfy this requirement should the need arise.

#### *Compliance Attainment Strategies*

- Quantify air emissions associated with airport improvements to determine where emissions mitigation is most beneficial to reducing the overall air quality impact. State agencies and private contractors are available to help with this process.

#### *Key Terms*

- **Mitigation**—Any action taken in pre-emption or response to an adverse environmental impact (including those associated with air quality), meant to decrease or negate the severity of that impact.

#### *Additional Resources*

- 49 U.S.C. Section 47106(c)(1)(B), as amended

#### Associated Activities

- Aircraft deicing/anti-icing
- Aircraft operation
- Aircraft lavatory service
- Auxiliary power unit operation
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Cargo handling
- Chemical storage/handling
- Degreasing
- Demolition/construction/development
- Fire fighting training/testing/flushing
- Ground service equipment operation
- Grounds maintenance landscaping
- Incinerator operation
- Motor vehicle operation
- On-airport power generation
- Painting
- Pavement deicing
- Refueling
- Runway rubber removal
- Spill response
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal



### 3.3 Air Pollutant Regulations

#### Associated Activities

- Aircraft deicing/anti-icing
- Aircraft operation
- Aircraft lavatory service
- Auxiliary power unit operation
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Cargo handling
- Chemical storage/handling
- Degreasing
- Demolition/construction/development
- Fire fighting training/testing/flushing
- Ground service equipment operation
- Grounds maintenance landscaping
- Incinerator operation
- Motor vehicle operation
- On-airport power generation
- Painting
- Pavement deicing
- Refueling
- Runway rubber removal
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal

#### Clean Air Act of 1970, as Amended

Title I of the CAA establishes EPA authority to safeguard human health and environmental welfare with respect to air pollution. Under §108(a) and §109 of the CAA the EPA Administrator must make an **endangerment finding** on air pollutants documented to cause or contribute to air pollution or endanger the public health. The EPA Administrator must also promulgate **National Ambient Air Quality Standards (NAAQS)** for these pollutants. EPA has issued NAAQS for the following “criteria” pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, particulate matter with mean diameters of 10 micrometers or less (PM<sub>10</sub>), particulate matter with mean diameters of 2.5 micrometers or less (PM<sub>2.5</sub>) and lead, representing the maximum allowable levels of these pollutants in outdoor air.

States must install and maintain outdoor air monitoring networks by which to gauge compliance with the NAAQS. Areas with monitored concentrations below the NAAQS are given an “**attainment**” status. Areas with concentrations higher than the NAAQS are considered “**non-attainment**” of that NAAQS. “Maintenance areas” correspond to geographic areas that were previously non-attainment, but have since remediated the problem. Some pollutants (e.g., ozone) require severity-based non-attainment designations. States with non-attainment areas must submit **State Implementation Plans (SIPs)** that outline emissions reduction strategies to be employed to attain the NAAQS by EPA’s prescribed deadlines.

Additionally, the **Prevention of Significant Deterioration (PSD)** program regulates new sources of air pollution in non-attainment areas to prevent worsening of current infractions, creating new infractions, or otherwise delaying NAAQS attainment. Section 112(b) helps EPA regulate **Hazardous Air Pollutants (HAPs)**, a class of air pollutants for which human toxicity data exists, but EPA has not currently established NAAQS. Section 112 also allows EPA to set **National Emissions Standards for Hazardous Air Pollutants (NESHAPs)** for the pollutants listed in 112(b), including asbestos, which inform emissions source operators of the level of required emissions controls needed to maintain the NESHAP. Importantly, §176(c)(4) of the CAA establishes the General Conformity Rule for non-attainment areas, which is discussed in a later section of this chapter.

#### *Small Airport Applicability*

General aviation airports are the most numerous of all airport types in the United States, and many of these airports exist in EPA’s NAAQS non-attainment areas. Small airports in non-attainment areas must comply with their local SIP by showing that air emissions associated with the airports’ operations and development do not hinder the areas’ ability to meet air quality goals in a timely manner.

### *Compliance Attainment Strategies*

- Quantify air emissions associated with airport operations and development to help state air quality agencies accurately represent airport activity in their air quality plans. State agencies and private contractors are available to help with this process.
- Communicate with state agencies to determine whether local air monitors are placed near the airport, and understand the monitoring data with respect to the state's air quality goals and EPA's NAAQS.
- Ask state air quality agencies to assist in ensuring that newly installed air emissions sources comply with NESHAP and PSD requirements.

### *Key Terms*

- **Attainment/Non-attainment**—An area that has monitored air pollutant concentrations below the established NAAQS is considered “attainment.” An area with concentrations above the NAAQS is considered “non-attainment.”
- **Endangerment Finding**—An EPA ruling after review of available evidence declaring that an air pollutant causes or contributes to the deterioration of human health or environmental welfare. This finding is requisite for EPA to establish NAAQS, or otherwise regulate the air pollutant under the CAA.
- **Hazardous Air Pollutants (HAPs)**—Any compound listed in §112(b) of the CAA having no established NAAQS but for which toxicity data exists.
- **National Ambient Air Quality Standards (NAAQS)**—Maximum acceptable levels of regulated air pollutants, including an acceptable margin of error, meant to safeguard human health (primary NAAQS) and environmental welfare (secondary NAAQS).
- **National Emissions Standards for Hazardous Air Pollutants (NESHAPs)**—A series of emissions standards set by EPA pursuant to their authority under §112 of the CAA, describing the maximum levels of HAPs listed in §112(b). Operators of HAP emissions sources must apply control technologies to ensure that emission levels do not exceed the NESHAP.
- **Prevention of Significant Deterioration (PSD)**—A program meant to regulate new sources of air pollution in non-attainment areas in a manner such that the sources do not contribute to new infractions, exacerbate existing infractions, or otherwise delay attainment of the NAAQS.
- **State Implementation Plan (SIP)**—A state-level compilation of air emissions levels, control strategies and timelines in non-attainment areas developed to demonstrate attainment of the NAAQS by EPA's mandated deadline.

### *Additional Resources*

- Additional information on air pollutants  
<http://www.epa.gov/air/airpollutants.html>
- List of Title I Statutes  
<http://www.epa.gov/air/caa/title1.html>
- 42 U.S.C. Section 7401-7515
- CAA List of Hazardous Air Pollutants  
<http://www.epa.gov/ttn/atw/orig189.html>



#### **Related Information**

See Section 7.5 for more information about asbestos regulations.

### 3.4 General Conformity Regulations

#### Clean Air Act of 1970, as Amended

##### Associated Activities

- Aircraft deicing/anti-icing
- Aircraft operation
- Aircraft lavatory service
- Auxiliary power unit operation
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Cargo handling
- Chemical storage/handling
- Degreasing
- Demolition/construction/development
- Fire fighting training/testing/flushing
- Ground service equipment operation
- Grounds maintenance landscaping
- Incinerator operation
- Motor vehicle operation
- On-airport power generation
- Painting
- Pavement deicing
- Refueling
- Waste generation/disposal

The General Conformity Rule established under Title I §176(c)(4) of the CAA, dictates that all **reasonably foreseeable direct and indirect air emissions caused or contributed by Federal Actions in NAAQS non-attainment and maintenance areas**, of which the responsible **Federal Agency** (the “**Lead Agency**”) can feasibly control, conform to the **applicable SIP**. Actions that worsen existing violations are also included. The Lead Agency can exercise discretion, defining actions or components of actions that are “**presumed to conform**” after determining that such actions have negligible effects on air quality.

Determination of conformity with an applicable SIP first involves an **Applicability Test** (see Figure 2). Emissions are quantified and compared against “**de minimis**” thresholds, over which a project or action must demonstrate conformity with the SIP. De minimis thresholds can be directly set for the **criteria pollutants** or indirectly set for pollutant precursors (i.e., Ozone de minimis thresholds are evaluated using levels of its precursors, oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOCs), and the values depend on the severity of non-attainment). The rule mandates that project emissions failing the Applicability Test must be fully offset using emissions reduction measures or by revising the SIP emissions budget to which the emissions must adhere. If the emissions cannot be fully offset, the project may not be eligible for federal funding. Having an airport’s emissions included in the SIP is the surest way to meet conformity requirements.

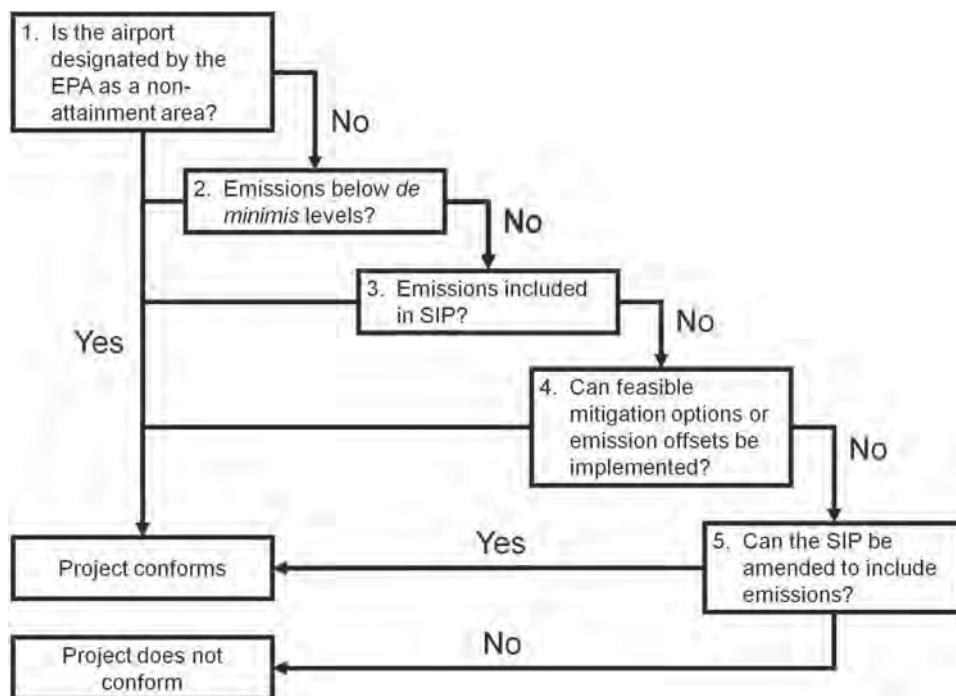


Figure 2. The general conformity determination process.

### *Small Airport Applicability*

As stated above, many small airports are currently located in EPA's non-attainment areas, meaning that the General Conformity process would apply to all federally sponsored actions occurring at the airport. This highlights the importance of airports operating in non-attainment areas establishing a rapport with the state air quality agency to ensure that they are in compliance with all applicable air quality regulations that would have an impact on the local SIP.

In April 2010, EPA revised the General Conformity regulations, allowing facilities such as airports to negotiate a "facility-wide" emissions budget with the state air quality agency, if desired. This budget could potentially allow for emissions associated with airport growth and development to be more easily accounted in a state's air quality planning. Airports should ensure activities subject to the General Conformity process are representative of actual airport activity. Specifically, if a state air quality agency does not have airport-specific activity to use to estimate airport emissions (or emissions estimates provided directly from the airport), they will often rely on a gross estimate using national data to approximate an airport's emissions in the planning process. This method may result in misrepresentation of the airport and potentially create complications in demonstrating that airport development conforms to the **SIP**.

### *Compliance Attainment Strategies*

- Quantify air emissions associated with airport operations and development to help state air quality agencies accurately represent airport activity in their air quality plans. State agencies and private contractors are available to help with this process.
- Make sure that all emissions sources requiring air permits have up-to-date permits, and that emissions controls on these sources are operating properly. All permitted sources are readily accounted in the state SIP.
- Be cognizant of potential emissions mitigation measures that would apply to projects subject to the Conformity process. Many measures described in Appendices B-1 through B-5 provide this information.
- Become familiarized with potential emissions reduction credit programs available through the state air quality agency. These credits can help demonstrate conformity if the need arises.

### *Key Terms*

- **Applicability Test**—The process by which air emissions related to a Federal action are inventoried and compared against de minimis thresholds and subject to a regional significance test.
- **Applicable State Implementation Plan (SIP)**—Refers to the portion(s) of the most recent SIP that have been approved by EPA under §110 and 301(d) of the CAA.
- **Cause or Contribute**—Implies that a Federal action would cause a new violation of the NAAQS in a non-attainment area or contribute, in conjunction with other reasonably foreseeable actions, to a new violation.
- **Criteria Pollutant**—A term describing air pollutants for which NAAQS have been established.



### **Did You Know**

The General Conformity Rule of the CAA only applies to airports located within EPA's air quality non-attainment areas. The EPA's Green Book of Non-attainment Areas is a useful resource for airports to determine if they are subject to the General Conformity Rule.

EPA's Green Book can be accessed at:

<http://www.epa.gov/oar/oaqps/greenbk/index.html>



### Helpful Hint

If airport improvements don't conform to a SIP, the related air pollution must be fully offset or mitigated, which is often costly.

Many options are available to help stop this problem before it starts. For more information, refer to Mobile Air-9 Practice in Appendix A-1, Construction Air-4 Practice in Appendix A-3, and Stationary Air-2 Practice in Appendix A-2.

### Associated Activities

- Aircraft operation
- Aircraft lavatory service
- Auxiliary power unit operation
- Cargo handling
- Demolition/construction/development
- Ground service equipment operation
- Grounds maintenance landscaping
- Motor vehicle operation
- Refueling
- Vehicle/equipment/aircraft maintenance
- Washing

- **De minimis Thresholds**—Maximum allowable levels of pollutants and precursors for a Federal action, governed by the severity of non-attainment in the area within which the action occurs.
- **Direct/Indirect Emissions**—Direct emissions are pollutant emissions that are caused or initiated directly by Federal action, taking place at the same time and location of that action. Indirect emissions refer to those emissions that are caused by the Federal action and yet occur at a distant time or place from the action, are reasonably foreseeable, and under the practical control of the Lead Agency.
- **Federal Action**—Any action taken on part of an agency or entity of the federal government, as well as any action funded, permitted, approved or otherwise developed by the entity.
- **Lead Agency**—The federal agency responsible for the planning, implementation and conformity determination of a federal action.
- **Presumed to Conform**—Components of a federal action that are considered to have a negligible effect on air quality, and thus are exempted from conformity determination.
- **Reasonably Foreseeable**—Projected future indirect air emissions that are identified at the time of conformity determination, have a known source and location, and are quantifiable.
- **Regionally Significant**—The distinction of a federal action whereby the direct and indirect air emissions associated with it exceed 10% of the regional emissions budget.
- **Total of Direct and Indirect Emissions**—All reasonably foreseeable and practicably controllable air emissions associated with a Federal action, some of which may be presumed to conform to the SIP. However, although such emissions would not be considered during determination, they must be accounted for in the Applicability Test.

### *Additional Resources*

- General Conformity Resource  
<http://www.epa.gov/oar/genconform/>
- 42 U.S.C. Section 7506(c)
- EPA's Green Book of Non-attainment Areas  
<http://www.epa.gov/oar/oaqps/greenbk/index.html>

## 3.5 Mobile Source Regulations

### Clean Air Act of 1970, as Amended

Title II of the CAA requires EPA to periodically create, update and enforce emissions and fuel standards for mobile sources of air pollution such as motor vehicles and aircraft, to which engine manufacturers and fuel refineries must adhere. This includes requirements on fuel efficiency, chemical composition of fuel (i.e., low sulfur diesel), and engine **emissions factors** describing how many pollutants are emitted per unit of fuel consumed. For vehicles currently in use, new or updated standards may be phased-in based on the type and size of the vehicles, their useful life, and the overall composition of the in-use vehicle fleet. Regulations under Title II not only apply to on-road motor vehicles, but to off-



road vehicles (i.e., construction and agricultural equipment), as well. Section 233 of the CAA prohibits state agencies from creating and implementing aircraft standards other than what are listed in Title II of the CAA.

### *Small Airport Applicability*

EPA plans to exercise its Title II authority upon concluding a study on the health and air quality effects of leaded aviation gasoline. The end result of this activity will involve imposing piston engine lead emissions standards and limitations on the content of lead in aviation gasoline, through consultation with FAA. Although alternative technologies and fuels to eliminate lead emissions from piston engines are currently under development, they are yet to be certified for safe use in aircraft.

Although the responsibility of Title II compliance rests with fuel refineries and engine manufacturers, small airports service a significant amount of general aviation operations, most of which are conducted using piston engine aircraft. Accordingly, small airports should monitor EPA actions on leaded aviation gasoline and piston aircraft closely.

### *Compliance Attainment Strategies*

- The responsibility of Title II compliance is delegated to fuel refineries and engine manufacturers. Notably, FAA prohibits public use airports from regulating the types of engines allowed to operate at the facility. However, airport operators can still be proactive by reporting violations of engines or fuel standards occurring at their airports to FAA.

### *Key Terms*

- **Emission Factors**—A term describing the rate at which an air pollutant(s) is emitted from a mobile source per unit of fuel consumed. For example, aircraft engine emissions factors are often reported in grams of pollutant per kilogram of fuel (e.g., 1.5 grams NO<sub>x</sub>/1,000 grams Jet A).

### *Additional Resources*

- EPA's Title II Requirements  
<http://www.epa.gov/air/caa/title2.html>
- Descriptions of some EPA Title II initiatives  
<http://www.epa.gov/air/peg/carstrucks.html>
- 42 U.S.C. Section 7521-7590

## 3.6 Stationary Source Regulations

### **Clean Air Act of 1970, as Amended**

Title V of the CAA requires operators of stationary sources and facilities that emit air pollutants to comprehensively detail all emissions discharged from the sources and facilities. This detail, referred to as the operating permit, includes a listing of all pollutants emitted, the quantity and rate at which they are emitted,



### **Did You Know**

CAA Title II regulations largely apply to fuel refineries and engine manufacturers.

Nonetheless, this may affect sources in operation at airports. For instance, EPA (in consultation with FAA) plans to soon create stronger lead emissions standards for piston aircraft engines and aviation gasoline.

**Associated Activities**

- Aircraft deicing/anti-icing
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Chemical storage/handling
- Degreasing
- Fire fighting training/testing/flushing
- Incinerator operation
- On-airport power generation
- Painting
- Pavement deicing
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal

**Helpful Hint**

Regularly monitor and maintain stationary sources and control technologies to ensure compliance with Title V regulations. Opt to use more environmentally friendly alternatives wherever feasible.

For more information, refer to Mobile Air-9 Practice in Appendix A-1, Indoor Air-1 Practice in Appendix A-5, and Stationary Air-2, and Stationary Air-5 Practices in Appendix A-2.

control technologies employed to mitigate these emissions, and compliance and violation monitoring. Periodically, the source operator must disclose and provide updates to this information to the EPA administration, neighboring states, and the public. Permits are approved and issued by EPA for durations not to exceed five years in most cases. Sources affected under Title V generally include those emitting more than 100 tons per year of any regulated (i.e., “criteria”) pollutant, although the allowable quantity can be reduced for sources operating in **non-attainment** areas. Moreover, the requirements of the Title V permitting program can also be adjusted at the state level. Maximum allowable **HAP** emissions must also be accounted for in the operating permit.

*Small Airport Applicability*

Small airports may not operate as many Title V regulated sources as larger commercial airports do, but Title V regulations still apply to small airport sources such as boilers, space heaters, paint booths, fuel storage and transfer facilities, and waste incinerators.

*Compliance Attainment Strategies*

- Ensure permits are up-to-date, and new sources are permitted prior to operation.
- Aggressively inspect and maintain source emissions control technologies required to demonstrate compliance with Title V emissions limitations.
- Proactively research and implement strategies to further reduce stationary source emissions, such as using different fuels or volunteering to implement the best available control technologies as they are produced.

*Additional Resources*

- Title V Permit Program  
<http://www.epa.gov/air/caa/title5.html>  
<http://www.epa.gov/air/oaqps/permits/>
- 42 U.S.C. Section 7661
- CAA List of Hazardous Air Pollutants  
<http://www.epa.gov/ttn/atw/orig189.html>

### 3.7 Regulations on Ozone Depleting Substances

#### Clean Air Act of 1970, as Amended

Title VI of the CAA allows EPA to regulate air pollutants that can have a damaging effect on the ozone layer, including many compounds commonly used as refrigerants or propellants. EPA identified a listing of these substances and categorized them into two categories based on their potential to deplete the ozone layer and contribute to global warming. **Class I substances** [identified in §7671(a)] correspond to those substances with the highest damage potential, that EPA planned to phase out of production by the year 2000, and included **chlorofluorocarbons (CFCs)**. **Class II substances** [identified in §7671(b)] refer



to those with slightly lesser damage potential (e.g., **hydrochlorofluorocarbons (HCFCs)**), and accordingly the phase-out process is required to be initiated by 2015. It is expected that HCFCs will continue to be available until 2030, and recycled HCFCs may still be available thereafter.

Title VI also allows EPA to set up monitoring and reporting requirements for sources emitting, producing, exporting, or otherwise transferring these compounds. Requisite to this reporting requirement is the establishment of a “**baseline**” production/emission level relative to the year 1989, and the periodic update of how this rate has been diminished relative to the baseline level.

According to §7671(g)(b), machines and other equipment that consume, process, contain, or move Class I and II substances must be equipped with control and capture devices to limit the release of these substances to the surrounding environment and, similarly regulate the manner with which these equipment are maintained or disposed. Sections 7671(g) and (h) require refrigeration or cooling systems containing more than 50 pounds of refrigerant must not leak more than 35% of their total charge within a 12-month period. Owners of these systems are required to report leaks exceeding this threshold to EPA, as well as to arrange for replacement or retrofitting, within 30 days. For motor vehicles, air conditioning repairs and modifications must additionally conform to SAE standards. Moreover, technicians are required to apply between 10 and 25 inches of Mercury vacuum when evacuating refrigeration and cooling systems for recycling and disposal, depending on the type of system and the ozone depleting substances contained. Lastly, EPA requires technicians that maintain or service these systems to become certified. **Type I technicians** are allowed to become certified by submitting a mail-in, open book test to EPA. **Type II, III and Universal technicians** must pass a closed-book certification exam proctored by an EPA-certified organization to attain certification.

#### *Small Airport Applicability*

Class I and II substances are typically used at small airports in terminal area heating ventilation and air conditioning (HVAC) machinery and motor vehicle/equipment air conditioning systems, and as such are subject to handling and reporting requirements of Title VI.

#### *Compliance Attainment Strategies*

- Ensure that maintenance technicians have the appropriate EPA certification.
- Develop a chemical inventory of refrigerants.
- Regularly inspect and maintain equipment and machinery that uses Title VI regulated substances.

#### *Key Terms*

- **Baseline**—Used to describe the amount of Class I or II ozone depleting substances in use by an applicable facility in the year 1989, against which monitoring and reporting in subsequent years would be compared.

#### Associated Activities

- Building operation/maintenance
- Chemical storage/handling
- Vehicle/equipment/aircraft maintenance



#### Did You Know

Although ozone is a harmful air pollutant at ground level, it performs a necessary environmental function at higher altitudes.



#### Helpful Hint

Keeping an updated chemical inventory of refrigerants, and conducting routine inspections of equipment that use them, will help maintain compliance with Title VI regulations.



### Helpful Hint

Consider limiting the amounts of ozone depleting substances used, opting instead for more environmentally friendly alternatives. For more information, refer to Air Evaluation-2 Practice in Appendix A-4, Mobile Air-9 Practice in Appendix A-1, Construction Air-5 Practice in Appendix A-3, and Indoor Air-5 Practice in Appendix A-5.

- **Chlorofluorocarbons (CFCs)**—Chlorofluorocarbon, an example of a Class I ozone depleting substance that had commonly been used as a refrigerant or propellant in commercial and industrial applications.
- **Class I Substance**—Any substance listed in §7671(a) of the CAA that has a very high potential to damage the ozone layer and contribute to global warming. These substances were to be phased out of production by the year 2000.
- **Class II Substance**—Any substance listed in §7671(b) of the CAA that has a significant potential to damage the ozone layer and contribute to global warming. These substances are to be phased out of production by 2015.
- **Hydrochlorofluorocarbon (HCFC)**—An example of a Class II ozone depleting substance that is commonly used as a refrigerant or propellant in commercial and industrial applications.
- **Type I Technician**—A technician that services or disposes of small appliances containing ozone depleting substances, subject to the minimum certification requirements by EPA.
- **Type II Technician**—A technician that services or disposes of high and very high pressure appliances containing ozone depleting substances, subject to the most stringent certification requirements by EPA.
- **Type III Technician**—A technician that services or disposes of low pressure appliances containing ozone depleting substances, subject to the most stringent certification requirements by EPA.
- **Universal Technician**—A technician that services all types of appliances or equipment that contain ozone depleting substances and are subject to regulation under Title IV, for which the most stringent EPA certification is required.

### *Additional Resources*

- EPA Resource on Ozone Depleting Substances  
<http://www.epa.gov/ozone/strathome.html>
- 42 U.S.C. Section 7671

## 3.8 Airports and Greenhouse Gases

Importantly, there are currently no existing federal regulations that attempt to control or reduce the levels of **greenhouse gases (GHG)**. However, on December 7, 2009, EPA declared an **endangerment finding** under Title I of the CAA, signifying that GHGs cause or contribute to negative impacts on human health or environmental welfare. This action allows EPA to begin regulating GHG using its authority under CAA. Although EPA has not yet stated how they intend to exercise this authority, available options may include establishing a market-based emissions **cap-and-trade** system, or establishing emissions or fuel standards for GHG sources.

A GHG reporting rule has also recently been established, requiring certain facilities routinely emitting a significant amount of GHG to periodically assess and report their GHG emissions to EPA. Specifically, fossil fuel suppliers, vehicle engine manufacturers, and facilities exceeding 25,000 metric tons of

**carbon dioxide equivalent (CO<sub>2</sub>e)** per year must report their emissions and activities.

Recent reports have concluded that the aviation industry contributes roughly 3% to the global levels of man-made GHG in the atmosphere, and suggest that increased aviation demand will cause this percentage to increase in the future. As such, small airports should show initiative in assessing their contribution to aviation-related GHG. Many resources exist or are in development that will provide important guidance on how to quantify, report, and assign ownership to GHG. Importantly, the ACRP has developed a guidebook that walks a user through the recommended methodology to address these issues.

Because GHG emissions often transcend geographic and political boundaries, they are often quantified on many spatial scales (i.e., locally, regionally, or globally). Accordingly, airport operators should be cautious in choosing which scale is best applicable to their facility when assessing GHG emissions associated with their airport. For example, a large hub commercial service airport with a considerable amount of long distance domestic and international air service may find it necessary to quantify aircraft GHG emissions at cruise altitudes between the origination and destination airports to get a sense of how many emissions are occurring on a regional or national scale. Conversely, small airports that do not typically handle many commercial air carrier service operations may be more concerned with quantifying emissions on a local or regional level, which would likely only involve aircraft emissions resulting from taxi, take-off, climb-out, and landing modes of operation. Small airport operators may obtain guidance on defining the spatial scale of their airport's emissions assessments through coordination with state agencies, environmental professionals, and ACRP guidance documents.

#### *Small Airport Applicability*

Small airports will not likely exceed any existing GHG reporting thresholds, but should carefully watch for future regulations issued by EPA to assess whether those regulations could potentially apply.

#### *Compliance Attainment Strategies*

- Conduct a GHG emissions inventory to gauge whether reporting requirements or emissions limits apply. Private contractors are available to assist in this process.
- Develop a proactive GHG reduction plan. Notably, many practices targeted at reducing fuel consumption and engine usage described in Appendices A-1 through A-5 can help structure this plan.

#### *Key Terms*

- **Cap-and-Trade**—A system by which air emissions levels are limited to a specific threshold. Emissions credits are awarded to facilities with emissions below the threshold. These facilities are allowed to sell these credits to others that are violating the threshold, so that overages and shortages cancel each other out and the limit is maintained.

#### **Associated Activities**

- Aircraft deicing/anti-icing
- Aircraft operation
- Aircraft lavatory service
- Auxiliary power unit operation
- Building operation/maintenance
- Cargo handling
- Chemical storage/handling
- Demolition/construction/development
- Fire fighting training/testing/flushing
- Ground service equipment operation
- Grounds maintenance/landscaping
- Incinerator operation
- Motor vehicle operation
- On-airport power generation
- Painting
- Pavement deicing
- Refueling
- Waste generation/disposal

- **Carbon Dioxide Equivalent (CO<sub>2</sub>e)**—An expression used in GHG assessment and reporting. To determine CO<sub>2</sub>e, individual GHG emissions are quantified and adjusted to the global warming potential of carbon dioxide.
- **Greenhouse Gasses (GHG)**—Any gas emitted into the atmosphere that has the potential to trap heat. The most common GHG occurring at airports are carbon dioxide, methane and nitrous oxide.

#### *Additional Resources*

- Endangerment Finding Synopsis  
<http://www.epa.gov/climatechange/endangerment.html>
- EPA's GHG Reporting Rule  
<http://www.epa.gov/climatechange/emissions/ghgrulemaking.html>
- EPA's 2009 GHG Inventory Report  
<http://www.epa.gov/climatechange/emissions/usinventoryreport.html>
- *ACRP Report 11: Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rpt\\_011.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_011.pdf)

### 3.9 Airports and Ultrafine Particulate Matter

As is the case with **GHG** emissions, there are currently no federal or state regulations on emissions of **ultrafine particulate matter (UFP, or PM<sub>0.1</sub>)**. For the purposes of this discussion, UFP is defined as particles contained in exhaust emissions that measure 0.1 micrometers or less in diameter. UFP can be omitted from vehicle engines at higher power settings when fuel combustion temperatures are very high. Because these particles are so small, they can penetrate deep into the respiratory system and cause considerable damage to living things. In fact, UFP has been implicated in increasing risk of cardiovascular disease, pulmonary ailments, and cancer development.

An increasing amount of scientific research has identified aircraft (especially jet turbine aircraft) as a significant source of UFP. Further, recent studies conducted by EPA and the California Air Resources Board (CARB) have indicated that UFP concentrations are commonly elevated in the immediate vicinity of Southern and Central California airports, including Los Angeles International (LAX) and Santa Monica (SMO). Because the state of the science regarding UFP is new and continually emerging, guidance on assessing UFP around airports is still in development. Nonetheless, small airport operators should monitor this environmental issue closely to ascertain any effects it may have on their airport.

#### *Small Airport Applicability*

To maintain public relations and be advised of potential regulatory developments, small airports should keep informed on this topic, especially if there is a significant amount of jet activity occurring at their facility.

#### **Associated Activities**

- Aircraft operation
- Auxiliary power unit operation
- Cargo handling
- Demolition/construction/development
- Fire fighting training/testing/flushing
- Ground service equipment operation
- Grounds maintenance/landscaping
- Incinerator operation
- Motor vehicle operation
- On-airport power generation
- Waste generation/disposal

### *Compliance Attainment Strategies*

- Communicate with federal, state, and local regulatory agencies and academic institutions to determine whether any UFP studies are planned or in place around the airport and become involved in any such studies. Taking a proactive role in assessing potential impacts can help the airport be prepared in the event of any negative public response or potential regulatory action.

### *Key Terms*

- **Ultrafine Particulate Matter (UFP or PM<sub>0.1</sub>)**—Particles contained in exhaust emissions that measure 0.1 micrometers or less in diameter.

### *Additional Resources*

- CARB Fine and Ultrafine Particulate Matter Research  
<http://www.arb.ca.gov/research/pmr/pmr.htm>
- EPA Fine and Ultrafine Particulate Matter Research  
[http://cfpub.epa.gov/ncer\\_abstracts/index.cfm/fuseaction/outlinks.centers/center Group/1](http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/outlinks.centers/center Group/1)

## Emergency Planning and Response

Small airports commonly store and handle numerous types of chemicals, oils, and other substances subject to emergency planning and response regulations. Most of these emergency planning and response regulations were promulgated in response to large accidents that caused significant loss of human life or extensive environmental damage. While small airports typically store limited quantities of chemicals, oils, and other regulated substances, these materials may be encountered during routine activities and remain a potential threat to human health and the environment if mismanaged.

Although the terminology used in this chapter sounds similar, the associated regulatory requirements may be very different. Some regulations apply to a particular substance. Other regulations refer to a defined group of regulated substances. Special attention should be given to the key terms defined in each section to prevent confusion.

The federal requirements applicable to emergency planning and response include the following:

- Emergency Planning and Community Right-to-Know Act of 1986, as Amended (EPCRA)
- Clean Water Act, as Amended (CWA)
- Oil Pollution Act of 1990, as amended (OPA)
- Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as Amended (FIFRA)
- Resource Conservation and Recovery Act of 1976, as Amended (RCRA)
- Hazardous Material Transportation Act of 1974, as Amended (HMTA)

The topics presented in Chapter 4 include the following:

- Community Emergency Planning, Storage, and Release Reporting
- Spill Prevention, Control, and Countermeasure
- Pesticide Application, Certification, and Disposal
- Underground Storage Tanks
- Hazardous Material Transport

### 4.1 Community Emergency Planning, Storage, and Release Reporting

#### Emergency Planning and Community Right-to-Know Act of 1986, as Amended

EPCRA, authorized by Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), includes reporting requirements to local agencies for facilities that store the following:

#### Associated Activities

- Aircraft deicing/anti-icing
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Cargo handling
- Chemical storage/handling
- Degreasing
- Demolition/construction/development
- Grounds maintenance/landscaping
- Pavement deicing
- Refueling
- Spill response
- Vehicle/equipment/aircraft maintenance



- **Hazardous chemicals**
- **CERCLA hazardous substances** (as defined by the Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended (CERCLA))
- **Extremely hazardous substances (EHS)** (as defined by EPCRA).

The term **facility** includes motor vehicles and aircraft. EPCRA includes three chemical reporting requirements: emergency planning notification, hazardous chemical inventory reporting, and emergency **release** notification.

#### *Emergency Planning Notification*

For emergency planning purposes, EPCRA Section 302 requires airports that produce, use, or store EPCRA EHS in quantities that exceed EPCRA **threshold planning quantities (TPQs)** must submit site-specific information to the **Local Emergency Planning Committee (LEPC)** and **State Emergency Response Commission (SERC)** within 60 days of receiving the substance. EPA provides a consolidated List of Lists that airports can use to identify TPQs for the EPCRA EHS. LEPCs are required to prepare and maintain emergency plans for facilities that manage EHS in quantities that exceed EPCRA TPQs. Airports should consult with their LEPC to determine the specific information and amount of assistance required to prepare an emergency plan.

#### *Hazardous Chemical Inventory Reporting*

Airports required by the Occupational Safety and Health Act of 1970 to prepare or have available a Material Safety Data Sheet (MSDS) for each hazardous chemical present at their facilities are subject to EPCRA Section 311 hazardous chemical inventory reporting requirements. MSDS requirements are specified in the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard [(29 Code of Federal Regulations (CFR) 1910.1200)]. Airports subject to OSHA must initially submit their MSDS or a detailed list of the same chemicals to their SERC, LEPC, and local fire department within three months after becoming subject to the OSHA regulations.

Airports submitting MSDS or chemical lists under Section 311 are also subject to the reporting requirements of EPCRA Section 312. Reporting to the SERC, LEPC and local fire department is required if one of the following situations occurs:

- Hazardous chemicals are stored in excess of 10,000 pounds
- Gasoline at retail gas stations is stored in excess of 75,000 gallons
- Diesel fuel at retail gas stations is stored in excess of 100,000 gallons
- EPCRA EHS are stored in excess of 500 pounds or the applicable TPQ

Reporting is accomplished using EPCRA Tier I or Tier II forms, although most states required the use of the Tier II forms. The forms are available on EPA's website. Completed forms must be submitted within 90 days of storage in excess of the quantities listed above, and then by March 1 annually thereafter.



#### **Did You Know**

LEPCs have not been established in every municipality. The EPA's Emergency Management webpage has a LEPC search tool to help find one for your area.

### *Emergency Release Notification*

For an accidental release of a CERCLA hazardous substance or EPCRA EHS in excess of its **reportable quantities (RQ)** and that will affect areas that are beyond the facility boundaries, EPCRA Section 304 requires airports to immediately notify their LEPC and SERC. Immediate verbal notification must be made within 15 minutes after discovering the release. Information provided during notification must include the following:

- Substance name or identity
- Whether the substance is an EHS
- An estimate of the quantity released
- Time and duration of the release
- Environmental media to which the release occurred
- Known or anticipated acute or chronic health risks associated with the released substance and advice regarding medical attention necessary for exposed individuals
- Precautions to take as a result of the release
- Name and telephone number of the individual to be contacted for further information

As soon as practicable after the event, written follow-up notification must be made. The written notification must include:

- Actions taken to respond and contain the release
- Known or anticipated acute or chronic health risks associated with the release
- Advice regarding medical attention necessary for exposed individuals

For releases of CERCLA hazardous substances, release information must be submitted to the **National Response Center (NRC)** as well. Certain releases are exempt from reporting, including those that are solely within facility boundaries or federally permitted [e.g., covered by a National Pollutant Discharge Elimination System (NPDES) permit].

### *Small Airport Applicability*

Public sector employees are not subject to the Occupational Safety and Health Act (OSHA) of 1970, and state-by-state programs similar to OSHA may differ. Although public sector employees (potentially including airport personnel at municipally owned airports) are not covered under OSHA, EPCRA incorporates the OSHA requirements for state and local government employees that are involved with hazardous waste operations. Airport operators should consult with an Environmental Health and Safety professional to determine the applicable health and safety requirements.

For airports that are regulated under EPCRA, it is very possible to store an EHS in quantities exceeding a TPQ. A typical EHS that may be managed at an airport is sulfuric acid contained in large fork lift electric batteries. Similarly, airports are likely to store hazardous chemicals requiring inventory reporting. Airports should also consult with their tenants (e.g., fixed base operators) to



#### **Helpful Hint**

Consider developing detailed and written spill notification procedures before you need them.

For more information, refer to Spill-5 Practice in Appendix A-6.



ensure that applicable reporting requirements are met, especially if a tenant is responsible for operating an airport-owned facility (e.g., fuel farm).

#### *Compliance Attainment Strategies*

- Maintain MSDS on file when a new EHS is purchased and is above the designated TPQ.
- Ensure staff is aware if the airport stores an EHS.
- Ensure staff is aware of TPQ for EHS stored onsite.
- Complete Tier I/II forms annually and submit to the appropriate emergency response agency.
- Ensure staff is aware of the EHS or CERCLA hazardous substance Reportable Quantity (RQ).
- Ensure staff is aware of spill notification requirements.
- Develop spill response procedures for the airport.
- Conduct spill response training on a regular schedule and maintain attendance records on file.
- Understand the airport's discharge conveyance system and ultimate discharge location(s) to help determine where a spill or release will drain to if it enters the storm sewer or sanitary sewer system.
- Maintain proper records of EHS or CERCLA hazardous substances on file.
- Ensure regular inspections are conducted for areas that are not frequently attended to assist with identifying a potential RQ spill.
- Implement a hazardous materials management system to prevent shelf-life expiration and unused materials from becoming wastes by not ordering materials in bulk that are unlikely to be used before the shelf-life expires.

#### *Key Terms*

- **CERCLA Hazardous Substance**—Chemicals regulated under CERCLA and included in the following regulatory lists:
  - Element, compound, mixture, solution, or substance designated as hazardous under Section 102 of CERCLA
  - CWA hazardous substances and toxic pollutants
  - RCRA hazardous wastes
  - Clean Air Act of 1970, as amended (CAA) hazardous air pollutants
  - Toxic Substances Control Act of 1976, as amended (TSCA) imminently hazardous chemical substances or mixtures
- **Extremely Hazardous Substances (EHS)**—A substance listed in Appendices A and B of 40 CFR 355 regulations for EPCRA.
- **Facility**—All buildings, equipment, structures, and other stationary items that are located on a single site or on contiguous or adjacent sites and that are owned or operated by the same person (or by any person that controls, is controlled by, or under common control with, such person).
- **Hazardous Chemical**—Any chemical for which a facility is required to maintain an MSDS under OSHA.
- **Local Emergency Planning Committee (LEPC)**—Defined by the EPA as a group of individuals that work together to understand chemical hazards in the community, develop emergency plans in case of an accidental release, and

look for ways to prevent chemical accidents. LEPCs are made up of emergency management agencies, responders, industry and the public.

- **National Response Center (NRC)**—Federal point of contact for reporting oil and chemical spills.
- **Release**—Spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any hazardous chemical, extremely hazardous substance, or CERCLA hazardous substance.
- **Reportable Quantity (RQ)**—For any CERCLA hazardous substance, the quantity (established in Table 302.4 of 40 CFR 302.4) for such substance. For any extremely hazardous substance, reportable quantity means the quantity established in Appendices A and B of 40 CFR 355 for such substance. Unless and until superseded by regulations establishing a reportable quantity for newly listed EHS or CERCLA hazardous substances, a weight of one pound shall be the reportable quantity.
- **State Emergency Response Commission (SERC)**—The State Emergency Response Commission for the state in which the facility is located except where the facility is located in Indian Country. In the absence of a SERC for a state or Indian Tribe, the Governor or the chief executive officer of the tribe, respectively, shall be the SERC. Where there is a cooperative agreement between a state and a Tribe, the SERC shall be the entity identified in the agreement.
- **Threshold Planning Quantity (TPQ)**—For a substance listed in Appendices A and B of 40 CFR 355, the quantity listed in the column “threshold planning quantity” for that substance.

#### *Additional Resources*

- 40 CFR 355-370
- EPCRA Requirements  
<http://www.epa.gov/emergencies/content/epcra/index.htm>
- EPCRA Local Emergency Planning Requirements  
[http://www.epa.gov/emergencies/content/epcra/epcra\\_plan302c.htm](http://www.epa.gov/emergencies/content/epcra/epcra_plan302c.htm)
- EPCRA Emergency Release Notification Requirements  
[http://www.epa.gov/emergencies/content/epcra/epcra\\_report.htm](http://www.epa.gov/emergencies/content/epcra/epcra_report.htm)
- EPA List of Lists Database  
<http://yosemite.epa.gov/oswer/lol.nsf/homepage>
- List of Extremely Hazardous substances in 40 CFR 355, Appendix A  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=96c433dfae0669cb2479a675bd59f7ce&rgn=div5&view=text&node=40:27.0.1.1.11&idno=40#40:27.0.1.1.11.4.17.3.14>
- List of Extremely Hazardous substances in 40 CFR 355, Appendix B  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=96c433dfae0669cb2479a675bd59f7ce&rgn=div5&view=text&node=40:27.0.1.1.11&idno=40#40:27.0.1.1.11.4.17.3.15>
- CERCLA Hazardous substance Reportable Quantities  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=96c433dfae0669cb2479a675bd59f7ce&rgn=div5&view=text&node=40:27.0.1.1.2&idno=40#40:27.0.1.1.2.0.1.4>

## 4.2 Spill Prevention, Control, and Countermeasure

### Associated Activities

- Auxiliary power unit operation
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Ground service equipment operation
- Motor vehicle operation
- On-airport power generation
- Refueling
- Spill response
- Vehicle/equipment/aircraft maintenance

### Clean Water Act, as Amended

The Oil Pollution Prevention Regulation was promulgated in 1973 under Section 311 of the CWA and is commonly referred to as the Spill Prevention, Control and Countermeasure (SPCC) rule. It required subject facilities to prepare an SPCC plan to protect **navigable waters of the U.S.** from spills of a wide variety of **oils**. EPA amended the Oil Pollution Prevention Regulation to improve the nation's ability to prevent, prepare for, and respond to oil spills largely due to public concern following the Exxon/Valdez oil spill incident. The 2010 BP Deepwater Horizon oil spill in the Gulf of Mexico will inevitably keep the SPCC rule at the forefront of public and EPA scrutiny.

The SPCC rule was amended in 2002, 2006, 2008, and 2009. The amendments provide increased clarity, tailor requirements to particular industry sectors, and streamline certain requirements for those **facility** owners or operators subject to the rule. The amendments became effective on January 14, 2010, with a compliance date of November 10, 2010. However, on June 28, 2010, EPA proposed to extend the compliance date for certain facilities subject to the SPCC rule (including airports). The new proposed compliance date is November 10, 2011, and is subject to public comment and potential further modification.

A facility must meet the following three conditions to be subject to the SPCC rule:

- The facility must be **non-transportation-related**.
- The facility must have an aboveground oil storage capacity greater than 1,320 gallons or a completely buried oil storage capacity greater than 42,000 gallons.
- There must be a reasonable potential for a discharge into or upon “navigable waters of the U.S.”

#### *Non-transportation-related Facility*

The term “transportation-related” pertains specifically to the transport of oil in commerce, such as a commercial tanker truck transporting oil from its bulk oil terminal to a gas station. “Non-transportation-related” facilities involve oil that is distributed from bulk storage containers or vehicles operating solely within the confines of the facility.

#### *Oil Storage Capacity Thresholds*

Tanks and containers with an oil storage capacity of 55 gallons or greater, and not associated with the propulsion of a vehicle are included in the oil storage capacity determination. Completely buried oil storage tanks, such as underground storage tanks (USTs) are exempt from the SPCC rule if they are regulated under a state or federally approved UST program and fully compliant with all



#### Helpful Hint

Consider developing a database of bulk oil storage containers to track the amount of oil stored at your airport.

For more information, refer to Practice Spill-1 in Appendix A-6.

applicable UST requirements. However, some USTs are not subject to all of the technical requirements of the federal or state UST requirements (e.g., emergency generator USTs, heating oil USTs) and may be subject to SPCC.

### *Potential to Discharge into Navigable Waters*

The definition and breadth of “navigable waters” has been the subject of recent legal challenges. The current applicable definition of “navigable waters” is from Section 502(7) of the Federal Water Pollution Control Act, as amended (FWPCA), also known as the CWA. To assess the potential for a discharge to reach navigable waters, an airport must consider its proximity and various means for spill conveyance (e.g., storm drain, drainage ditch, sheet flow, etc.).

If the conditions described above are met, a facility is required to meet SPCC requirements including the development and implementation of an SPCC plan. The contents of an SPCC plan generally include descriptions of the following:

- Contents, volumes, and locations of **bulk oil storage containers**
- Container construction
- Secondary containment measures
- Drainage controls
- Overfill and spill prevention measures
- Container inspection and testing methods
- Security measures to prevent vandalism
- Spill control and containment countermeasures
- Potential spill volumes and pathways
- Training requirements

An SPCC plan must also be certified by a licensed professional engineer or in certain cases, through self-certification. Additionally, changes at the facility, such as the addition of regulated containers, modifications to secondary containment, changes in location of oil transfer operations, and modifications to the drainage system require an amendment to the SPCC plan within 6 months of the change.

### *Small Airport Applicability*

If airports meet the three conditions described in the previous section, the SPCC requirements apply and a SPCC plan must be developed and implemented. Condition #1 is often a source of confusion for airports as they are commonly thought to be “transportation-related” and therefore exempt from SPCC. However, airport operations typically involve oil distribution from bulk storage containers or vehicles operating solely within the confines of the facility. Therefore, airports are in fact “non-transportation-related” and subject to SPCC.

The typical regulated containers at airports include aboveground storage tanks (ASTs), drums, emergency generators, **mobile refuelers**, towable equipment, and **oil-filled operational equipment** (e.g., transformers, elevator reservoirs, hydraulic lifts). Underground storage tanks at airports are usually covered under a state UST regulatory program. However, emergency generator USTs may be included in an



#### **Did You Know**

Many small airports are able to self-certify their own SPCC plan.

Facilities can self-certify their own SPCC plan if the total oil storage capacity is less than 10,000 gallons (other requirements apply). In 2010, the EPA issued a Tier I Qualified Facility SPCC template.



#### **Helpful Hint**

EPA provides guidance for preparing SPCC Plans in the SPCC Guidance for Regional Inspectors.

airport SPCC plan. As a result, the oil storage capacity at small airports frequently exceeds the regulatory thresholds.

Typical airport operations that may result in a discharge of oil include fueling, maintenance activities, drum handling, and AST/UST filling. Filling mobile refuelers and using them to refuel aircraft or vehicles has been one of the more controversial potential sources of a discharge. Regulatory amendments have since clarified that mobile refuelers and tank trucks operating at an airport do not require **sized secondary containment** capable of containing the entire volume of the tank (and extra capacity for precipitation). Instead, operators of this equipment are only required to contain the likely discharge of oil, which is an amount defined by the entity preparing the SPCC plan. This clarification creates a potential point of conflict between airports and fixed base operators (FBOs). If an FBO underestimates its likely discharge volume associated with its operations, the airport may as the property owner unknowingly share the risk associated with the discharge.

Since many airports are located near streams or rivers, or have drainage that conveys to these resources, the potential for a discharge to “navigable waters” exists. Floor drains or other sanitary piping at an airport that may be conveyed to a publically owned treatment works (POTW) should also be considered a potential discharge pathway.

#### *Compliance Attainment Strategies*

- Understand the number, type, and contents of bulk oil storage containers or equipment at the airport.
- Equip airport bulk oil storage containers with adequate sized secondary containment.
- Equip airport mobile refuelers with **general secondary containment** capable of containing a reasonably defined likely discharge volume.
- Maintain adequate amounts of spill response materials at airport areas where spills or drips are likely to occur, and replace when used.
- Conduct regular inspections of oil storage areas that are not frequently attended to help identify potential drips, leaks, and spills.
- Prepare and review spill response procedures.
- Understand the airport’s discharge conveyance system and ultimate discharge location(s) to help determine where a spill or **release** will drain to if it enters the storm sewer or sanitary sewer system.
- Sign, certify, and review airport SPCC plans on a regular schedule and update when there is a change in oil storage or drainage at the airport.
- Conduct spill response training on a regular schedule and maintain attendance records.
- Perform required inspections as specified in the SPCC plan on a regular schedule, and maintain records on file.
- Maintain detailed information pertaining to aboveground or underground storage tank construction at the airport.
- Establish baseline data for bulk storage containers requiring non-destructive testing.



- Properly decommission or permanently close airport bulk oil storage containers that are non-operational.

#### *Key Terms*

- **Bulk Oil Storage Container**—A container used to store oil that is regulated by SPCC and has a shell capacity equal to or greater than 55 gallons.
- **General Secondary Containment**—SPCC-required containment to address the most likely discharge from a bulk oil storage container or transfer operation including dikes, berms, or sorbent materials.
- **Mobile Refueler**—A type of bulk oil storage container onboard a vehicle or towed, that is designed or used solely to store and transport fuel for transfer into or from an aircraft, motor vehicle, or other oil storage container.
- **Navigable Waters of the U.S.**—Applicable to the SPCC rule, includes waters as defined in section 502(7) of the FWPCA, including all navigable waters of the U.S., as defined in judicial decisions prior to passage of the 1972 Amendments to the FWPCA, and tributaries of such waters; interstate waters; intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes; and intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce.
- **Non-transportation-related**—Not related to the transport of oil in commerce as defined in the Memorandum of Understanding between the Secretary of the U.S. Department of Transportation (U.S.DOT) and the Administrator of the EPA (Appendix A of 40 CFR 112).
- **Oil**—Oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil.
- **Oil-filled Operational Equipment**—A type of oil storage container regulated by SPCC in which oil is present solely to support the function of the apparatus or the device (e.g., elevator hydraulic reservoirs, hydraulic systems, lubricating systems, and electrical transformers).
- **Sized Secondary Containment**—SPCC-required secondary means for containment of an entire shell capacity of the largest single container with sufficient freeboard for precipitation.

#### *Additional Resources*

- 40 CFR 110, 112
- EPA Website on the SPCC Rule  
<http://www.epa.gov/emergencies/content/spcc/index.htm#guidance>
- SPCC Guidance for Regional Inspectors  
[http://www.epa.gov/emergencies/content/spcc/spcc\\_guidance.htm](http://www.epa.gov/emergencies/content/spcc/spcc_guidance.htm)

## 4.3 Pesticide Application, Certification, and Disposal

### Associated Activities

- Building operation/maintenance
- Cargo handling
- Chemical storage/handling
- Grounds maintenance/landscaping
- Spill response
- Waste generation/disposal

### Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as Amended

FIFRA established a program for managing **pesticides** in the United States. A pesticide is a substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant. Key components of FIFRA include the following:

- Registration
- Manufacturing
- Transportation
- Sale
- Labeling
- Storage
- Application
- Disposal

The requirements for pesticide use that typically apply to airport operations include storage and labeling as well as application and disposal, which are further described in the following sections

#### *Storage and Labeling*

Pesticides must be stored in an approved container or package and be properly labeled. Labels must include the pesticide registration number, health hazards, and warnings. The label must be clearly legible and easily located on the container or package.

#### *Application*

Individuals applying **restricted use pesticides** must either be certified as a **commercial** or **private applicator**, or be supervised by a certified commercial or private applicator. The different types of certified applicators depend on the type of land where the pesticide is applied. To become certified, applicators must understand the proper use and handling of pesticides. Appropriate personal protective equipment (PPE) must be worn when applying pesticides, as specified on the product labeling.

#### *Disposal*

Pesticide applicators must follow the instructions included on pesticide labels, including triple rinsing or pressure rinsing empty containers before disposal. Unused pesticides that have been recalled or managed as part of a waste pesticide collection program may be recycled under the universal waste management procedures (refer to Section 7.2).



### Helpful Hint

Consider utilizing low-toxicity pesticides or herbicides to minimize potential exposure concerns.

For more information, refer to Pesticides-2 Practice in Appendix A-8.

### *Small Airport Applicability*

Pesticides used at airports typically include those for vegetation (e.g., weeds, brush, or invasive species) or pest (e.g., insect, or rodent) control. Airports may perform pesticide application activities, or contract with a service provider. Airports that perform pesticide application must ensure containers are adequately stored, labeled, and disposed. Airport personnel responsible for applying pesticides are typically considered commercial applicators.

### *Compliance Attainment Strategies*

- Ensure pesticides are not purchased at local retail stores, as these types of pesticides are not intended for commercial applicators.
- Do not use used **oil** to control weeds.
- Do not over apply pesticides.
- Ensure proper PPE is worn by airport personnel in accordance with product labeling when applying pesticides.
- Replace pesticide labels that are old, peeling, or unable to be deciphered.
- Properly label pesticide containers.
- Triple rinse pesticide containers prior to disposal.
- Do not discard unused pesticides in the trash or dumped down a sanitary drain.
- Only allow certified pesticide applicators to perform application activities, or only allow application to be conducted under the supervision of a certified pesticide applicator.
- Ensure pesticide applicators are properly trained on proper application or disposal techniques.

### *Key Terms*

- **Commercial Applicator**—Certified applicator (whether or not he or she is a private applicator with respect to some uses) who uses or supervises the use of any pesticide which is classified for restricted use for any purpose or on any property.
- **Pesticide**—A substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant.
- **Private Applicator**—Certified applicator that uses or supervises the use of any pesticide which is classified for restricted use for purposes of producing any agricultural commodity.
- **Restricted Use Pesticide**—Restricts pesticide use to a certificated pesticide applicator or under the direct supervision of a certified applicator.

### *Additional Resources*

- 49 CFR 150-180
- Certification and Training of Pesticide Applicators  
<http://www.epa.gov/oppfead1/safety/applicators/applicators.htm>
- FIFRA Enforcement Policy and Guidance  
<http://cfpub.epa.gov/compliance/resources/policies/civil/fifra/>



#### **Related Information**

For more information pertaining to RCRA, refer to Chapter 7.



#### **Related Information**

Pesticide use at airports may be included as an industrial activity that affects storm water quality if not properly managed. For more information pertaining to pesticides and water quality, refer to Section 8.2.



**Associated Activities**

- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Chemical storage/handling
- On-airport power generation
- Property acquisition
- Refueling
- Spill response
- Vehicle/equipment/aircraft maintenance

**Helpful Hint**

Airport hydrant piping may utilize USTs for fuel supply. Consider installing a line leak detection system for your aircraft fuel hydrant system.

For more information, refer to UST-3 Practice in Appendix A-9.

## 4.4 Underground Storage Tanks

### Resource Conservation and Recovery Act of 1976, as Amended

RCRA is an amendment to the Solid Waste Disposal Act of 1965, and provides the framework for managing and recycling wastes. In 1984, RCRA was amended by the Hazardous and Solid Waste Amendments. The 1984 amendments included regulation for USTs storing **regulated substances** that include **petroleum** and **CERCLA hazardous substances**. The amendments established specific requirements for tank design, **release detection**, and corrective actions for **releases** from leaking underground storage tanks (LUSTs). Other aspects of RCRA are described in Chapter 7 of this Guidebook.

Most states and certain areas (e.g., District of Columbia) implement their own UST program. Those states that do not have their own program are regulated by EPA. The federal UST regulations require owners to register tanks with either their state UST program or EPA. Notification is completed using EPA Form 7530-1 or state-specific forms. If several tanks are located at one address, owners may submit one form. However, if tanks are located at more than one address, separate notifications must be filed. Information provided in the notification must include:

- Tank ownership
- Location
- **Facility** type
- Contact information

Owners of USTs must provide information that demonstrate they have the financial ability to cover potential corrective actions or compensate third parties for accidental releases (also known as “financial assurance”). Additionally, owners and operators of **new UST systems** must certify compliance with tank and piping installation, **cathodic protection**, financial responsibility, and release detection. Notification forms are also required for individuals who intend to sell tanks for use as USTs.

#### *Small Airport Applicability*

Many airports own and/or operate USTs regulated under 40 CFR 280-282. Examples of USTs that may be present at an airport include those that contain jet fuel, used **oil**, fuel oil, diesel, or gasoline. Airports must register their tanks with either the state UST program or EPA. For airports that have several USTs, one form may be submitted. Airports may want to coordinate with tenants and fixed-based operators (e.g., tenant-owned UST) to ensure all USTs at the facility are registered.

#### *Compliance Attainment Strategies*

- Ensure adequate amounts of spill response materials are maintained at UST loading areas where spills or drips could occur.

- Ensure staff is aware of UST leak detection operations and monitoring requirements.
- Perform required inspections for tanks and containment at the frequency specified by the state or federal UST requirements and maintain associated records on file.
- Conduct leak detection training on a regular schedule and maintain attendance records on file.
- Maintain detailed documentation of UST construction and contents as this information can be used to demonstrate compliance with specific UST requirements.
- Replace or retrofit old tanks to help prevent leaks from occurring.
- Complete required state or federal UST forms and submit to the appropriate regulatory agency.
- Properly decommission or permanently close airport USTs that are non-operational in accordance with the state or federal UST requirements.
- Register airport USTs in accordance with the requirements of the state or federal UST regulatory authority.

### *Key Terms*

- **Cathodic Protection**—A technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. For example, a tank system can be cathodically protected through the application of either galvanic anodes or impressed current.
- **New Underground Storage Tank (UST) System**—Tank system that contains an accumulation of regulated substances and for which installation has commenced after December 22, 1988.
- **Petroleum**—Petroleum and petroleum-based substances including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure. The term includes motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.
- **Regulated Substance**—Any substance defined in Section 101(14) of CERCLA (but not including any substance regulated as a hazardous waste under RCRA Subtitle C), and petroleum, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute). The term includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading, and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.
- **Release Detection**—Determining whether a release of a regulated substance has occurred from a UST system into the environment or into the interstitial space between the UST system and its secondary barrier or secondary containment around it.

### *Additional Resources*

- 40 CFR 280-282
- General Underground Storage Tank Information  
<http://www.epa.gov/OUST/>

**Associated Activities**

- Aircraft deicing/anti-icing
- Building operation/maintenance
- Cargo handling
- Chemical storage/handling
- Degreasing
- Demolition/construction/development
- Grounds maintenance/landscaping
- Painting
- Pavement deicing
- Refueling
- Spill response
- Vehicle/equipment/aircraft maintenance
- Waste generation/disposal

## 4.5 Hazardous Material Transport

### Hazardous Material Transportation Act of 1974, as Amended

HMTA, as amended by the Hazardous Materials Transportation Uniform Safety Act of 1990 and the Federal Hazardous Materials Transportation Law of 2005, established regulations for the safe transport of **hazardous materials** in commerce (e.g., by air, highway, rail, or water). The regulations, also called the Hazardous Materials Regulations (HMR), are governed by the U.S.DOT.

Hazardous materials are broadly defined and include hazardous wastes regulated under RCRA (see Chapter 7) and **regulated medical waste**. Hazardous materials may differ from the **CERCLA hazardous substances**, EHS, and **hazardous chemicals** discussed earlier in this chapter.

HMR apply to transporting hazardous materials and to persons “offering” hazardous materials to transporters for disposal, known as **offerors**. Offerors must register using U.S.DOT Form F 5800.2, which must be submitted no later than June 30 for each registration year. Offerors must also perform **pre-transportation functions**. Preparation of shipping papers may also be required before transporting certain hazardous materials. Shipping papers for hazardous materials must be retained for 2 years. Additionally, shipping manifests must be retained for 3 years if the material transported is a hazardous waste. Adequate shipping papers may include the following:

- Description of the hazardous material
- Offeror’s certification
- Uniform Hazardous Waste Manifest

Emergency response information must be maintained at the **facility** where hazardous materials are loaded for transport. The emergency response information includes the following:

- Basic description of the hazardous material
- Technical name
- Immediate hazards to health
- Risks of fire or explosion
- Immediate precautions for an accident or incident
- Immediate methods for handling fires
- Initial methods for handling spills or leaks in the absence of fire
- Preliminary first aid measures
- Emergency response contacts

#### *Small Airport Applicability*

Small airports that transport hazardous materials offsite are considered offerors of hazardous materials, and are subject to HMR. Hazardous waste transported from the facility is most common. Aircraft operators may be subject to additional requirements if transporting hazardous materials by air.

### *Compliance Attainment Strategies*

- Understand what hazardous materials qualify for hazardous transport.
- Properly label hazardous materials to be transported offsite.
- Complete shipping papers that are required for hazardous material pick-up.
- Ensure shipping papers contain the correct information and are adequately filled out.
- Ensure shipping papers are certified.
- Maintain records of shipping papers or manifests on file.
- Ensure staff understands emergency response procedures.
- Submit registration forms and fees to the U.S.DOT.

### *Key Terms*

- **Carrier**—A person who transports passengers or property in commerce by rail car, aircraft, motor vehicle, or vessel.
- **Hazardous Material**—A substance or material that the Secretary of the U.S.DOT has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has been designated as hazardous under Section 5103 of federal hazardous materials transportation law (49 U.S.C 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated in 49 CFR 172.101, and materials that meet the defining criteria for hazard classes and divisions in 49 CFR 173.
- **Marking**—A descriptive name, identification number, instructions, cautions, weight, specification, or United Nations marks, or combinations thereof, on outer packaging of hazardous materials.
- **Offeror**—A person who performs or is responsible for performing any pre-transportation function for transportation of a hazardous material in commerce and/or tenders or makes the hazardous material available to a **carrier** for **transportation** in commerce.
- **Pre-transportation Function**—A function that is required to assure the safe transportation of a hazardous material in commerce. Examples include determining the hazard class of a hazardous material; selecting, filling, and closing a hazardous materials **packaging** or container; package **marking** and labeling; preparing and reviewing shipping papers; providing and maintaining emergency response information; loading, blocking, and bracing a hazardous materials package in a freight container or transport vehicle; and/or selecting, providing, or affixing placards for a freight container or transport vehicle to indicate that it contains a hazardous material.
- **Packaging**—A receptacle and any other components or materials necessary for the receptacle to perform its containment function.
- **Regulated Medical Waste**—Waste or reusable material derived from the medical treatment of an animal or human, which includes diagnosis and immunization, or from biomedical research, which includes the production and testing of biological products.
- **Transportation**—The movement of property and loading, unloading, or storage incidental to that movement.



### **Did You Know**

You do not need to de-register or otherwise contact the U.S.DOT if you no longer are subject to the HMTA offeror registration requirements. You may simply let the registration lapse.

*Additional Resources*

- 49 CFR 105-180
- General information for HMTA  
<http://www.epa.gov/OEM/content/lawsregs/hmtaover.htm>
- The Hazardous materials Regulations  
<http://www.phmsa.dot.gov/hazmat/regs>
- List of Hazardous materials  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=807650d0e02ac5b689ceab20820f40ab&rgn=div6&view=text&node=49:2.1.1.3.7.2&idno=49>
- Pipeline and Hazardous materials Safety Administration Registration  
<http://www.phmsa.dot.gov/hazmat/registration>

## Noise

Aircraft noise is a common concern of communities surrounding airports. This issue can lead to poor relations between an airport and the community, especially if an airport does not proactively engage residential airport neighbors and acknowledge their concerns. Voluntary analyses of aircraft noise at small airports can help quantify a potential problem, but can be more challenging than analyses at larger airports typically due to a lack of readily available aircraft operational data. The general public may struggle to understand the results of noise analyses, as FAA's standard **Day-Night Average Sound Level (DNL)** metric does not represent the annoyance factor of single aircraft noise events. Also, the DNL 65 decibel (dB) threshold for residential land use compatibility does not mean noise problems stop at the DNL 65 dB contour line. Therefore, airport operators must be aware of the types of information that can be provided to enhance the public's understanding of aircraft noise exposure. Airport operators must also understand data requirements for noise analyses, potential operational mitigation measures, and the limits of aircraft access restrictions.

The federal requirements applicable to noise include the following:

- Aviation Safety and Noise Abatement Act of 1979, as amended (ASNA)
- Airport Noise and Capacity Act of 1990, as amended (ANCA)

The topics presented in Chapter 5 include the following:

- Part 150 Programs
- Part 161 Access Restrictions

### 5.1 Part 150 Programs

#### Aviation Safety and Noise Abatement Act of 1979, as Amended

The 14 Code of Federal Regulations (CFR) part 150 (Part 150) program is voluntary for airport operators. Part 150 describes the procedures, standards, and methodology governing the development, submission, and review of airport **noise exposure maps** and airport Noise Compatibility Programs (NCP), including the process for evaluating and approving those programs. It prescribes systems for measuring noise at airports and surrounding areas that generally provides a highly reliable relationship between projected noise exposure and surveyed reaction of people to noise, and determining exposure of individuals to noise that result from the operations of an airport. It also identifies those land uses that are normally compatible with various levels of exposure to noise by individuals. Part 150 provides technical assistance to airport operators, in conjunction with other local, state, and federal authorities, to prepare and execute appropriate noise compatibility planning and implement programs. This regulation implements portions of the ASNA.

#### Associated Activities

- Property acquisition
- Airport Layout Plan (ALP) Changes



### *Small Airport Applicability*



#### **Helpful Hint**

If the surrounding community has voiced concerns about aircraft noise, an airport could consider engaging the public in a discussion of airport operations and provide a method to log noise complaints from the public.

For more information, refer to Noise-4, Noise-6, and Noise-7 Practices in Appendix A-10.

To determine the aircraft noise exposure surrounding an airport, airport operators may develop existing and future (5-year forecast) Noise exposure maps in accordance with Part 150. The Noise exposure maps must include DNL **noise contours**. DNL is the 24-hour average sound level, in decibels, with a nighttime penalty applied to represent a greater annoyance from noise at night. Table 1 in Appendix B of Part 150 describes compatible land use information for several land uses as a function of these noise values. This information should be viewed as a starting point in the noise impact evaluation process and can be adjusted to accommodate specific local conditions and requirements.

If the noise exposure maps reveal there are noise-sensitive uses within the DNL 65+ dB noise contours, an NCP may be developed to provide recommendations for mitigating noise impacts. Recommended measures may include residential sound insulation, land acquisition, and voluntary aircraft curfews, among many other mitigation possibilities. FAA will review the NCP and accept or reject each recommendation. AIP funding may be available for FAA-approved mitigation measures.

FAA Advisory Circular 150/5020, *Noise Control and Compatibility Planning for Airports*, provides guidance for noise control and compatibility planning for airports under Part 150 and the ASNA. This guidance is intended for use by airport operators, state and local planners and officials, and interested members of the public. The goal of noise compatibility planning is to reduce the amount of existing **non-compatible land uses** around airports and to prevent new, additional non-compatible land uses.

An airport must follow Part 150 requirements if it is seeking grant assistance for noise mitigation from FAA. Some small airports may not have incompatible land uses, but still may have a noise problem if local residents protest noise originating at the airport. An airport may choose to incorporate some aspects of a Part 150 noise study to address the community's concern. Public outreach and voluntary aircraft operational mitigation strategies could be implemented without conducting a formal Part 150 Program.



#### **Helpful Hint**

To minimize noise exposure close to its property line, an airport could consider engaging the airport users to participate in voluntary measures, such as using recommended aircraft run-up locations.

For more information, refer to Noise-13 Practice in Appendix A-10.

### *Compliance Attainment Strategies*

The regulations that relate to aircraft noise studies are voluntary for airports, and there are no mandatory compliance concerns from an airport operator's standpoint.

- An airport does not have the authority to impose federal regulations regarding the noise levels generated by aircraft using the facility.

### *Key Terms*

- **Day-Night Average Sound Level (DNL)**—The 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of 10 decibels to sound levels for the periods between midnight and 7:00 a.m., and between 10:00 p.m. and midnight local time.

- **Noise Contour**—A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.
- **Noise Exposure Map**—A scaled, geographic map of an airport, its noise contours, and surrounding area developed in accordance with ASNA and 14 CFR Part 150.
- **Non-compatible Land Uses**—Land uses that are not compatible with levels of aircraft noise identified in Table 1 in Appendix B of 14 CFR Part 150.

#### *Additional Resources*

- Title 14 CFR Part 150, *Noise Control and Compatibility*  
[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150\\_main\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150_main_02.tpl)
- FAA Advisory Circular (AC) 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)

## 5.2 Part 161 Access Restrictions

### **Airport Noise and Capacity Act of 1990, as Amended**

ANCA enabled the Secretary of Transportation to issue regulations establishing a national aviation noise program for reviewing airport noise and access restrictions on operations of **Stage 2** and **Stage 3 aircraft**. As part of ANCA, the program was to provide adequate public notice and comment opportunities on such restrictions.

Part 161 implements ANCA. It prescribes notice requirements and procedures, with exceptions, for airport operators implementing Stage 3 aircraft noise and access restrictions pursuant to agreements between airport operators and aircraft operators; analysis and notice requirements for airport operators proposing Stage 2 aircraft noise and access restrictions; notice, review, and approval requirements for airport operators proposing Stage 3 aircraft noise and access restrictions; and Procedures for FAA reevaluation of agreements containing restrictions on Stage 3 aircraft operations and of aircraft noise and access restrictions affecting Stage 3 aircraft operations imposed by airport operators.

#### *Small Airport Applicability*

Civilian aircraft greater than 75,000 pounds (maximum weight) must be certified as Stage 3 aircraft. The Stage 3 requirement for operation in the U.S. does not apply to aircraft less than 75,000 pounds, which may be more common at small airports.

Small airports may find the approval process for access restrictions to be cumbersome and costly. A more cost-effective strategy may be to establish voluntary measures, such as a voluntary curfew, no run-up operations during nighttime hours, or other similar voluntary restrictions.

#### **Associated Activities**

- Property acquisition



### *Compliance Attainment Strategies*

The regulations that relate to aircraft noise studies are voluntary for airports and there are no mandatory compliance concerns from an airport operator's standpoint.

- An airport does not have the authority to impose federal regulations regarding the noise levels generated by aircraft using the facility.

### *Key Terms*

- **Stage 2 Aircraft**—An aircraft that has been shown to comply with the Stage 2 requirements of 14 CFR Part 36. On January 1, 2000, civilian Stage 2 aircraft weighing greater than 75,000 lbs. were not allowed to operate in the U.S.
- **Stage 3 Aircraft**—An aircraft that has been shown to comply with the Stage 3 requirements of 14 CFR Part 36.

### *Additional Resources*

- Title 14 CFR Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=14:1.0.1.3.19&idno=14>
- Title 14 CFR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*  
[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=9eea2835dca447270645f9582d872924&c=ecfr&tpl=/ecfrbrowse/Title14/14cfrv3\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=9eea2835dca447270645f9582d872924&c=ecfr&tpl=/ecfrbrowse/Title14/14cfrv3_02.tpl)

## Planning and Development

Planning and development can be challenging for small airports due to the complexity of environmental regulations and the limited personnel and/or resources available to aid in this process. Various natural and cultural resources in the airport area may need to be considered in the planning and development process. For example, the redevelopment of an aircraft hangar facility dating back to the 1940s may be affected by historic preservation regulations. Or, a recommended development program identified during the Airport Master Planning process may trigger the need for environmental evaluations under the National Environmental Policy Act of 1969, as amended (NEPA). Proactive environmental stewardship activities can also be considered during the planning and development phase to assist with effective airport project implementation.

The federal requirements applicable to planning and development include the following:

- National Historic Preservation Act of 1966, as Amended (NHPA)
- U.S. Department of Transportation (U.S.DOT) Act of 1966
- Archeological and Historic Preservation Act of 1974, as Amended (AHPA)
- Archeological Resources Protection Act of 1979, as Amended (ARPA)
- American Indian Religious Freedom Act of 1978 (AIRFA)
- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)
- Executive Order 13175, Consultation with Indian Tribal Governments (2000)
- NEPA
- Council on Environmental Quality (CEQ) Regulations for Implementing NEPA
- FAA Order 1050.1E, Change 1 Environmental Impacts: Policies and Procedures (March 2006)
- FAA Order 5050.4B, NEPA Implementing Instructions for Airport Actions (April 2006)
- Comprehensive Environmental Response, Compensation and Liability Act of 1980, as Amended (CERCLA)
- Endangered Species Act of 1973
- Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended
- Marine Mammals Protection Act of 1972
- Migratory Bird Treaty Act of 1918
- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (2001)
- Bald Eagle and Golden Eagle Protection Act of 1940, as Amended

The topics presented in Chapter 6 include:

- Historical, Archaeological, and Ethnological Resources
- Environmental Protection
- Property Transfer



### Related Information

See Chapter 7 for additional information about the Clean Water Act, which may also apply to planning and development activities at small airports.

- Public Involvement
- Fish, Wildlife, and Plants

## 6.1 Historical, Archaeological, and Ethnological Resources

### Associated Activities

- Demolition/ construction/ development
- Property acquisition

### National Historic Preservation Act of 1966, as Amended

NHPA is the national policy on the preservation of **historic properties**. NHPA created the Advisory Council on Historic Preservation (ACHP) to advise the President and Congress on matters involving historic preservation and established the National Register of Historic Places (NRHP). The ACHP is authorized to review and comment upon activities licensed, permitted, or funded by the federal government that would have an effect upon properties either listed in the NRHP or eligible for inclusion. A property (including sites, buildings, or objects) may be considered for eligibility on the NRHP once it is 50 years old.

Section 110 governs agencies' responsibilities to preserve and use historic buildings, designate an agency Federal Preservation Officer (FPO), and identify, evaluate, and nominate eligible properties to the NRHP. Section 106 requires federal agencies to consider the potential effects of their undertaking on properties in or eligible for inclusion in the NRHP. Section 106 also requires agencies to consult with ACHP, the State Historic Preservation Officer (SHPO), and/or Tribal Historic Preservation Officer (THPO) if there is a potential adverse effect to **historic properties** in or eligible for inclusion in the NRHP.

NHPA replaced the Antiquities Act of 1906 with respect to establishing permitting and prosecution regulations for cultural resources.

#### *Small Airport Applicability*

Airport projects (called undertakings) that receive federal funding or that require a federal permit or license are subject to Section 106. Historic properties that may be affected by the proposed undertaking must be identified and evaluated to determine whether they are either already listed in the NRHP or eligible for inclusion. The responsible FAA official must consult with the appropriate officials (SHPO, THPO) and other interested parties, known as consulting parties, regarding the effects of their proposed undertaking on historic properties. The comments of the consulting parties must be considered in decision-making in the Section 106 process. Alternatives to undertakings that may have an adverse effect on historic properties need to be explored, although not in as rigorous a manner as that required by Section 4(f) of the U.S.DOT Act of 1966.

If an adverse effect is agreed upon by all consulting parties through the consultation process, then a Memorandum of Agreement is prepared and signed which contains measures to mitigate the project's adverse effects.



### Helpful Hint

Redeveloping in areas previously built upon preserves both the natural and cultural resources.

For more information, refer to Planning-3 Practice in Appendix A-11.

*Compliance Attainment Strategies*

- Be aware of the age and possible historic significance of buildings and structures on the airport property; collect relevant information from the SHPO and local historic preservation organization.
- Understand possible archaeological sensitivity through a site file search at the SHPO and at county or local historical commissions or agencies.
- Understand the steps in Section 106 (identify if the project requires Section 106, identify and evaluate historic properties, evaluate the effects, and consider possible alternatives to avoid, minimize, or mitigate the effects).
- Understand the consultation process of Section 106.

*Key Terms*

- **Historic Property**—“Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the NRHP” (36 Code of Federal Regulations (CFR) Section 800.16).

*Additional Resources*

- NHPA, as Amended  
<http://www.achp.gov/nhpa.html>
- American Antiquities Act of 1906  
<http://www.nps.gov/history/local-law/anti1906.htm>
- Executive Order 11593, Protection and Enhancement of the Cultural Environment  
<http://www.archives.gov/federal-register/codification/executive-order/11593.html>

**United States Department of Transportation Act of 1966**

Section 4(f) of the U.S.DOT Act of 1966 applies to **historic properties** of national, state, and/or local significance. Historic properties can either be individually listed or individually eligible for the NRHP or a contributing resource in a listed or eligible district. Section 4(f) states that the Secretary of the U.S.DOT may approve a transportation program or project (other than any project for a park road or parkway under Section 204 of Title 23) that would require the use of publicly owned land, public parks, recreation areas, wildlife and waterfowl refuges, or historic sites of national, state, or local significance (as determined by federal, state, or local officials having jurisdiction over the site) only if there is no prudent and feasible alternative to using that land. Additionally, the program or project must include all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from its implementation. Where federal lands are administered for multiple uses, the federal official having jurisdiction over the lands shall determine whether the subject lands are being used for historic purposes. The initial assessment will determine whether the requirements of Section 4(f) are applicable.

*Small Airport Applicability***Helpful Hint**

Developing a Cultural Resources Management Plan and Unanticipated Discovery Plan is a proactive and time-efficient approach to cultural resources management that aids during the development of airport projects.

For more information, refer to Planning-10 and Planning-11 Practices in Appendix A-11.

A direct or indirect use of a Section 4(f) resource may occur as a result of airport development. The term “use” within the meaning of Section 4(f) includes the direct impacts to the site (such as taking of land) as well as indirect impacts (**constructive uses**). When constructive uses are being evaluated, FAA must determine if the indirect impacts would substantially impair the resource. Substantial impairment occurs when the resource’s activities, features, or attributes that contribute to its significance or enjoyment are substantially diminished. The responsible FAA official must consult with the appropriate officials (federal, state, and local) having jurisdiction over the affected properties when determining whether project-related noise impacts would substantially impair a property. If there are no constructive or **direct uses**, then Section 4(f) of the U.S.DOT Act of 1966 would not apply.

Section 4(f) would not apply to historic properties if the FAA issues a finding of No Historic Properties Affected or No Adverse Effects under Section 106 of the NHPA.

If FAA determines that Section 4(f) applies for a particular property and there are no prudent or feasible alternatives that would avoid the use of the property, the effect on the property must be described in detail, including measures needed to minimize the impact or harm. Mitigation measures could include the replacement of lands and facilities or design measures such as plantings or screening.

*Compliance Attainment Strategies*

- Consider Section 4(f) implications of planning future development actions near historic and public park resources.
- Consider Section 4(f) when considering the development of park resources on airport property. Development of public parks on airport property may limit future airport-related development opportunities in the area due to Section 4(f).

*Key Terms*

- **Constructive Use**—Indirect uses of a property/resource that result in substantially impairing the activities, features, or attributes of a resource that qualifies under Section 4(f) of the U.S.DOT Act of 1966.
- **Direct Use**—Direct impacts to a property/resource, such as taking of land, that qualifies under Section 4(f) of the U.S.DOT Act of 1966.

*Additional Resources*

- U.S.DOT Act of 1966  
<http://www.environment.fhwa.dot.gov/4f/index.asp>
- Federal Highway Administration, Office of Planning, Environment and Realty, *Section 4(f) Policy Paper*  
<http://www.environment.fhwa.dot.gov/4f/4fpolicy.asp>
- Maryland State Highway Administration, Section 4(f) Interactive Training  
<http://www.section4f.com/>

**Did You Know**

These standards apply to all proposed grant-in-aid development projects assisted through the National Historic Preservation Fund.

## Archeological and Historic Preservation Act of 1974, as Amended

The AHPA provides for the preservation of historic American sites, buildings, objects, and antiquities of national significance by requiring survey, recovery, and preservation of historical and archeological data which might otherwise be irreparably lost or destroyed as the result from the alteration of the terrain caused as a result of any federal construction project or federally licensed or funded activity or program. Alterations of terrain mentioned in the AHPA include flooding, the building of access roads, and the relocation of railroads and highways.

The AHPA requires an agency to notify the Secretary of the Interior (Secretary) when its activities, in connection with any federal construction project or federally licensed project, activity, or program (such as an FAA-funded airport project), may cause irreparable loss or destruction of significant scientific, prehistorical, historical, or archeological data. The agency may request the Secretary to undertake the recovery, protection, and preservation of such data (including preliminary survey, or other investigation as needed, and analysis and publication of the reports resulting from such investigation), or it may undertake such activities itself. Copies of reports of any investigations must be submitted to the Secretary and subsequently be made available to the public for review. No survey or recovery work would be required if, in the determination of the head of the responsible agency, activities would be undertaken in connection with any emergency including projects or activities undertaken in anticipation of, or as a result of, a natural disaster.

36 CFR Part 68 sets forth standards for the treatment of **historic properties** containing standards for preservation, rehabilitation, restoration and reconstruction.

### *Small Airport Applicability*

AHPA is applicable when federal lands are involved, when federal funding is used, or when federal permits are required for construction actions and it is commonly cited in conjunction with NHPA. The Archaeological and Historic Preservation Act of 1974 provides specific relief from survey and recovery work in the event of natural disasters and with the approval of FAA.

### *Compliance Attainment Strategies*

- Follow the attainment strategies outlined for NHPA.
- In the event of an emergency and its associated activities, notify the airport's FAA point of contact of the nature of the emergency and the procedural steps that cannot be implemented because of the emergency.

### *Additional Resources*

- Archaeological and Historic Preservation Act of 1974, as Amended  
<http://www.thecre.com/fedlaw/legal13/archpreserv.htm>



## Archeological Resources Protection Act of 1979, as Amended

ARPA prohibits unauthorized excavation of archaeological resources on federal or Indian lands, establishes permit standards for survey and excavation of archaeological sites on these lands, and increases the severity of penalties for the destruction of archaeological resources located on public lands. ARPA requires federal agencies to identify archaeological sites on public lands. Public lands are defined as lands owned and administered by the United States as part of the national park system, the national wildlife refuge system, the national forest system, and all other lands where fee title is held by the United States.

### *Small Airport Applicability*

Airports that are located within or adjacent to these types of public lands must consider the permit requirements authorizing excavation and/or removal of archaeological resources under ARPA.

### *Compliance Attainment Strategies*

- Ensure all necessary permits have been obtained prior to excavation.
- Coordinate actions with the park, refuge, or public lands manager to ensure that uniform recommendations are made for resources which may be jointly held.

### *Additional Resources*

- ARPA, as Amended  
<http://archnet.asu.edu/Topical/CRM/usdocs/arpa79.html>

## American Indian Religious Freedom Act of 1978

AIRFA was established to protect and preserve the American Indians' inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians. This includes but is not limited to, access to sites, use and possession of **sacred objects**, and the freedom to worship through ceremonials and traditional rites. AIRFA applies to any project that is federally permitted or funded or that is located on federal land.

### *Small Airport Applicability*

If objects having religious or cultural importance are discovered during development or other federally funded or permitted activity, the airport operators must notify Indian tribes of possible harm to, or destruction of, sites.

### *Compliance Attainment Strategies*

- Prior to the activity, know who to contact in case objects of importance are found.



*Key Terms*

- **Sacred Objects**—Specific ceremonial objects that are needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present day adherents.

*Additional Resources*

- 42 U.S.C. 1996  
<http://vlex.com/vid/traditional-religions-native-americans-19251162>
- 43 CFR Part 7.7 and 7.32  
<http://cfr.vlex.com/source/code-federal-regulations-public-lands-interior-1092/toc/01.38>
- 25 CFR. Part 262.7  
<http://cfr.vlex.com/vid/262-possible-harm-cultural-religious-19731159>

**Native American Graves Protection and Repatriation Act of 1990**

NAGPRA provides for the protection of Native American graves and deals with the disposition of **cultural items**, including human remains, by a federally funded repository. NAGPRA also governs the inadvertent discovery of cultural items on federal or tribal lands. It provides for the inventory, protection, and return of cultural items to affiliated tribes. It requires ARPA permits and consultation with tribes for intentional excavation and removal of cultural items from federal or tribal lands.

*Small Airport Applicability*

For airport projects, NAGPRA applies when the airport is located on federal land, or when there is federal funding or permitting required. 43 CFR Part 10 regulations pertain to the identification and appropriate disposition of human remains, funerary objects, sacred objects, or objects of **cultural patrimony**.

*Compliance Attainment Strategies*

- Develop an unanticipated discovery plan and submit the plan to be reviewed and accepted by the SHPO and the airport's FAA point of contact.

*Key Terms*

- **Associated Funerary Objects**—Objects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later, and both the human remains and associated funerary objects are presently in the possession or control of a federal agency or museum, except that other items exclusively made for burial purposes or to contain human remains shall be considered as associated funerary objects.
- **Cultural Items**—Human remains, **associated funerary objects**, **unassociated funerary objects**, sacred objects, and cultural patrimony.

**Helpful Hints**

Of particular concern to an airport is when historical objects are discovered inadvertently during federally funded or permitted development activities or on federal lands. Know who to call if this situation occurs.

- **Cultural Patrimony**—An object having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself, rather than property owned by an individual Native.
- **Unassociated Funerary Objects**—Objects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later, where the remains are not in the possession or control of the federal agency or museum and the objects can be identified by a preponderance of the evidence as related to specific individuals or families or to known human remains or, by a preponderance of the evidence, as having been removed from a specific burial site of an individual culturally affiliated with a particular Indian tribe.

*Additional Resources*

- NAGPRA  
<http://www.nps.gov/nagpra/MANDATES/25USC3001etseq.htm>

**Executive Order 13175, Consultation with Indian Tribal Governments (2000) and the Presidential Memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments**

Executive Order 13175 was created to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, to strengthen government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

In formulating or implementing policies that have tribal implications, the Executive Order directed agencies to follow these fundamental principles:

1. The United States recognizes Indian tribes as domestic dependent nations under its protection and has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes; in accordance with treaties, statutes, Executive Orders, and judicial decisions.
2. The United States has recognized the right of Indian tribes to self-government and continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights.
3. The United States recognizes the right of Indian tribes to self-government and supports tribal sovereignty and self-determination.

*Small Airport Applicability*

For airport projects that use Airport Improvement Program (AIP) grant funding and may affect Native American cultural resources, FAA consults with the appropriate Native American officials to satisfy the Executive Order and Presidential Memorandum.

### *Compliance Attainment Strategies*

- Coordinate with the airport’s FAA point of contact to notify pertinent Native American tribes of upcoming construction or permitting actions at the facility.

### *Additional Resources*

- Executive Order 13175, *Consultation with Indian Tribal Governments* (2000) <http://ceq.hss.doe.gov/nepa/regs/eos/eo13175.html>
- Presidential Memorandum of April 29, 1994, *Government-to-Government Relations with Native American Tribal Governments* <http://www.em.doe.gov/tribalpages/whletter.aspx>

## 6.2 Environmental Protection

### **National Environmental Policy Act of 1969, as amended**

NEPA declares the national policy to “encourage a productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality (CEQ).” Through NEPA, Congress requires Federal agencies to consider the environmental effects of proposed **actions** and their reasonable alternatives.

The CEQ prepared the regulations implementing the law that apply to all agencies, entitled *Regulations for Implementing NEPA*. These implementing regulations dictate that all federal agencies must prepare policies and procedures on implementing NEPA, as well as encourage and facilitate public involvement in decisions which affect the quality of the environment. FAA has issued two guidance documents for implementing NEPA: *Order 5050.4B, NEPA Implementing Instructions for Airport Actions (April 2006)* and *Order 1050.1E, Change 1 Environmental Impacts: Policies and Procedures (March 2006)*.

### *Small Airport Applicability*

Planned development at Airports must adhere to NEPA requirements if there is a “federal action” including conducting an **environmental impact evaluation**. NEPA defines a federal action as one which could consist of FAA funding for the project or FAA approval of the Airport Layout Plan (ALP) revision. Implementation of NEPA consists of three varying levels of environmental analysis (presented in order from least to greatest complexity):

- **Categorical Exclusion (CATEX)**
- **Environmental Assessment (EA) and Finding of No Significant Impact (FONSI)**
- **Environmental Impact Statement (EIS)**

### **Associated Activities**

- Demolition/  
construction/  
development
- Property acquisition

### *Compliance Attainment Strategies*

- If a project is a federal action, determine if a CATEX, EA, or EIS applies.
- Identify potential environmental impacts early in the planning process.
- A required CATEX, EA, or EIS must be completed and approved prior to any federal action at the airport.
- Coordinate with the airport's FAA point of contact early in the planning process.
- Identify environmental concerns early through public and agency **scoping** meetings.
- Comply with FAA Orders 1050.1E and 5050.4B (detailed in the following sections).

### *Key Terms*



#### **Helpful Hint**

Typical projects that could be categorically excluded under NEPA include installation or upgrade of airfield lighting, general landscaping, and repair and maintenance of existing pavement or buildings.

For more information, refer to Energy-4, Energy-5, and Energy-7 Practices in Appendix A-23.

- **Action**—Defined by the CEQ as new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies, or procedures; and legislative proposals.
- **Categorical Exclusion (CATEX)**—Defined by the CEQ as a category of actions which do not individually or cumulatively have a significant effect on the human environment and for which neither an environmental assessment nor an environmental impact statement is required.
- **Environmental Assessment (EA)**—Defined by the CEQ as a concise public document that provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. The EA must facilitate compliance with NEPA when no environmental impact statement is necessary, or facilitate preparation of a statement when one is necessary.
- **Environmental Impact Evaluation**—A detailed written document concerning the environmental impacts of a proposed action. The Environmental Impact Evaluation may be in the form of an EA or an EIS.
- **Environmental Impact Statement (EIS)**—Defined by the CEQ as an action-forcing device to ensure that the policies and goals defined in NEPA are infused into the proposed action. An EIS provides complete, unbiased, and factually supported discussion of significant environmental impacts to inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.
- **Finding of No Significant Impact (FONSI)**—A written document concerning the environmental impacts of a proposed action listed in an EA document, which would not have a significant environmental impact.
- **Scoping**—An early and open process for determining the scope of issues to be addressed in an EA or EIS and identifying the significant issues related to a proposed action (40 CFR 1501.7). It is an important and required part of the EIS process, and an optional part of the EA process. The purpose of scoping is to identify significant environmental issues to be analyzed in greater depth, identify and eliminate from detailed study issues that are insignificant or that have been covered by prior environmental review, and set the temporal and geographic boundaries of the EIS. Scoping (with

agencies and/or the public) also allows the responsible FAA official to identify available technical information and additional reasonable alternatives.

#### *Additional Resources*

- NEPA  
[http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse\\_usc&docid=Cite:+42USC4321](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+42USC4321)
- CEQ Regulations for Implementing NEPA  
[http://ceq.hss.doe.gov/nepa/regs/ceq/toc\\_ceq.htm](http://ceq.hss.doe.gov/nepa/regs/ceq/toc_ceq.htm)
- CEQ's 40 Most Asked Questions  
<http://ceq.hss.doe.gov/NEPA/regs/40/40p3.htm>
- FAA list of Airport Environmental Records of Decision (RODs)  
[http://www.faa.gov/airports/environmental/records\\_decision/](http://www.faa.gov/airports/environmental/records_decision/)

### **United States Department of Transportation, FAA, Order 1050.1E, Change 1 Environmental Impacts: Policies and Procedures (March 2006)**

Order 1050.1E *Environmental Impacts: Policies and Procedures* sets FAA's agency-wide environmental protocol, as required by CEQ's *Regulations for Implementing NEPA*. Order 1050.1E provides FAA-specific guidance on integrating NEPA into the planning process and describes FAA actions subject to NEPA review. The NEPA review process addresses impacts of Federal actions on the human environment, including noise, socioeconomic, land uses, air quality, and water quality. Chapter 2 of the Order presents an overview of the NEPA process. Depending upon the context and potential impacts, procedures for implementing NEPA differ. Chapter 3 of the Order addresses those types of FAA actions that do not normally require preparation of an EA or EIS, called CATEX (see paragraphs 303 and 307-312). Chapters 4 and 5 of the Order outline the processes for preparing an EA and EIS.

#### *Small Airport Applicability*

FAA Order 1050.1E applies to classes of FAA actions that have or may have a significant impact on the human environment. Appendix A of Order 1050.1E establishes the environmental resource categories that FAA must analyze in environmental impact analyses.

#### *Compliance Attainment Strategies*

- If a project is a federal action, determine if a CATEX, EA, or EIS applies.
- Be familiar with FAA **thresholds for significant impacts**.
- Coordinate with the airport's FAA point of contact early in the planning process.
- Identify environmental concerns early through public and agency scoping meetings.
- A CATEX, EA, or EIS must be completed prior to any federal action at the airport.

*Key Terms*

- **Significant Impact Threshold** – The impact level or “threshold” that the responsible FAA official uses to determine if the environmental effects of a proposed action or its reasonable alternatives would cause significant environmental effects. If FAA has established a threshold for a resource, the responsible FAA official must use that threshold to determine impact severity and context.

*Additional Resources*

- FAA, Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (March 2006)  
[http://www.faa.gov/documentLibrary/media/order/energy\\_orders/1050-1E.pdf](http://www.faa.gov/documentLibrary/media/order/energy_orders/1050-1E.pdf)

**United States Department of Transportation, FAA, Order 5050.4B, National Environmental Policy Act of 1969, as Amended: Implementing Instructions for Airport Actions (April 2006)**

FAA’s Office of Airports (ARP) is responsible for reviewing and deciding on projects airport sponsors propose for public-use airports. Order 5050.4B provides the most current instructions for implementing the NEPA for airport-specific projects under its ARP’s authority. Order 5050.4B supplements FAA Order 1050.1E, providing detailed guidance on how FAA should integrate NEPA into the planning and decision making processes for major Federal **actions** related to airports. These procedures are intended to guide FAA’s preparation and review of environmental documents for airport actions.

*Small Airport Applicability*

As part of the Airport’s Sponsor’s responsibilities to seek FAA approvals for changes to their ALPs or for Federal funds under the AIP to build airport facilities, Order 5050.4B stipulates that the Airport Sponsor must consider environmental factors, through the NEPA process, in early planning efforts for proposed development projects. This Order provides guidance relevant to the Airport Sponsor on preparing NEPA documents, including the necessary agency, tribal, and public coordination, and detailed descriptions of what is to be included in the documents.

Of note to small airports are the list of CATEX for airport actions contained in Tables 6-1 and 6-2 of FAA Order 5050.4B. Airports implementing projects that that result in a CATEX typically must complete a short form provided by the airport’s FAA point of contact for documentation.

*Compliance Attainment Strategies*

- If a project is a federal action, determine if a CATEX, EA, or EIS applies.
- Be familiar with FAA **thresholds for significant impacts**.
- Coordinate with local FAA airports district office early in the planning process.



- Identify environmental concerns early through public and agency **scoping** meetings.
- A CATEX, EA, or EIS must be completed prior to any federal action at the airport.

#### *Key Terms*

- **Public Hearing**—A gathering under the direction of a designated hearing officer for the purpose of allowing interested parties to speak and hear about issues of concern. 40 CFR 1506.6(c) states that public hearings should be held whenever appropriate or to meet statutory requirements applicable to an agency.

#### *Additional Resources*

- FAA, Order 5050.4B, *NEPA Implementing Instructions for Airport Actions* (April 2006)  
[http://www.faa.gov/airports/resources/publications/orders/environmental\\_5050\\_4/media/5050-4B\\_complete.pdf](http://www.faa.gov/airports/resources/publications/orders/environmental_5050_4/media/5050-4B_complete.pdf)
- FAA *Environmental Desk Reference for Airport Actions*, FAA Office of Airports, Office of Airport Planning and Programming, Airports Planning and Environmental Division, APP-400, October 2007  
[http://www.faa.gov/airports/environmental/environmental\\_desk\\_ref/](http://www.faa.gov/airports/environmental/environmental_desk_ref/)

## 6.3 Property Transfer

### **Comprehensive Environmental Response, Compensation and Liability Act of 1980, as Amended**

CERCLA (commonly referred to as Superfund) was amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, which established procedures to protect potential property purchasers from buying property that may have existing environmental contamination. The procedures under SARA include conducting Environmental Site Assessments (ESAs) to identify a property's potential contamination before the property transaction occurs. Examples of potential issues that an ESA may uncover include soil contamination from leaking underground storage tanks, past chemical spills, former landfill locations, sites listed on the National Priorities List (NPL), and regulatory required remediation activities. Three types of ESAs are described below:

- Phase I ESA – Document environmental conditions and determine whether environmental contamination is likely to be present
- Phase II ESA – When Phase I ESA indicates likelihood of environmental contamination (includes site sampling)
- Phase III ESA – Site remediation activities

To establish a landowner did not know and had no reason to know of releases or threatened releases, landowners must demonstrate that they conducted “**all appropriate inquiries**” into the previous ownership and uses of the property.

#### **Associated Activities**

- Demolition/ construction/ development
- Property acquisition
- Waste generation/ disposal



### Helpful Hint

Review environmental documents prepared by the property owner prior to transfer to identify potential concerns with the property, such as leaking underground storage tanks or improper waste disposal.

For more information, refer to Property-1 Practice in Appendix A-14.

The EPA has established standard practices for conducting All Appropriate Inquiries for Phase I ESAs, including that ESAs are conducted by or under the supervision of an **environmental professional**. A Phase I ESA includes investigation of neighboring properties to determine if they are on the National Priority List or if hazardous substances have been released that can affect the subject property. The All Appropriate Inquires regulations require an environmental professional to sign the final Phase I report. In addition to the regulations, EPA approved two ASTM International standards for conducting ESAs, including ASTM E1527-05 and ASTM E2247-08.

### *Small Airport Applicability*

FAA has an interest in potential property acquisition when funds are provided through the AIP. Airports must provide a Certificate of Environmental Site Assessment to FAA after conducting a Phase I ESA when using these funds. If a finding for potential environmental contamination exists in the Phase I ESA, the airport must notify FAA before proceeding to a Phase II or Phase III ESA. Airports should perform an ESA even when Airport Improvement Funds are not involved to prevent airports encumbering liabilities of previous owner's adverse impact on the environment.

### *Compliance Attainment Strategies*

- Ensure the ESA report contains the signature of the environmental professional and declaration of qualification.
- Conduct comprehensive interview to identify all environmental issues.
- Conduct a search for lien and use limitation and review property deeds, and transfer records.
- Conduct ESAs for non-AIP funded properties to identify environmental issues to avoid significant liability becoming the airport's responsibility.
- Ensure environmental staff are made aware of the extent or degree of environmental contamination at a site, so that the correct cleanup measures are taken.

### *Key Terms*

- **All Appropriate Inquiries**—Must be conducted within one year prior to the date of acquisition of the subject property and include an inquiry by an environmental professional, collection of information pursuant to 40 CFR 312.22, and searches for recorded environmental cleanup liens.
- **Environmental Professional**—A person who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding conditions indicative of releases or threatened releases.

### *Additional Resources*

- ASTM E1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

- ASTM E2247-08, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property
- ASTM E1903-97, Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process
- FAA Order 1050.19B, *Environmental Due Diligence Audits in the Conduct of FAA Real Property Transactions*

## 6.4 Public Involvement

State and local agencies may have regulatory requirements regarding public involvement practices. Consideration should be given to all regulatory requirements.

### FAA Advisory Circular No. 150/5070-7, The Airport System Planning Process (including reference to FAA's Community Involvement Manual)

Although not a federal requirement, the Advisory Circular (AC) provides guidance to Airports on providing the public an opportunity for review and comment to the extent appropriate with the particular project's scope. It states that the public involvement process should be inclusive of all members of the interested public, the opportunity for public participation or comment is available, and that the process is designed to consider input from the public for the project's development.

#### *Small Airport Applicability*

FAA's Community Involvement Manual (referenced in FAA Order 5050.4B and in this AC) can assist planners with addressing the concerns of airport communities during times of airport development. The manual provides practical guidelines for involving the community in a variety of aviation planning situations.

#### *Compliance Attainment Strategies*

- Actively involve the public early in the project to identify areas of concern.
- Develop a public coordination plan to identify key points during project planning/development when the public will receive updates and/or be invited to participate.
- Conduct periodic public information meetings to keep the public involved.

#### *Additional Resources*

- FAA AC No. 150/5070-7  
[http://www.faa.gov/about/office\\_org/headquarters\\_offices/aep/planning\\_tool\\_kit/media/VI.A.pdf](http://www.faa.gov/about/office_org/headquarters_offices/aep/planning_tool_kit/media/VI.A.pdf)
- FAA, Order 5050.4B, *NEPA Implementing Instructions for Airport Actions* (April 2006)

#### Associated Activities

- Demolition/ construction/ development
- Property acquisition



#### Helpful Hint

Public involvement is required to comply with NEPA and CEQ; however, it is a beneficial tool for any project to keep the public informed of airport activities and maintain positive relations with the community.

For more information, refer to Planning-12, Planning-13, and Planning-14 Practices in Appendix A-11.

[http://www.faa.gov/airports/resources/publications/orders/environmental\\_5050\\_4/media/5050-4B\\_complete.pdf](http://www.faa.gov/airports/resources/publications/orders/environmental_5050_4/media/5050-4B_complete.pdf)

- FAA, Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (March 2006)  
[http://www.faa.gov/documentLibrary/media/order/energy\\_orders/1050-1E.pdf](http://www.faa.gov/documentLibrary/media/order/energy_orders/1050-1E.pdf)

## 6.5 Fish, Wildlife, and Plants

State and local agencies may have other regulatory requirements. Consideration should be given to all requirements when fish, wildlife, and/or plants may be impacted.

### Associated Activities

- Demolition/ construction/ development
- Grounds maintenance/ landscaping
- Property acquisition

### Endangered Species Act of 1973

The Endangered Species Act of 1973 requires that federal agencies, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), seek to conserve endangered or threatened species and ensure that any **action** authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of any endangered or threatened species or the habitat of such species.

#### *Small Airport Applicability*

Under the Endangered Species Act of 1973, FAA approved or financed actions may occur in those habitats, provided the actions do not jeopardize the protected species' existence or the Secretary issues an exemption under 50 CFR Section 453. Compliance with the Endangered Species Act of 1973 is required if the responsible FAA official determines the actions may affect Federally listed endangered or threatened species and their critical habitats.

The Endangered Species Act of 1973 typically addresses airport actions on the airside such as a new airport, a new or expanded terminal or hangar, a new or extended runway or taxiway, or installing navigational aids (NAVAIDS); and on the landside, actions such as building or moving a new access road, a remote parking facility, or rental car lots, or even smaller-scale projects such as the addition of fencing or clearing of obstruction/trees. If a careful review suggests a project-affected area would not involve a federally listed species or its critical habitat, the environmental document should state that fact, and further consultation under the Endangered Species Act of 1973 is not needed. 50 CFR Part 402 provides the procedures for agency coordination under Section 7 of the Endangered Species Act of 1973, as amended.

Some airport actions do not affect federally listed species or their critical habitats, but they may affect state-listed endangered or threatened species. Although the Endangered Species Act of 1973 does not protect state-protected species or habitats, the responsible FAA official must ensure the environmental documents prepared for such airport actions address effects on state-protected resources.



#### Did You Know

The acronym ESA can refer to either the Endangered Species Act (Section 6.5) or an Environmental Site Assessment (Section 6.3).

*Compliance Attainment Strategies*

- Review federal and state protected species listings and mapping to determine if any protected species are present in the project area.
- Review the proposed project site for evidence of **species of concern** or suitable habitat.
- Contact appropriate federal (USFWS or NMFS) or state agencies to discuss design measures to ensure avoidance or minimization.

*Key Terms*

- **Species of Concern**—Those species listed in the periodic report "Migratory Nongame Birds of Management Concern in the U.S.," priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 CFR 17.11.

*Additional Resources*

- Endangered Species Act of 1973 (16 U.S.C. 1531-1544)  
<http://epw.senate.gov/esa73.pdf>

**Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended**

MSA governs marine fisheries management in U.S. federal waters. Most notably, MSA aided in the development of the domestic fishing industry by phasing out foreign fishing. MSA prohibits **actions** that may affect **essential fish habitat (EFH)**. Eight regional fishery management councils identify and describe fishery management plans to protect all commercial fisheries. If a federal action, such as airport development, would affect EFH, an impact assessment on the affected EFH is required. The assessment and any mitigation must be conducted in consultation with the NMFS. This program targets marine fisheries management, but includes certain anadromous and catadromous species that use freshwater stream and rivers for portions of their life cycle.

*Small Airport Applicability*

MSA is a concern when airport development requires a Corps of Engineers permit and EFH will be affected.

*Compliance Attainment Strategies*

- Review the NMFS EFH web site for the presence of EFH species in project area.
- Assemble a list of EFH species and habitat preferences
- Review the project site for the presence of species, migratory paths or suitable habitat.
- Contact the local or regional NMFS office to discuss the project, potential impact to EFH and coordination requirements.

*Key Terms*

- **Essential Fish Habitat (EFH)**—Waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

*Additional Resources*

- MSA  
[http://ecfr.gpoaccess.gov/cgi/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title50/50cfr600\\_main\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title50/50cfr600_main_02.tpl)
- NMFS EFH web site  
<http://www.nmfs.noaa.gov/habitat/efh/>

**Marine Mammal Protection Act of 1972**

The Marine Mammal Protection Act of 1972 seeks to protect and encourage development of marine mammals in order to maintain the health and stability of the marine ecosystem. The Marine Mammal Protection Act of 1972 prohibits harassment, hunting, capturing, or killing of marine mammals and prohibits importation of marine mammals and marine mammal products without a permit from either the Secretary of the Interior or the Secretary of Commerce, depending upon the species of marine mammal involved. Such permits may be issued only for purposes of scientific research and for public display if the purpose is consistent with the policies of the Marine Mammal Protection Act of 1972. If an **action** may result in a **take** of a marine mammal, consultation with the NMFS is required and mitigation actions to minimize or avoid the potential take must be implemented.

*Small Airport Applicability*

The Marine Mammal Protection Act of 1972 is a concern for coastal airports when work is proposed in marine waters. Such an action would also require Section 7 consultation under the Endangered Species Act of 1973.

*Compliance Attainment Strategies*

- Review the NMFS web site for presence of marine mammals in project area.
- Review the project site for the presence of marine mammals or suitable habitat.
- Contact the local or regional NMFS office to discuss project and potential impact to marine mammals and coordination requirements.

*Key Terms*

- **Take**—To attempt or actually pursue, hunt, shoot, wound, kill, trap, capture, or collect.

*Additional Resources*

- Marine Mammal Protection Act of 1972 (16 U.S.C. 1361 et seq.)  
<http://www.nmfs.noaa.gov/pr/pdfs/laws/mmpa.pdf>



## Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act of 1918 makes it unlawful to **take** or sell “**migratory birds**” identified in the Migratory Bird Treaty Act of 1918. A complete list of migratory birds protected by the Migratory Bird Treaty Act of 1918 is available at 50 CFR Section 10.13. The statute does not discriminate between live or dead birds and also grants full protection to any bird parts including feathers, eggs and nests. Over 800 species are currently on the list. **Actions** that may take a migratory bird species are prohibited. If an action may take a migratory bird or affect its breeding habitat, consultation with the USFWS is needed. If it is determined there are no feasible alternatives to taking the migratory bird or its nest, USFWS must issue a permit for the taking. The permit will likely require mitigation.

### *Small Airport Applicability*

Airport maintenance or development activities should be designed in coordination with a wildlife biologist to determine if migratory birds are present on the airport in areas that may potentially be disturbed. If migratory bird species are identified on the airport property, the USFWS should be consulted to ensure that neither protected birds nor their habitat are disrupted.

### *Compliance Attainment Strategies*

- Conduct a survey of the project site for the presence of migratory birds or nesting areas.
- Design the project to avoid or minimize impacts to migratory bird habitats.

### *Key Terms*

- **Migratory Bird**—Any bird listed in 50 CFR 10.13.

### *Additional Resources*

- Migratory Bird Treaty Act of 1918 (16 U.S.C. Sections 703-712)  
<http://www.fws.gov/permits/mbpermits/regulations/mbta.html>
- Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (2001)  
[http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2001\\_register&docid=fr17ja01-142.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2001_register&docid=fr17ja01-142.pdf)
- Birds Protected By The Migratory Bird Treaty Act of 1918  
[http://training.fws.gov/branchsites/CSP/Resources/mig\\_birds/CD/MBTA%20Resources/MBTA%20Alpha%20List.htm](http://training.fws.gov/branchsites/CSP/Resources/mig_birds/CD/MBTA%20Resources/MBTA%20Alpha%20List.htm)
- Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (2001)  
[http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2001\\_register&docid=fr17ja01-142.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2001_register&docid=fr17ja01-142.pdf)



### Helpful Hint

Bald eagle nests in proximity to runways are a potential wildlife hazard.

For more information, refer to Wildlife-3 and Wildlife-4 Practices in Appendix A-13.

## Bald Eagle and Golden Eagle Protection Act of 1940, as Amended

The Bald Eagle and Golden Eagle Protection Act of 1940, as amended prohibits anyone, without a permit issued by the Secretary of the Interior, from taking or disturbing bald or golden eagles, including their parts, feathers, nests, or eggs. Prohibited activities include killing or injuring an eagle and activities that substantially interfere with normal breeding, feeding, or sheltering behavior causing decreased productivity or nest abandonment. Taking of a bald or golden eagle includes actions to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.

### *Small Airport Applicability*

Steps should be taken at the airport, including coordination with a wildlife biologist, to identify evidence of Bald or Golden Eagle habitat. If Bald or Golden Eagles have been identified at the airport (including evidence of nests or other habitat indicators), development activities or routine maintenance should avoid disturbing the eagles in any way identified in the Bald Eagle and Golden Eagle Act. Such activities include adding or extending runways or terminal buildings in previously vegetated areas or near water bodies, or maintenance of any structure on the airport that contains a potential eagle nest.

### *Compliance Attainment Strategies*

- Review the project site for presence of eagle nests, roosting areas, perching sites or feeding areas.
- Contact USFWS or state agencies to discuss design measures to ensure avoidance or minimization of impacts to nests and habitat.

### *Additional Resources*

- Bald Eagle and Golden Eagle Protection Act of 1940, as Amended (16 U.S.C. 668-668d)  
<http://alaska.fws.gov/birds/guidelines/bgepa.html>

## **FAA Advisory Circular No. 150/5200-33B, Hazardous Wildlife Attractants On or Near Airports (Part 139, Certification of Airports)**

Although not a federal requirement, the AC provides guidance to airports on land uses that have the potential to attract wildlife. The AC also discusses development projects affecting operations near wildlife attractants.

During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, as well as billions of dollars in aircraft damage. Hazardous wildlife attractants on and near airports can jeopardize future airport expansion, making proper community land-use planning essential. This AC provides airport and those parties with whom they cooperate with the guidance needed to assess and address potentially hazardous wildlife attractants when locating new **facilities** and implementing certain land-use practices on or near public-use airports.

### *Small Airport Applicability*

Most public-use airports have large tracts of open, undeveloped land that provide added margins of safety and noise mitigation but that can also present potential hazards to aviation. Constructed or natural areas, such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, agricultural or aquaculture activities, surface mining, or wetlands, can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife.

### *Compliance Attainment Strategies*

While AC 150/5200-33B is not a requirement, there are strategies an airport should consider in order to reduce the possibility of wildlife strikes; to avoid impacting protected species; and where applicable, for Part 139 compliance.

- Create and maintain a wildlife hazard management plan.
- Ensure landscape and buildings are maintained in a manner that discourages hazardous wildlife activity.
- Airport personnel should be equipped and trained to perform wildlife control activities, such as utilizing pyrotechnics to scare birds away.
- Maintain a daily log of wildlife control activities and wildlife strikes.
- Report wildlife strikes to the FAA Wildlife Strike Database to help further research.

### *Additional Resources*

- FAA AC No. 150/5200-33B  
[http://www.faa.gov/regulations\\_policies/advisory\\_circulars/index.cfm/go/document.information/documentID/22820](http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/22820)
- FAA Wildlife Strike Database  
<http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx>
- Wildlife Hazard Management at Airports, a Manual for Airport Personnel  
[http://wildlife-mitigation.tc.faa.gov/wildlife/downloads/2005\\_FAA\\_Manual\\_complete.pdf](http://wildlife-mitigation.tc.faa.gov/wildlife/downloads/2005_FAA_Manual_complete.pdf)

## Waste Management

The operations at small airports generate waste subject to federal, state, and local waste management regulations. Across all industries, the management of waste is heavily regulated in response to past detrimental impacts to human health and environment associated with waste disposal practices. Today, waste is regulated using a “cradle-to-grave” approach, which refers to regulation from the point in time a waste is generated to the time it is ultimately disposed.

Waste generated by airports can be broadly categorized as non-hazardous and hazardous. Non-hazardous wastes are generally regulated at the state and local levels and are not addressed further in this chapter. This chapter focuses on hazardous wastes, or materials that may become hazardous waste depending on how they are managed. Additionally, due to their human health risks, polychlorinated biphenyls, lead-based paint, and asbestos-containing materials have unique regulatory requirements restricting their use and handling. These materials are discussed in this chapter because human health risks prompt facilities to eliminate these materials, thus potentially generating regulated waste.

The federal requirements presented in this chapter that are applicable to waste management include the following:

- Resource Conservation and Recovery Act of 1976, as Amended (RCRA)
- Toxic Substances Control Act of 1976, as Amended (TSCA)

The topics presented in Chapter 7 include the following:

- Hazardous Waste Regulations
- Universal Waste Requirements
- Used Oil and Used Oil Filters
- Polychlorinated Biphenyl Waste
- Asbestos Containing Material Management
- Lead

### 7.1 Hazardous Waste Regulations

#### Resource Conservation and Recovery Act of 1976, as Amended

RCRA, an amendment to the Solid Waste Disposal Act of 1965, established requirements to ensure the proper **cradle-to-grave** management of hazardous waste. However, to assess RCRA applicability, airports must first determine if their waste is a hazardous waste. RCRA hazardous wastes are identified through a three-step determination process based on the following questions:

1. Is the material a “**solid waste**”?
2. If yes to question number 1, is the solid waste excluded from RCRA regulation?
3. If no to question number 2, is the solid waste a “**hazardous waste**”?

#### Associated Activities

- Aircraft operation
- Building operation/ maintenance
- Bulk fuel and oil storage/handling
- Cargo handling
- Chemical storage/handling
- Degreasing
- Demolition/ construction/ development
- Ground service equipment operation
- Motor vehicle operation
- On-airport power generation
- Painting
- Refueling
- Spill response
- Vehicle/equipment/ aircraft maintenance
- Waste generation/ disposal

While only three questions, the process for identifying hazardous waste is complex and requires direct consultation with the applicable regulations and hazardous waste determination guidance. Several EPA guidance documents are identified in this chapter as additional resources. Ultimately, a solid waste is a hazardous waste if:

- It is a **listed hazardous waste** in Subpart C of RCRA.
- It is a mixture of solid waste and one or more listed hazardous wastes.
- It is a **characteristic hazardous waste** exhibiting one or more of the characteristics of ignitability, corrosivity, reactivity, or toxicity.



#### Helpful Hint

Disposal of hazardous wastes could be costly. Consider substituting non-hazardous products for those that result in a hazardous waste upon use.

For more information, refer to Haz Waste-1 Practice in Appendix A-16.

**Generators** of hazardous waste fall into one of three classes depending upon the amount of hazardous waste generated in a calendar month. Generator classification can change from one month to the next, and the regulatory requirements increase as more waste is generated. The three generator classifications include the following:

- **Conditionally Exempt Small Quantity Generator (CESQG)**
- **Small Quantity Generator (SQG)**
- **Large Quantity Generator (LQG)**

The key elements of hazardous waste management include:

- Registration of generator activities
- Characterization (identification) of waste streams
- Accumulation container management
- Shipping documentation (i.e., **Uniform Hazardous Waste Manifest**)
- Disposal at a permitted facility
- Confirmation of recycling or disposal

A key requirement for hazardous waste management is proper storage of waste, including storage location and volume requirements, and proper closing and labeling of containers. Depending on the classification of generator, restrictions apply to the duration facilities can store full waste containers on site (i.e., 90, 180, or 270 days). Storage of hazardous wastes beyond the established timeframes requires a special treatment, storage, or disposal permit from EPA.

#### *Small Airport Applicability*

Airports operators should understand if the wastes they generate are hazardous or non-hazardous. Typically, airports do not generate large volumes of hazardous waste from their operations, and therefore are usually classified as either a CESQG or SQG. Examples of hazardous wastes that may be generated at an airport include ignitable waste solvents from vehicle maintenance activities or discarded oil-based paint. Additionally, used spill clean-up materials may be hazardous, depending on the chemical spilled.

If a waste is determined to be hazardous, adequate container management and shipping documentation requirements apply. A certified waste hauler should be used to remove hazardous waste from the facility.

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International flights carrying hazardous materials (see Section 4.5) may be subject to the hazardous waste generator and management requirements. Similarly international exports of hazardous wastes are also subject to reporting and manifest requirements. Airports should be aware of tenants performing these activities at their facilities.

### *Compliance Attainment Strategies*

- Characterize and document waste streams generated by the airport as hazardous or non-hazardous wastes.
- Understand and document the airport's generator status.
- Do not mix hazardous wastes with solid non-hazardous waste.
- Ensure staff properly labels and closes storage containers after use.
- Ensure hazardous wastes are not stored in greater quantities or for longer periods than are permissible for the airport's generator status.
- Perform required inspections on a regular schedule and maintain records of the inspections on file.
- Complete and retain Uniform Hazardous Waste Manifest records and Land Disposal Restriction Forms.
- Identify and implement opportunities to reduce hazardous waste generation.

### *Key Terms*

- **Characteristic Hazardous Waste**—A solid waste, as defined in 40 Code of Federal Regulations (CFR) 261.2, which is not excluded from regulation as a hazardous waste under §261.4(b), and exhibits any of the characteristics of ignitability, corrosivity, reactivity or toxicity.
- **Conditionally Exempt Small Quantity Generator (CESQG)**—Generators that generate  $\leq 220$  pounds per month of hazardous waste,  $\leq 2.2$  pounds per month of acutely hazardous waste, or  $<220$  pounds per month of acute spill residue or contaminated soil. Conditionally Exempt Small Quantity Generators may not store more than 1,000 kg of hazardous waste at any time.
- **Cradle-to-Grave**—A general RCRA term that describes regulation of a hazardous waste from the time it is generated to the time it is disposed.
- **Generator**—Any entity, by site, whose act or process produces hazardous waste identified or listed in part 40 CFR 261 or whose act first causes a hazardous waste to become subject to regulation.
- **Large Quantity Generator (LQG)**—Generators that generate  $\geq 2,200$  pounds per month of hazardous waste,  $>2.2$  pounds per month of acutely hazardous waste, or  $>220$  pounds per month of acute spill residue or contaminated soil.
- **Listed Hazardous Waste**—A solid waste is a hazardous waste if it is listed in this subpart, unless it has been excluded from this list under 40 CFR 260.20 and §260.22, including F-, K-, P- and U-listed hazardous wastes.
- **Small Quantity Generator (SQG)**—Generators that generate  $>220$  pounds, but  $<2,200$  pounds, of hazardous waste per month.
- **Solid Waste**—A waste, as defined in 40 CFR 261.2, including any garbage, refuse, sludge from a waste treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural



### **Did You Know**

Steel aerosol cans that are emptied of their contents and recycled for metal content are exempt from the RCRA disposal requirements.



operations and community activities, but does not include solid or dissolved material in domestic sewage.

- **Uniform Hazardous Waste Manifest**—EPA form 8700-22 and any continuation sheet attached to the form that provides information about the generator of the waste; the facility receiving the waste; the nature of and quantity of the waste; shipping container types and numbers; and shipping method. The manifest was developed to meet both EPA’s requirements for a manifest, and U.S.DOT’s requirements for shipping papers.

#### *Additional Resources*

- 40 CFR 260 – 268
- Introduction to Land Disposal Restrictions (40 CFR Part 268)  
<http://www.epa.gov/waste/inforesources/pubs/hotline/training/ldr05.pdf>
- RCRA Corrective Action  
<http://www.epa.gov/epawaste/hazard/correctiveaction/index.htm>
- Hazardous Waste Generator Summary Chart  
<http://www.epa.gov/waste/hazard/generation/summary.htm>
- Hazardous Waste Characteristics, A User-friendly Reference Document  
<http://www.epa.gov/waste/hazard/wastetypes/wasteid/char/hw-char.pdf>

## 7.2 Universal Waste Requirements

### Associated Activities

- Building operation/ maintenance
- Chemical storage/ handling
- Demolition/ construction/ development
- Grounds maintenance/ landscaping
- Spill response
- Vehicle/equipment/ aircraft maintenance
- Waste generation/ disposal

### Resource Conservation and Recovery Act of 1976, as Amended

In 1995, RCRA was amended to reduce the hazardous waste management requirements for certain commonly generated hazardous wastes to encourage recycling and to prevent disposal with municipal **solid waste**. The subset of hazardous wastes regulated by the 1995 amendments are called **universal wastes** and include certain batteries, pesticides, **mercury-containing equipment** (including thermostats), and **lamps** (defined in 40 CFR 273.2), all of which may be found at airports. If universal waste is not managed as specified by the universal waste rules, it must be managed as hazardous waste fully subject to the RCRA hazardous waste requirements described in Section 7.1.

Facilities that generate universal wastes are known as **Universal Waste Handlers**. Universal Waste Handlers are either considered **Small Quantity Handlers of Universal Waste (SQHUW)** or **Large Quantity Handlers of Universal Waste (LQHUW)**. SQHUW have less than 5,000 kg of universal waste accumulated at their facilities at any given time. A Universal Waste Handler must inform the EPA Regional Administrator before accumulating 5,000 kg or more universal waste at a facility, and must also receive an EPA identification number. The Universal Waste Handler accumulating 5,000 kg or more is then considered a LQHUW until the end of the calendar year. LQHUW must maintain records of shipments of universal waste for at least 3 years.

Universal waste handlers must comply with certain storage timeframes and labeling requirements. For example, used lamps must be stored in packages so they do not break and labeled with the words “Universal Waste Lamps.” Spent batteries must be labeled with the words “Universal Waste Batteries.” The

accumulation time should also be marked on each package so that the 1-year storage timeframe (beginning with the date the first universal waste is stored) is not exceeded.

Universal waste must be removed from facilities by a **universal waste transporter** and taken to a **destination facility** where it is ultimately treated, disposed, or recycled.

### *Small Airport Applicability*

The most common universal wastes generated by small airports include used lamps and spent batteries. However, unused pesticides or mercury-containing equipment may also be generated. Small airports may not generate large volumes of universal waste from their operations, and therefore would likely be classified as SQHUWs.

### *Compliance Attainment Strategies*

- Understand the airport's Universal Waste Handler status. Properly store universal waste lamps so that they are not easily broken.
- Label universal wastes with the proper regulatory terminology, such as "Universal Waste Lamp" or "Universal Waste Battery."
- Ensure staff is aware of the accumulation date for universal wastes.
- Ensure universal wastes are not stored at the airport for over one year.
- Prohibit tenants from disposing universal waste in municipal solid waste dumpsters operated by the airport.

### *Key Terms*

- **Destination Facility**—A facility that treats, disposes of, or recycles a particular category of universal waste. A facility at which a particular category of universal waste is only accumulated is not a destination facility for purposes of managing that category of universal waste.
- **Lamp**—The bulb or tube portion of an electric lighting device designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common universal waste electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide.
- **Large Quantity Handler of Universal Waste (LQHUW)**—A universal waste handler who accumulates a total of 5,000 kg or more of universal waste at any time. This designation as a large quantity handler of universal waste is retained through the end of the calendar year in which the 5,000 kg limit is met or exceeded.
- **Mercury-containing Equipment**—A device or part of a device (including thermostats, but excluding batteries and lamps) that contains elemental mercury integral to its function.
- **Small Quantity Handler of Universal Waste (SQHUW)**—A universal waste handler who does not accumulate 5,000 kg or more of universal waste at any time.



### **Related Information**

For more information pertaining to RCRA, refer to Chapter 4.

- **Universal Waste**—Any of the following hazardous wastes that are managed under the universal waste requirements: batteries, pesticides, mercury-containing equipment, and lamps.
- **Universal Waste Handler**—A generator of universal waste; or the owner or operator of a facility, including all contiguous property, that receives universal waste from other universal waste handlers, accumulates universal waste, and sends universal waste to another universal waste handler, to a destination facility, or to a foreign destination.
- **Universal Waste Transporter**—A person engaged in the off-site transportation of universal waste by air, rail, highway, or water.

#### *Additional Resources*

- 40 CFR 273
- General Universal Waste Information  
<http://www.epa.gov/waste/hazard/wastetypes/universal/index.htm>
- Introduction to Universal Waste  
<http://www.epa.gov/waste/inforesources/pubs/hotline/training/uwast05.pdf>
- Fact Sheet: Discarded Mercury-Containing Equipment Classified as Universal Waste  
<http://www.epa.gov/waste/hazard/recycling/electron/mce-fs.pdf>
- Fact Sheet: More Recycling and Reuse Proposed for Electronic Wastes and Mercury-Containing Equipment  
<http://www.epa.gov/waste/hazard/recycling/electron/crtprop.pdf>
- Fact Sheet: Some Used Lamps are Universal Wastes  
[http://www.epa.gov/waste/hazard/downloads/fs\\_lamps.pdf](http://www.epa.gov/waste/hazard/downloads/fs_lamps.pdf)

## 7.3 Used Oil and Used Oil Filters

### Resource Conservation and Recovery Act of 1976, as Amended

In 1992 RCRA was amended to encourage **used oil** recycling. Specifically, the 1992 amendments excluded used oil from the hazardous waste regulations provided that it is recycled properly and not intentionally mixed with hazardous wastes. Used oil means any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities.

Containers, tanks, and piping leading to a tank storing used oil must be labeled with the words “Used Oil.” If used oil is to be transported to an off-site recycling center in quantities exceeding 55 gallons, the transporter must be registered as a **used oil transporter**. Under the used oil management rules, there are no requirements for storage quantities or timeframes. However, used oil storage may be regulated under the SPCC rule. Information pertaining to the SPCC requirements is presented in Section 4.2.

The used oil management rules do not allow mixing used oil with RCRA hazardous wastes. For example, if it is determined that used oil contains more than 1,000 parts per million (ppm) total halogens (e.g., chlorine), it is presumed that the used oil has been mixed with a halogenated hazardous waste. The

#### Associated Activities

- Aircraft operation
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Chemical storage/handling
- Ground service equipment operation
- Motor vehicle operation
- On-airport power generation
- Spill response
- Vehicle/equipment/aircraft maintenance
- Waste generation/disposal

resultant mixture is then considered a RCRA hazardous waste. This presumption can be rebutted if data exists demonstrating that the used oil was not mixed with halogenated hazardous waste.

Used oil filters are generated from vehicle and equipment maintenance activities. Oil filters are either non-terne plated or terne plated. Non-terne plated filters do not contain lead. Certain procedures can be implemented during maintenance so that non-terne plated filters are exempt from hazardous waste management requirements. Particularly, used oil filters should be gravity hot drained. Hot-draining requires the engine to be brought up to normal engine operating temperature just before removing the filter and draining hot oil by gravity. Oil that is drained from used oil filters should be managed as used oil. There are no limits on the storage quantity or maximum storage period for non-terne plated used oil filters. Because **terne-plated** filters contain lead, they may be considered RCRA hazardous waste when disposed, and should be tested for hazardous materials prior to selecting an appropriate disposal option.

#### *Small Airport Applicability*

Used oil and used oil filters are commonly generated at airports during vehicle and equipment maintenance activities. The types of used oils generated may include crankcase motor oil, hydraulic fluid, gear oil, grease, cutting fluid, transmission fluid, and brake fluid. Today, terne-plated used oil filters are rarely used. In cases where airport maintenance facilities use terne-plated oil filters, the filters should be characterized as hazardous or non-hazardous using the method described earlier in Section 7.1.

#### *Compliance Attainment Strategies*

- Ensure staff is aware of the procedures for properly draining used oil filters.
- Store used oil filters in containers that do not leak.
- Label containers, tanks, and piping with the words “Used Oil” and not “Waste Oil.”
- Do not mix used oil with waste gasoline, diesel fuel, sump fuel, or other chemicals during maintenance activities.
- Identify if staff utilizes terne-plated or non-terne plated used oil filters for vehicles and equipment.
- Properly characterize used oil filters to identify if it is hazardous or non-hazardous, prior to disposal.
- Ensure the person or individual transporting used oil to be recycled is registered as a used oil transporter.

#### *Key Terms*

- **Terne-plated** – A plating mixture of tin and lead typically on steel.
- **Used Oil** – Oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities.
- **Used Oil Transporter** – Any person who transports used oil; collects used oil from more than one generator and transports the collected oil; and owners and operators of used oil transfer facilities. Used oil transporters may



#### **Related Information**

Refer to Chapter 4 for additional information pertaining to airport oil management.



#### **Helpful Hint**

Consider re-using used oil for heating purposes to reduce energy bills.

For more information, refer to Haz Waste-6 Practice in Appendix A-16.

consolidate or aggregate loads of used oil for purposes of transportation but may not process used oil. Transporters may conduct incidental processing operations that occur in the normal course of used oil transportation (e.g., settling and water separation), but that are not designed to produce (or make more amenable for production of) used oil derived products or used oil fuel.

#### *Additional Resources*

- 40 CFR 279
- 40 CFR 261.4(b)(13)
- Used Oil Management Program  
<http://www.epa.gov/waste/conserva/materials/usedoil/index.htm>
- Collecting Used Oil for Recycling or Reuse, Tips for Consumers Who Change their Own Motor Oil and Oil Filters  
<http://www.epa.gov/osw/wycd/downloads/recy-oil.pdf>

## 7.4 Polychlorinated Biphenyl Waste

### Associated Activities

- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Chemical storage/handling
- Demolition/construction/development
- Property acquisition
- Spill response
- Waste generation/disposal

### Toxic Substances Control Act of 1976, as Amended

TSCA authorized EPA to develop regulations for managing wastes containing **polychlorinated biphenyls (PCBs)**. PCBs were used in many different industrial and commercial applications due to their non-flammability, chemical stability, and electrical insulating properties. Although this chemical had a wide variety of uses, it was found that exposure to PCBs can lead to significant human health effects and adverse environmental issues. The manufacturing of PCBs was banned in 1979.

Facilities regulated under the rule include those involved with the following:

- Manufacturing
- Processing
- Distributing in commerce
- Disposing
- Storing
- Marking PCBs

Regulated facilities are required to maintain an annual written document log, which includes the name, address, and EPA identification number of the facility; calendar year of the log; unique **Uniform Hazardous Waste Manifest** numbers; service and disposal information; unique equipment identifiers; and total number of **PCB articles** in use and in storage.

Regulated PCB-containing equipment must be properly marked identifying it contains PCBs, regular inspections must be conducted, and inspection logs must be maintained on file. If PCB-containing equipment is to be disposed or if surrounding areas, such as soil, have become contaminated from leaky equipment, proper treatment and disposal requirements apply. **PCB waste** management regulations include requirements for record keeping and reporting; and site characterization and cleanup. Annual records must be retained, which include



signed manifests, certificates of disposal, inspections, and documentation of clean-up activities. These requirements are coordinated by the EPA, and some states have identified specific PCB treatment and disposal requirements. Certain contractors specialize in PCB sampling, cleanup, and disposal.

### *Small Airport Applicability*

At airports, the primary PCB-regulated activities include marking, storage, and disposal. Particularly, PCBs may be present in older electrical equipment, such as lighting ballasts, transformers, and capacitors. Owners of **PCB transformers** must register each transformer using EPA form 7720-12. Airports must also perform regular inspections using inspection logs and maintain the documentation on file. In cases where PCB-containing equipment is to be disposed, airports must ensure the equipment is properly disposed from the facility, necessary clean-up operations are conducted, and disposal records are provided. Utility companies are responsible to register and maintain transformers owned by them and that are located on utility easements on airport property. Airports may contact the local utility to verify whether or not they own the transformer.

### *Compliance Attainment Strategies*

- Ensure staff is aware that PCB-containing equipment is present at the airport.
- Identify if PCB-containing equipment is present in buildings to be purchased to help prevent potential exposure to individuals on site.
- Ensure PCB-containing equipment is properly marked.
- Replace PCB labels that are old, peeling, or unable to be deciphered.
- Register transformers that contain dielectric fluid with PCB concentrations greater than or equal to 500 ppm with the EPA.
- Perform inspections of PCB-containing equipment on a regular schedule and maintain records on file.
- Maintain manifest, disposal, written document log records on file.

### *Key Terms*

- **Polychlorinated Biphenyls (PCBs)**—A chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees, or any combination of substances which contains such substance.
- **Polychlorinated Biphenyls (PCB) Article**—A manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCBs. “PCB article” includes capacitors, transformers, electric motors, pumps, pipes, and any other manufactured item which is formed to a specific shape or design during manufacture, has end use function(s) dependent in whole or in part upon its shape or design during end use, and has either no change of chemical composition during its end use or only those changes of composition which have no commercial purpose separate from that of the PCB Article.
- **Polychlorinated Biphenyls (PCB) Transformer**—Transformers containing dielectric fluid with PCB concentrations greater than or equal to 500 ppm.
- **Polychlorinated Biphenyls (PCB) Waste**—PCB articles, PCB article containers, PCB containers, PCB equipment, or anything that deliberately or



### Helpful Hint

Conduct a PCB inventory for all airport transformers. The inventory will come in handy during future planning activities.

For more information, refer to Haz Waste-3 Practice in Appendix A-16.



### Did You Know

PCBs are highly persistent in the environment resulting in “bioaccumulation.” Bioaccumulation is where PCBs are increasingly concentrated in plant, fish, and animal tissues as food is consumed through the food chain.



unintentionally contains or has as a part of it any PCBs subject to PCB storage and disposal requirements.

#### *Additional Resources*

- 40 CFR 761
- General PCB Information  
<http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/about.htm>
- January 2009 PCB Question and Answer Manual  
<http://www.epa.gov/waste/hazard/tsd/pcbs/pubs/qacombed.pdf>
- TSCA Disposal Requirements for Fluorescent Light Ballasts  
<http://www.epa.gov/waste/hazard/tsd/pcbs/pubs/ballastchart.pdf>

## 7.5 Asbestos Containing Material Management

### Associated Activities

- Building operation/maintenance
- Demolition/construction/development
- Property acquisition
- Spill response
- Vehicle/equipment/aircraft maintenance
- Waste generation/disposal

### Toxic Substances Control Act of 1976, as Amended

TSCA authorized EPA to develop regulations for managing **asbestos**, a fiber mineral that when inhaled can cause respiratory diseases. Asbestos is widely regulated under other programs including the Clean Air Act of 1970, as amended, Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), and Safe Drinking Water Act, as amended (SDWA). Asbestos may be contained in building materials including roofing, flooring, and insulation. Health concerns arise when these materials are disturbed and become **friable**. Friable asbestos are easily crumbled or crushed by hand pressure and can become airborne, resulting in exposure through inhalation. Asbestos may become friable from regular maintenance, building deterioration or during renovation, construction, and demolition activities. Proper disposal of **asbestos-containing material (ACM)** is regulated by the EPA. A National Emissions Standards for Hazardous Air Pollutants (NESHAP) has been established for asbestos under the CAA (see Section 3.3).

Asbestos was primarily mined and manufactured prior to 1990, after which production dropped significantly due to national and international policies to ban or phase out **asbestos-containing products (ACP)**. Environmental regulations prohibit the following for certain ACP:

- Manufacturing
- Importation
- Processing
- Distribution in commerce

#### *Small Airport Applicability*

Asbestos may be present within older airport-owned buildings or properties, and they may become friable when it is disturbed from airport building renovations, demolition, or maintenance. Prior to these activities, airports should perform inventories for the presence of ACM using qualified professionals. If ACM is encountered, the airport must adequately label the material to identify it contains asbestos. Specific wording for labels is provided in the regulation.

Stickers or tags must be placed directly on the visible exterior of wrappings and packaging. Labels must be attached so they cannot be removed without defacing or destroying the wrappings or packaging.

Public sector employees may not be subject to the Occupational Safety and Health Act of 1970 and state-by-state programs similar to Occupational Safety and Health Act of 1970 may differ. However, TSCA regulations include protection requirements for state and local government employees that are not covered under the asbestos standards of the Occupational Safety and Health Act of 1970. This may apply to airport personnel at municipally owned airports. Airport operators should consult with an Environmental Health and Safety professional to determine the applicable health and safety requirements.

If an airport project involves building renovations, demolition, or maintenance and will impact known ACM, the airport will be subject to CAA, worker protection, and state-specific ACM disposal requirements.

#### *Compliance Attainment Strategies*

- Identify if ACM is present in buildings located on airport property to help prevent potential exposure to individuals on site.
- Properly label ACM.
- Replace labels for ACM that are old, peeling, or unable to be deciphered.
- Properly label or handle (if removed) ACM in buildings that are purchased or acquired by the airport.
- Understand the proper ACM management methods prior to construction or demolition activities.

#### *Key Terms*

- **Asbestos**—Asbestiform varieties of Chrysotile (serpentine), crocidolite (riebeckite), amosite (cum-mingtonite/grunerite), anthophyllite, tremolite, and actinolite.
- **Asbestos-containing Material (ACM)**—A material or product which contains more than 1% asbestos.
- **Asbestos-containing Product (ACP)**—A product to which asbestos is deliberately added in any concentration or which contains more than 1% asbestos by weight or area.
- **Friable**—Material that when dry may be crumbled, pulverized, or reduced to powder by hand pressure.

#### *Additional Resources*

- 40 CFR 763
- Asbestos Laws and Regulations  
<http://www.epa.gov/asbestos/pubs/asbreg.html>
- General Asbestos Information  
<http://www.epa.gov/asbestos/>
- Asbestos Building Management  
[http://www.epa.gov/asbestos/pubs/management\\_in\\_place.html](http://www.epa.gov/asbestos/pubs/management_in_place.html)



#### **Related Information**

Asbestos air emissions are regulated under the CAA. Refer to Chapter 3 for additional information pertaining to CAA regulations.

## 7.6 Lead

### Associated Activities

- Building operation/maintenance
- Demolition/construction/development
- Painting
- Property acquisition
- Spill response
- Waste generation/disposal

### Toxic Substances Control Act of 1976, as Amended

Historically **lead** has been used in a variety of industrial and consumer products. Lead was used in **lead-based paints** prior to a ban in 1978, as an additive to gasoline prior to a ban in 1996. It is still used in leaded aviation gasoline (see Section 3.5 about potential changes to this use), batteries, and wheel weights, among other uses. If inhaled or ingested, lead can cause significant adverse health effects. Therefore, to reduce human and environmental exposure to lead-based products and processes, EPA developed regulatory requirements for lead under TSCA. Lead may also be regulated as a hazardous waste under RCRA, a HAP under the CAA, and a drinking water contaminant under the SDWA. This section focuses specifically on the regulation of lead-based paint under TSCA.

The regulatory requirements for lead are primarily applicable to activities conducted for **target housing** (i.e., generally, housing constructed prior to 1978) or **child-occupied facilities** (e.g., school, day care facilities), and primarily apply during risk assessments, residential renovations, inspections, or abatement activities. Specific work practices, such as dust control, cleaning techniques, and waste management practices apply to those working around or handling lead-based paint. Individuals performing inspections, lead-hazard screenings, risk assessment, or abatement activities must be trained and certified by an EPA-accredited program. Additionally, new rules (effective April 22, 2010) require all firms and individuals to be trained and certified when performing renovations for target housing or child-occupied facilities.

#### *Small Airport Applicability*

Lead work practice requirements may apply to airports when residential properties or child-occupied facilities require **renovations** as part of noise mitigation requirements from proposed airport actions. For example, changes in airport noise levels may require the airport to provide noise insulation to nearby houses. Airports may also purchase properties constructed prior to 1978. In cases where demolition, renovations, or **abatement** at these facilities is planned, airports should require inspections for lead prior to the action. Airports must also ensure that those conducting the work are adequately trained and certified.

#### *Compliance Attainment Strategies*

- Identify if lead-based paint is present in buildings located on airport property to help prevent potential exposure to individuals on site.
- Properly handle (if removed) lead-based paint in buildings that are purchased or acquired by the airport.
- Ensure individuals or firms performing renovation or **lead-based paint activities** are adequately certified.
- Ensure proper personal protective equipment (PPE) is worn by individuals conducting lead-based paint activities.

*Key Terms*

- **Abatement**—Any measure or set of measures designed to permanently eliminate lead-based paint or other hazards.
- **Child-occupied Facility**—Building constructed prior to 1978 that is visited regularly by the same child, under 6 years of age, on at least two different days within any week (Sunday through Saturday period), provided that each day's visit lasts at least three hours and the combined weekly visits last at least six hours, and the combined annual visits last at least 60 hours.
- **Lead**—Naturally occurring, bluish-grey toxic metal that can result in significant health effects when inhaled or ingested.
- **Lead-based Paint**—Paint or other surface coatings that contain lead equal to or in excess of 1.0 mg/cm<sup>2</sup> or more than 0.5% by weight.
- **Lead-based Paint Activities**—Inspection, risk assessment, and abatement activities for target housing and child-occupied facilities.
- **Renovation**—Modification of any existing structure, or portion thereof, that results in the disturbance of painted surfaces, unless that activity is performed as part of an abatement.
- **Target Housing**—Housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any child who is less than six years of age resides or is expected to reside in such housing) or any no-bedroom dwelling (e.g., studio apartment, dormitory).

*Additional Resources*

- 49 CFR 745
- Lead in Paint, Dust, and Soil  
<http://www.epa.gov/lead/index.html>
- Renovation, Repair, and Painting (RRP)  
<http://www.epa.gov/lead/index.html>

## Water Resources

Federal rules and regulations for water resources in the United States date back to 1899 and were primarily developed in relation to commerce and agricultural development. As the population in the United States grew throughout the mid-twentieth century, regulation of water resources also increased. Amendments and further promulgation of rules and regulations by federal and state agencies have continued into the twenty-first century in an effort to protect the nation's water resources.

Airport operations routinely interact with water resources from the treatment and distribution of drinking water to the discharge of storm water into surrounding rivers, streams or lakes. Subsequently, airports are subject to various water-related rules and regulations.

The federal requirements applicable to water include the following:

- Safe Drinking Water Act of 1974, as Amended (SDWA)
- Clean Water Act, as Amended (CWA)
- Rivers and Harbors Act of 1899, as Amended
- Executive Order 11990, Protection of Wetlands
- U.S.DOT Order 5660.1A Preservation of the Nation's Wetlands (1978)

The topics presented in Chapter 8 include:

- Federal Drinking Water Supply
- Storm Water Discharges Associated with Industrial Activities
- Storm Water Discharges Associated with Construction Activities
- Storm Water Discharges Associated with Municipal Separate Storm Sewer Systems
- Industrial Wastewater Pretreatment
- Surface Waters and Wetlands

### 8.1 Drinking Water

#### Safe Drinking Water Act of 1974, as Amended

The SDWA was established to protect public health through regulation of drinking water supplies. The SDWA has since been amended to protect the sources of drinking water, such as rivers, lakes, reservoirs, and ground water. The EPA implements the program in some states and specialized areas. A major aspect of the SDWA is the establishment of National Primary Drinking Water Regulations (NPDWR) for **public water systems**. Other major sections of the SDWA that are not discussed in this Guidebook include underground injection control (UIC) and sole source aquifer programs.

The EPA has listed drinking water contaminants, including chlorine, metals, bacteria, and organics that have been determined to affect public health. Studies

#### Associated Activities

- Building operation/maintenance

carried out by the EPA have identified contaminant concentrations at which there are no known health risks, called maximum contaminant level goals (MCLGs). As a result, the EPA established primary drinking water standards to protect human health based on these goals. Each contaminant has a designated concentration level for drinking water, called a **maximum contaminant level (MCL)**. Drinking water contaminants must not exceed the established MCL and may require treatment to ensure MCLs are met. **Secondary maximum contaminant levels (SMCLs)** have also been established for drinking water, but are not based on health risks. The SMCLs are based on aesthetic drinking water issues, such as color, smell, and taste. These standards are not enforced by the EPA, but are recommended to be implemented by drinking water suppliers.



#### Helpful Hint

Protect onsite drinking water supplies by minimizing chemical or fuel storage areas near water wells.

For more information, refer to Water Conservation-11 Practice in Appendix A-18.

Drinking water sources are protected through surveys and assessments, distribution operator training, educational outreach programs, and other prevention practices. Additionally, information is available for the control of cross-connections (connections between potable and non-potable water supply) to minimize potential contamination of public drinking water.

Suppliers of drinking water must conduct specific water treatment methods (e.g., filtration, disinfection), monitoring, and laboratory analytical tests. Depending on the type of supplier and state or local requirements, it may be necessary to make information about drinking water readily available to the public.

#### *Small Airport Applicability*

Some airports may operate their own drinking water treatment and distribution systems. If airport drinking water is not provided by a local municipality, an on-site supply system would be considered either a **transient non-community water system** or **non-transient non-community water system**.

Airports that are considered non-community water systems must periodically test drinking water to ensure water quality requirements are met. Testing parameters depend on drinking water source and treatment technologies (i.e., disinfection). Reports of the analytical data may be required to be sent to the EPA or state resource agencies responsible for ensuring drinking water quality requirements are adequately obtained.

Air carriers typically board aircraft drinking water using designated **watering points**. The Food and Drug Administration (FDA) is responsible for regulating watering points. Once water is onboard aircraft, the EPA is responsible for regulating the distribution of water for consumption. Air carriers have recently been designated as transient, non-community drinking water systems and specific regulations have been developed for ensuring adequate drinking water quality from aircraft under the Aircraft Drinking Water Rule (40 Code of Federal Regulations (CFR) 141.800). Air carriers supplying drinking water are subject to sampling, maintenance, reporting and recordkeeping requirements, and may be subject to audits or inspections to ensure drinking water boarding operations are adequate.



*Compliance Attainment Strategies*

- Properly store hoses that transfer water to an aircraft during non-use.
- Perform regular maintenance or cleaning for water cabinets, carts, or trucks.
- Understand the type of public water system at the airport.
- Perform required monitoring or analytical tests to demonstrate compliance with water quality requirements.

*Key Terms*

- **Maximum Contaminant Level (MCL)**—The maximum permissible level of a contaminant in water which is delivered to any user of a public water system.
- **Non-transient Non-community Drinking Water System**—A public water system that regularly supplies water to at least 25 of the same people at least six months per year, but not year-round (e.g., schools, factories, office buildings).
- **Public Water System**—A system for providing piped water for human consumption through a minimum of 15 service connections or regularly servicing at least 25 individuals.
- **Secondary Maximum Contaminant Level (SMCL)**—The maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system.
- **Transient Non-community Drinking Water System**—A public water system that provides water in areas where people do not remain for long periods of time (e.g., campgrounds).
- **Watering Points**—Facilities where water is transferred from a water supply to an aircraft, including water cabinets, carts, trucks, and hoses.

*Additional Resources*

- 40 CFR 141-149
- Basic Information about SDWA  
<http://www.epa.gov/safewater/sdwa/basicinformation.html>
- Understanding SDWA  
[http://www.epa.gov/safewater/sdwa/pdfs/fs\\_30ann\\_sdwa\\_web.pdf](http://www.epa.gov/safewater/sdwa/pdfs/fs_30ann_sdwa_web.pdf)
- Aircraft drinking water rules  
[www.epa.gov/safewater/airlinewater/regs.html](http://www.epa.gov/safewater/airlinewater/regs.html)

## 8.2 Storm Water Discharges Associated with Industrial Activities

### Clean Water Act, as Amended

The CWA regulates the discharges of pollutants into **waters of the U.S.** and establishes **water quality standards** for these waters, as well. Initial efforts to regulate water pollution were enacted in the Federal Water Pollution Control Act of 1948 (FWPCA). The FWPCA was significantly amended in 1961, 1966, 1970, and 1972. With the 1977 amendments, the FWPCA became more commonly known as the CWA.

### Associated Activities

- Aircraft deicing/anti-icing
- Aircraft operation
- Aircraft lavatory service
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Cargo handling
- Chemical storage/handling
- Degreasing
- Fire fighting training/testing/flushing
- Ground service equipment operation
- Grounds maintenance/landscaping
- Motor vehicle operation
- On-airport power generation
- Painting
- Pavement deicing
- Refueling
- Runway rubber removal
- Spill Response
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal

The CWA established the **National Pollutant Discharge Elimination System (NPDES)**, which regulates direct discharges of pollutants into waters of the U.S. through **effluent limitations**. An example of a direct discharge, or “**point source**” discharge, into waters of the U.S. is a **publicly owned treatment works (POTW)**. Pollutants that are discharged into waters of the U.S. may also come from indirect sources, which are regulated through the National Pretreatment Program (see Section 8.5 for more information pertaining to indirect discharges).

Amendments to the CWA by the Water Quality Act of 1987 included regulation of storm water under the NPDES program. The amendments were intended to prevent the direct discharge of harmful pollutants into a facility’s storm water drainage system and to prevent storm water runoff from transporting pollutants into nearby surface waters. Storm water point sources are categorized as industrial/commercial, construction-related (see Section 8.3), and municipal (see Section 8.4), and typically include a definable storm water discharge outfall.

To maintain the quality of waters of the U.S., EPA issues NPDES permits to facilities that discharge storm water in association with **industrial activities**, as do states delegated authority to implement the NPDES program. General NPDES permits cover many facilities that have similar operations, whereas individual NPDES permits are activity- or site-specific. Typically, obtaining coverage under an individual NPDES permit requires a calculation for the level of pollutant(s) that may be discharged to surface waters. The calculated pollutant levels must not exceed established water quality standards, described as a **total maximum daily load (TMDL)**, which are criteria that water bodies must meet based upon their designated use (e.g., waters for recreational use, shellfish harvesting, etc.).

Elements of the NPDES industrial storm water permit program typically include requirements to do the following:

- Prepare a **Storm Water Pollution Prevention Plan (SWPPP) for Industrial Activities**
- Conduct inspections
- Train employees
- Sample storm water discharges
- Implement **best management practices (BMPs)**
- Clean up spills

Industrial storm water permits are generally issued for a period of 5 years and may include **effluent limitation guidelines (ELGs)** for pollutants, monitoring requirements, and/or special conditions to meet water quality standards. Applications for a storm water permit typically require submittal of a Notice of Intent (NOI).

### *Small Airport Applicability*

EPA specifically identified the following industrial activities occurring at air transportation facilities as requiring an NPDES permit:

- Servicing, repairing, or maintaining aircraft and ground support equipment (GSE)
- Equipment cleaning and maintenance, which includes vehicle and equipment repairs, painting, fueling, and lubrication
- Deicing/anti-icing operations

As a result, most small airports are required to obtain coverage for their storm water discharges through a general or individual industrial NPDES permit, even if it is the airport tenants that conduct the above-listed activities.

On August 28, 2009, EPA proposed ELG and New Source Performance Standards for airport deicing operations. The proposed rule contains two primary elements including a standard for the percent of aircraft deicing fluid (ADF) that must be collected, and treatment requirements for the collected effluent. The proposed rule applies to airports that conduct aircraft deicing and have 1,000 or more annual jet departures and 10,000 or more total annual departures. Airports that meet these criteria would be required to collect ADF runoff and treat it. The proposed rule also incorporates water quality criteria for ammonia and associated urea-based airport pavement deicing operations. The proposed rule has the potential to significantly affect deicing operations at large airports, but may impact small airport operations, as well.

### *Compliance Attainment Strategies*

- Submit a permit renewal to the appropriate permitting agency before the permit expires.
- Ensure sampling is conducted as specified in the permit.
- Develop a SWPPP that addresses specific permit requirements and identifies storm water best management practices to reduce potential storm water pollutants.
- Implement a storm water pollution prevention team that includes representatives from airport tenants conducting regulated industrial activities.
- Train airport and tenant staff on storm water pollution prevention measures.
- Routinely inspect airport operations, including during rain events, to determine if storm water pollutants are visible.
- Update SWPPP when changes to the airport are made that could affect storm water quality.

### *Key Terms*

- **Best Management Practices (BMPs)**—Schedules of activities, prohibitions of practices, maintenance procedures, structural controls, and other administrative practices to prevent or reduce the pollution of waters of the U.S.
- **Effluent Limitation**—Any restriction on quantities, discharge rates, and concentrations of pollutants discharged from point sources into waters of the U.S.



#### **Helpful Hint**

For more information on developing an airport-wide storm water pollution prevention program, see the case study presented in Appendix B-4.



#### **Helpful Hint**

Provide tenants with sump fuel collection containers so that sump fuel is not discarded on the ramp. Sump fuel on the ramp can runoff with storm water.

For more information, refer to Industrial SW-2 Practice in Appendix A-20.



### Did You Know

Polluted storm water runoff is a leading cause of impairment to the nearly 40% of surveyed U.S. water bodies which do not meet water quality standards.

- **Effluent Limitation Guideline (ELG)**—Technology-based regulations to control industrial discharges directly to surface waters and those discharging to POTWs. ELGs are intended to work in conjunction with water quality standards, to protect surface waters.
- **Industrial Activities**—EPA defines industrial activities as activities, such as material handling and storage, which are often exposed to the weather and take place at facilities included in one of 29 industrial sectors. The sectors group similar facilities by the nature of industrial activity, type of materials handled, and material management practices employed. Most sectors are based on a facility’s Standard Industrial Classification (SIC) code.
- **National Pollutant Discharge Elimination System (NPDES)**—EPA’s program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under the CWA.
- **Point Source**—Any discernible, confined, and discrete conveyance of storm water.
- **Publicly Owned Treatment Works (POTW)**—A treatment works, as defined by §212 of the CWA, which is owned by a state or municipality. A POTW includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature; and it may include sewers, pipes, and other conveyances only if they convey wastewater to the POTW.
- **Storm Water Pollution Prevention Plan (SWPPP) for Industrial Activities**—A site-specific plan to minimize impacts to storm water quality from industrial sites/activities. Plans typically include storm water control measures, maintenance and inspection procedures, identification of non-storm water discharges, and employee training.
- **Total Maximum Daily Load (TMDL)**—The sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background applicable to a body of water (e.g., a river).
- **Water Quality Standards**—EPA or state-established standards for pollutants applicable to waters of the U.S.
- **Waters of the U.S.**—Broadly defined by 40 CFR 230.3(s) as:
  - All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
  - All interstate waters including interstate wetlands;
  - All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
    - i. Which are or could be used by interstate or foreign travelers for recreational or other purposes;
    - ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    - iii. Which are used or could be used for industrial purposes by industries in interstate commerce.
  - All impoundments of waters otherwise defined as waters of the U.S. under this definition;

- Tributaries of waters identified in paragraphs (s)(1) through (4) of this section; and
- The territorial sea.

#### *Additional Resources*

- 40 CFR 122-125
- Airport Deicing Effluent Guidelines  
<http://www.epa.gov/guide/airport/>
- Storm Water Basic Information  
<http://cfpub.epa.gov/npdes/stormwater/swbasicinfo.cfm>
- Storm Water Discharges from Industrial Facilities  
<http://cfpub.epa.gov/npdes/stormwater/indust.cfm>
- Industrial Stormwater Fact Sheet Series—Sector S: Vehicle Maintenance Areas, Equipment Cleaning Areas, or Deicing Areas Located at Air Transportation Facilities  
[http://www.epa.gov/npdes/pubs/sector\\_s\\_airtransmaint.pdf](http://www.epa.gov/npdes/pubs/sector_s_airtransmaint.pdf)
- Industrial Storm Water Permit Guide  
<http://www.pneac.org/stormwater/>

## 8.3 Storm Water Discharges Associated with Construction Activities

### Clean Water Act, as Amended

As described in Section 8.2, amendments to the CWA by the Water Quality Act of 1987 regulate storm water discharges including discharges from construction sites. However, because of the significant differences between industrial and construction sites, construction storm water discharges are permitted separately under the **NPDES** program. State agencies and EPA implement the construction NPDES program. Examples of pollutants that may affect storm water quality from construction sites include sediment, oil, grease, and chemicals.

Initially, NPDES regulations required permits for construction sites equal to or greater than five acres of land, commonly referred to as the Phase I permitting program. Substantial amendments to the regulations in 2003 included permitting construction storm water for sites disturbing greater than one acre to five acres of land, referred to as the Phase II permitting program. Also, **construction activities** part of a larger common plan for development may be required to obtain a permit if the plan will ultimately disturb five acres or more.

On December 1, 2009, EPA published **ELGs** to further control construction storm water discharges. The regulation became effective in February 2010 and aims to reduce the amount of sediment and other pollutants typically discharged from construction sites. The regulation also requires construction sites to implement a range of erosion and sediment control **BMPs**. Sites that disturb more than 20 acres of land at one time must also comply with a turbidity limitation (effective August 2011). The turbidity limitation will be extended to construction sites that disturb more than 10 acres, after February 2, 2014.

#### Associated Activities

- Bulk fuel and oil storage/handling
- Chemical storage/handling
- Demolition/construction/development
- Painting





### Helpful Hint

Incorporate temporary and permanent soil stabilization techniques during construction to help reduce pollutant runoff from the airport.

For more information, refer to Construction SW-1 Practice in Appendix A-19.

Elements of the NPDES construction permit program typically include requirements for implementation of water quality control measures, such as:

- Sediment and erosion controls
- BMPs
- Inspections
- Employee training
- A **SWPPP for Construction Activities**

Construction storm water permits are generally issued for the period of construction. Applications for a construction storm water permit may include submittal of a NOI prior to the beginning of construction to the authorizing agency.

#### *Small Airport Applicability*

Depending on the acreage of a construction project, small airports may be required to obtain coverage under the NPDES construction storm water program. Prior to commencement of construction activities, such as clearing, grading and excavation, airports must obtain a permit and meet the conditions specified in the permit (e.g., SWPPP preparation, training, etc.). Construction must also be carried out in accordance with FAA AC 150/5370-10, “Standards for Specifying Construction of Airports,” which includes construction BMPs and minimization measures. Also, airports should coordinate with the U.S. Department of Agriculture (USDA) and the permit issuing authority to ensure that permit BMP requirements do not conflict with FAA AC 150/5200-33B, “Hazardous Wildlife Attractants on or Near Airports.”

#### *Compliance Attainment Strategies*

- Obtain a construction NPDES permit prior to construction activities.
- Develop a SWPPP for construction activities that addresses specific permit requirements and identifies storm water BMPs that will meet the ELG.
- Ensure BMPs are implemented during construction to help prevent water quality impacts.
- Conduct applicable inspections and training and prepare required plans as required by permit conditions.

#### *Key Terms*

- **Construction Activity**—An activity involving the alteration, replacement, or addition to existing processes or production equipment; placement, assembly, or installation of facilities or equipment; or significant site preparation work including clearing, excavation or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment.
- **Storm Water Pollution Prevention Plan (SWPPP) for Construction Activities**—A site-specific plan to prevent or minimize impacts to storm water quality from construction sites/activities. Plans typically include storm water control measures, erosion and sediment control measures, maintenance



and inspection procedures, identification of non-storm water discharges, and employee training.

#### *Additional Resources*

- 40 CFR 122-124
- Storm Water Discharges from Construction Activities  
<http://cfpub.epa.gov/npdes/stormwater/const.cfm>
- EPA Construction General Permit  
<http://cfpub.epa.gov/npdes/stormwater/cgp.cfm>
- FAA AC 150/5200-33B, “Hazardous Wildlife Attractants on or Near Airports”  
[http://www.faa.gov/documentLibrary/media/advisory\\_circular/150-5200-33B/150\\_5200\\_33b.pdf](http://www.faa.gov/documentLibrary/media/advisory_circular/150-5200-33B/150_5200_33b.pdf)
- FAA AC 150/5370-10, “Standards for Specifying Construction of Airports”  
[http://www.faa.gov/airports/engineering/construction\\_standards/](http://www.faa.gov/airports/engineering/construction_standards/)
- Florida Department of Transportation Best Management Practices Manual, Technical Report and Application Assessment.  
<http://www.dot.state.fl.us/Aviation/stormwater.shtm>

## 8.4 Storm Water Discharges Associated with Municipal Separate Storm Sewer Systems

### **Clean Water Act, as Amended**

Municipalities may be required to obtain coverage for storm water discharges under the CWA’s **NPDES** permit program. Regulation under the program is required for Municipal Separate Storm Sewer Systems (MS4s), which include storm water conveyance systems that are:

- Owned by a state, city, town, village, or other public entity that discharges to **waters of the U.S.**
- Designed or used to collect or convey storm water (including storm drains, pipes, ditches, etc.)
- Not a combined sewer
- Not part of a **POTW**

MS4s are designated as small, medium, or large based on the density and size of the population being served by the system. In 1990, **medium and large MS4s** were required to obtain permit coverage for their storm water discharges. In 1999, coverage under the MS4 program extended to **small MS4s**. MS4s are responsible for reducing discharges of pollutants from the MS4 to the maximum extent practicable through implementation of a **storm water management program**. The storm water management program must incorporate the following minimum control measures:

- Public Education
- Public Involvement
- **Illicit discharge** Detection and Elimination

### Associated Activities

- Aircraft deicing/anti-icing
- Aircraft operation
- Aircraft lavatory service
- Building operation/maintenance
- Bulk fuel and oil storage/handling
- Cargo handling
- Chemical storage/handling
- Degreasing
- Demolition/construction/development
- Fire fighting training/testing/flushing
- Ground service equipment operation
- Grounds maintenance/landscaping
- Motor vehicle operation
- On-airport power generation
- Painting
- Pavement deicing
- Refueling
- Runway rubber removal
- Spill response
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal

- Construction Storm Water Management
- Post-construction Storm Water Management
- Pollution Prevention/Good Housekeeping

Training is an important component of a storm water management program to ensure responsible parties are aware of requirements and program elements. Typically, there is a timeframe of five years from the time an MS4 permit is issued and the requirement for full implementation of the storm water management program. An MS4 may impose conditions or practices to minimize pollutants entering the MS4 system.

#### *Small Airport Applicability*

Areas at airports not covered under an industrial storm water NPDES permit, may be covered under an MS4 permit. Examples of these areas include parking lots, publically accessible areas (e.g., stores, restaurants, or gas stations), or roadways. Since MS4s may impose conditions or practices to minimize pollutants entering the MS4 system, airport areas may be affected and require implementation of measures to ensure the conditions of the MS4 program are met.

#### *Compliance Attainment Strategies*

- Identify if areas at the airport are covered under an MS4 permit.
- Implement pollution prevention/good housekeeping practices.

#### *Key Terms*

- **Illicit Discharge**—A discharge to a storm sewer that is not composed entirely of storm water except discharges pursuant to an NPDES permit and discharges resulting from fire fighting activities.
- **Medium and Large Municipal Separate Storm Sewer Systems (MS4)**—Municipal Separate Storm Sewer Systems that generally serve populations of 100,000 people or greater.
- **Small Municipal Separate Storm Sewer Systems (MS4)**—Municipal Separate Storm Sewer Systems that generally serve populations of less than 10,000 people.
- **Storm Water Management Program**—A program developed by an MS4 to comply with the requirements of their NPDES permit. Programs include government coordination, comprehensive planning, funding and staffing, public education and participation, and BMP selection.

#### *Additional Resources*

- 40 CFR 122-124
- Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s)  
<http://cfpub.epa.gov/npdes/stormwater/munic.cfm>

## 8.5 Industrial Wastewater Pretreatment

### Clean Water Act, as Amended

**POTWs** collect and treat wastewater from homes, commercial buildings, and industrial facilities and directly discharge treated effluent into nearby rivers or streams. Pollutants that are directly discharged into **waters of the U.S.** from indirect sources, such as wastewater or process water discharges from industrial (non-domestic) users, are regulated through the National Pretreatment Program.

The CWA established the General Pretreatment Regulations that require POTWs to issue pretreatment permits to industrial wastewater dischargers to control pollutants that may enter the treatment works. Typical discharges, such as sanitary wastes, are excluded from the industrial discharges. The pretreatment permitting is necessary to protect the operation of the treatment works and ensure the system is capable of meeting its own discharge permit limits.

Most municipalities issue local ordinances that identify the requirements for obtaining a pretreatment permit. Permit conditions are generally based on EPA or state regulations and usually require periodic monitoring and laboratory analysis of the industrial wastewater discharges. The data must be reported, and a certification of compliance with the permit requirements or an explanation of non-compliance is required.

In addition to specific pretreatment permit conditions, general permit conditions require that pollutants are not discharged into the system that can cause **pass through** or **interference** with the POTW. Prohibitions exist for pollutants that can create a fire, cause corrosive structural damage, obstruct flow, or any petroleum oil in amounts that will cause interference or pass through. Municipalities may also require industrial wastewater dischargers to develop and maintain a **slug control plan**. A slug control plan requires the permittee to evaluate the potential for discharging wastewater from accidental releases or other upset conditions in their pretreatment system at the site.

#### *Small Airport Applicability*

Airport discharges into a POTW may be regulated as an industrial wastewater discharge that requires a pretreatment permit. Examples of discharges from airports that may be conveyed to the POTW include those from aircraft deicing, refueling, floor drains near maintenance areas, oil/water separators, or wash bays. Because municipalities primarily authorize pretreatment permits, the discharge parameters and conditions vary. However most permits incorporate the periodic monitoring and data reporting requirements.

#### *Compliance Attainment Strategies*

- Identify if an industrial wastewater pretreatment permit is needed for the airport and understand the permit requirements.
- If a slug control plan is required as a result of refueling operations, request that the Pretreatment Program authority consider accepting an SPCC plan as an alternative, if available.

#### Associated Activities

- Aircraft deicing/anti-icing
- Aircraft lavatory service
- Bulk fuel and oil storage/handling
- Chemical storage/handling
- Degreasing
- Pavement deicing
- Spill response
- Vehicle/equipment/aircraft maintenance
- Washing



#### Helpful Hint

Recycle collected spent deicer fluid for reuse. Discharge any remaining fluid to the POTW.

For more information, refer to Deicer-8 Practice in Appendix A-17.

- Report pollutants that if accidentally discharged into the system could cause interference with the POTW.
- Ensure staff is aware of the types and amounts of pollutants that could cause an interference with the POTW.
- Confirm wash rack/stations and floor drains in maintenance facilities are connected to an oil/water separator prior to discharge to a POTW, and confirm the oil/water separator is maintained (i.e., grit trap emptied and sludge pumped out) and properly functioning.

#### *Key Terms*

- **Interference**—A discharge which, alone or in conjunction with a discharge or discharges from other sources, both: (1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and (2) is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the statutory provisions and regulations or permits issued there under.
- **Pass Through**—A discharge which exits the POTW into waters of the U.S. in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).
- **Slug Control Plan**—A written plan required by industrial wastewater pretreatment permits that describe the procedures and controls that a discharger will use to prevent an accidental discharge to a POTW.

#### *Additional Resources*

- 40 CFR 400-471
- Introduction to the National Pretreatment Program  
<http://www.epa.gov/npdes/pubs/final99.pdf>

## 8.6 Surface Waters and Wetlands

### Rivers and Harbors Act of 1899, as Amended

Section 10 of the Rivers and Harbors Act of 1899, as amended established a permit program for activities in **traditional navigable waters of the U.S.** Examples of these waters include rivers and streams discharging into larger rivers. The U.S. Army Corps of Engineers (USACE) is responsible for enforcing the provisions of Section 10. If work in traditional navigable waters of the U.S. or **structures** affect these waters, a Section 10 permit must be issued by the USACE before activities commence. Section 10 also prohibits building any obstacle (i.e., jetty, breakwater, wharf pier, boom, bulkhead, etc.) that adversely affects navigation in navigable waters.

Section 10 permits are regulated under 33 CFR 322. Issuance of a Section 10 permit may be as a general or individual permit. General Section 10 permits

#### Associated Activities

- Demolition/  
construction/  
development
- Grounds  
maintenance/  
landscaping
- Property acquisition

cover many similar types of activities in navigable waters, whereas individual Section 10 permits are project-specific or exceed general permit conditions.

### *Small Airport Applicability*

Small streams located on airport property may be considered a traditional navigable water of the U.S. Although it may not appear as if these waters are “navigable,” if they are tidal or otherwise designated as a navigable water by the USACE, they are covered under Section 10 of the Rivers and Harbors Act of 1899, as amended. Section 10 jurisdiction extends up to mean high water in tidal areas and the width of the waterway where designated as a navigable water. **Wetlands** and waterways above mean high tide and adjacent to tidal waters, including hydraulically connected streams and wetlands are also regulated by the USACE, but under Section 404 of the CWA, discussed in the following paragraph.

Before construction, development activities, or other activities that affect the physical properties of these areas commence, the airport must confirm if the waters are federally regulated. In cases where the waters are federally regulated, the airport may be required to obtain a Section 10 permit. The need for a permit is based on the type of activity and length of impact. Many activities may be eligible for authorization under a General Permit or Nationwide Permit without prior notification to the USACE. However, additional notifications may be required to the state Coastal Zone Management Program, State Historic Preservation Officer, Tribal Historic Preservation Officers, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Questions regarding Section 10 authorization of the project should be discussed with the USACE and state agencies to ensure unauthorized impacts do not occur.

### *Compliance Attainment Strategies*

- Identify if navigable waters are located on airport property.
- Allocate adequate funds and allow for enough time to obtain a Section 10 permit.
- Do not underestimate the time that is needed to obtain a Section 10 permit.
- Collect all information (i.e., historical, threatened or endangered species) needed for a Section 10 permit application.

### *Key Terms*

- **Structures**—Dams, dikes, bridges, and causeways or other obstacles (i.e., jetty, breakwater, wharf pier, boom, bulkhead, etc.).
- **Traditional Navigable Waters of the U.S.**—Defined by 33 CFR 329.4 as those waters that are subject to the ebb and flow of the tide and/or are used, have been used in the past, or may be susceptible to use to transport interstate or foreign commerce.
- **Wetlands**—Under the USACE jurisdiction, wetlands are defined as areas that surface or groundwater inundate or saturate at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, and similar areas.



### **Did You Know**

According to the U.S. EPA, one acre of wetlands can store 1 to 1.5 million gallons of floodwater.

- **Work in Navigable Waters of the U.S.**—Dredging or disposal of dredged material, excavation, filling, or other modification of a navigable water of the U.S.

*Additional Resources*

- Section 10, 33 U.S.C. 403  
<http://www.epa.gov/wetlands/regs/sect10.html>

### **Clean Water Act, as Amended**

A new permitting program under Section 404 of the CWA was established in 1972 under EPA's guidance for discharges of dredge or fill materials into **waters of the U.S.** As with Section 10 permitting, the USACE is responsible for administering Section 404 of the CWA, although the EPA has oversight authority.

The term "waters of the U.S." has caused much confusion and controversy since the beginning of the 404 permit program. For example, some waters may not technically be considered a water of the U.S., whereas others are. An important case was brought before the U.S. Supreme Court in *Rapanos v. U.S.*, which addressed the USACE jurisdiction over these waters. The Supreme Court issued a decision in the Rapanos case in 2006, determining that the USACE regulates:

- **Traditional navigable waters**
- **Wetlands adjacent to traditional navigable waters**
- **Non-navigable tributaries of traditional navigable waters that are relatively permanent**
- **Wetlands** that directly abut non-navigable tributaries

Before a Section 404 permit is obtained from the USACE, jurisdiction must be determined. The USACE decides if they have jurisdiction over wetlands and other waters based on a fact-specific analysis to determine if there is a significant "nexus," or connection, with traditional navigable water. A jurisdictional determination may be requested from the USACE to confirm whether wetlands are subject to jurisdiction under Section 404.

Section 404 permits are regulated under 33 CFR 320-330. Issuance of a Section 404 permit may be as a general (including Nationwide Permit) or individual permit. Section 404 general permits cover many similar types of activities in waters of the U.S., whereas individual Section 404 permits are project-specific or exceed general permit conditions.

Review of Section 404 permits is governed by *Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (404(b)(1) guidelines) which stipulate how impacts to wetlands and waters are to be evaluated. A key component of the 404(b)(1) guidelines is the alternatives analysis that is needed to demonstrate that the project avoids, minimizes, and mitigates wetland impacts (in that order).



#### **Helpful Hint**

Construct an engineered wetland that does not attract hazardous wildlife for temporary storm water storage or deicer treatment.



### *Small Airport Applicability*

Property owned by a small airport may contain wetlands that are under the jurisdiction of the USACE. Before construction, development activities, or other activities that affect the physical properties of these areas commence, the airport must confirm if the wetlands are federally regulated. In cases where wetlands are federally regulated (i.e., hydraulically connected to a navigable water), the airport may be required to obtain a Section 404 permit. The need for a permit is based on wetland acreage impacts. Impacts that are below regulatory thresholds may not need a permit. However, it is important that these assessments are discussed with the USACE and state resource agencies to ensure unauthorized impacts do not occur.

### *Compliance Attainment Strategies*

- Identify if jurisdictional waters or wetlands are located on airport property.
- Allocate adequate funds and allow for enough time to obtain a Section 404 permit. In addition to preparing the permit application, it is also important that the airport plans for adequate funds to implement the mitigation measures that are required by the permit.
- Collect all information (i.e., historical, tribal, threatened or endangered species) needed for a Section 404 permit application.

### *Key Terms*

- **Non-navigable Tributaries of Traditional Navigable Waters that are Relatively Permanent**—Those bodies of waters that flow into a traditional navigable water either directly or indirectly by means of other tributaries. Relatively permanent bodies are those which typically flow year-round or waters that have a continuous flow at least seasonally (e.g., typically three months) (126 S. Ct. at 2221 n. 5).
- **Wetlands Adjacent to Traditional Navigable Waters**—Those wetlands which are bordering, contiguous, or neighboring traditional navigable waters. Adjacent wetlands include those separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, and beach dunes (see 33 CFR Section 328.3(c)).

### *Additional Resources*

- 33 CFR 320 – 330
- *Rapanos v. U.S.*
- *Carbell v. USACE*
- General Wetland Information  
<http://www.epa.gov/wetlands/>
- Wetland Regulatory Authority  
[http://www.epa.gov/owow/wetlands/pdf/reg\\_authority\\_pr.pdf](http://www.epa.gov/owow/wetlands/pdf/reg_authority_pr.pdf)
- Section 404 (B)(1) Guidelines  
<http://www.epa.gov/wetlands/pdf/40cfrPart230.pdf>

## Executive Order 11990, Protection of Wetlands

Executive Order 11990, *Protection of Wetlands*, directs federal agencies to “avoid to the extent possible the long-term and short-term adverse impacts associated with the destruction or modification of **wetlands** and to avoid direct or indirect support of **new construction** in wetlands wherever there is a practicable alternative.” This statement generally suggests avoiding or minimizing impacts to wetlands to the greatest extent possible. In determining the feasibility for wetland protection, a federal agency should consider the following factors:

- Public health, safety, and welfare including water supply, quality, recharge, and discharge; pollution and storm hazards; and sedimentation and erosion
- Maintenance of natural systems including conservation and long term productivity of existing flora and fauna; species and habitat diversity and stability; hydrologic utility; fish and wildlife; timber; and food and fiber resources
- Other uses of wetlands in the public interest including recreational, scientific, and cultural uses



### Related Information

See Chapter 6 for additional information pertaining to NEPA.

This Executive Order also requires that federal agencies provide the opportunity for public review of plans or proposals that have the potential to impact wetlands. These specific requirements could also be met under the National Environmental Policy Act (NEPA), if the project in question is under such an environmental review.

This Order notes that the provisions of this act are not applicable to emergency activities essential to saving lives and protecting property, health and safety.

### *Small Airport Applicability*

Federal agencies, such as FAA, may be involved in approving projects where wetlands are present or may be impacted. Additionally, because Section 404 and Section 10 permits are approved by the USACE, Executive Order 11990 applies. To meet the requirements, agencies must evaluate the project and options to avoid or minimize impacts. Typically airport planners are involved with reviewing and developing project alternatives. Airport planners should review the project goals and determine if the project can be relocated elsewhere to avoid physical impacts to surface waters or wetlands. If the project cannot be relocated, the airport must identify alternatives to minimize impacts. These alternatives should be reviewed with authorizing agencies to determine if they are adequate for addressing the avoidance criteria.

### *Compliance Attainment Strategies*

- Identify if wetlands are located on airport property.
- Prepare project alternatives that are sufficient to demonstrate avoidance of wetlands.

*Key Terms*

- **New Construction**—Draining, dredging, channelizing, filling, diking, impounding, and related activities, including construction of any structures or facilities begun or authorized after the effective date of Executive Order 11990 Protection of Wetlands.

*Additional Resources*

- 42 FR 26961, 1977
- Protection of Wetlands  
<http://www.epa.gov/owow/wetlands/regs/eo11990.html>

**U.S. Department of Transportation Order 5660.1A Preservation of the Nation's Wetlands (1978)**

U.S.DOT developed and issued U.S.DOT Order 5660.1A, *Preservation of the Nation's Wetlands*, to provide additional guidance to DOT agencies on how to carry out Executive Order 11990, *Protection of Wetlands* (see above). In accordance with E.O. 11990, this Order stipulates that **new construction** in **wetlands** shall be avoided unless there is no practicable alternative to the construction and the proposed action includes all practicable measures to minimize harm to wetlands which may result from such construction.

*Small Airport Applicability*

This Order states that for any project which will have a significant impact on wetlands, an Environmental Impact Statement (EIS) must be prepared. As always, the airport sponsor should contact their FAA environmental specialist to assist in determining whether their project entails significant impacts to wetlands and whether an EIS is required. If FAA determines that an EIS is required, to meet the requirements of 40 CFR 1506.5(c), FAA (as the lead agency) remains responsible for selecting an EIS contractor, leading scoping, providing guidance, participating in EIS preparation, and completing the NEPA process. Alternatives that would avoid new construction in wetlands must be explored, while giving consideration to environmental and economic factors. The Order states that upon completion of the environmental analysis, the federal agency preparing the EIS must make a finding that (1) there is no practicable alternative to construction in the wetland, and (2) that all practicable measures to minimize harm have been included. The proposed finding should ordinarily be included in the final EIS or negative declaration for the proposal.

State and local agencies may have other regulatory requirements. Consideration should be given to all requirements when wetlands may be impacted.

*Compliance Attainment Strategies*

- When a project may have impacts on wetlands, ensure early coordination with applicable agencies.
- The airport should explore alternatives with fewer impacts to wetlands.

- The airport should ensure that all mitigation strategies are implemented and if applicable, maintained.

*Key Terms*

- See Definitions of Key Terms under Executive Order 11990, Protection of Wetlands (1977)

*Additional Resources*

- Preservation of the Nation's Wetlands  
<http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/docs/6749292D98E3C0CD85256FE400731ADF?opendocument&CurrentCategory=Natural%20Environment>
- FAA Guidance, "Airport Drainage Ditches and Section 404 Requirements"  
[http://www.faa.gov/airports/environmental/policy\\_guidance/media/section404.pdf](http://www.faa.gov/airports/environmental/policy_guidance/media/section404.pdf)
- FAA Guidance, "A Wetland Banking Mitigation Strategy for FAA"  
[http://www.faa.gov/airports/environmental/policy\\_guidance/media/wetland\\_banking.pdf](http://www.faa.gov/airports/environmental/policy_guidance/media/wetland_banking.pdf)
- FAA AC 150/5200-33B, "Hazardous Wildlife Attractants on or Near Airports."  
[http://www.faa.gov/documentLibrary/media/advisory\\_circular/150-5200-33B/150\\_5200\\_33b.pdf](http://www.faa.gov/documentLibrary/media/advisory_circular/150-5200-33B/150_5200_33b.pdf)
- FAA Guidance, Airport Drainage Ditches and Section 404 Requirements, October, 1997:  
[http://www.faa.gov/airports/environmental/policy\\_guidance/media/section404.pdf](http://www.faa.gov/airports/environmental/policy_guidance/media/section404.pdf)
- FAA Guidance, A Wetland Mitigation Strategy for FAA, July 1996:  
[http://www.faa.gov/airports/environmental/policy\\_guidance/media/wetland\\_banking.pdf](http://www.faa.gov/airports/environmental/policy_guidance/media/wetland_banking.pdf)
- FAA AC 150/5200-33, Hazardous Wildlife Attractants on or Near Airports:  
[http://rgl.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/53bdf1c5aa1083986256c690074ebab/\\$FILE/150-5200-33.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/53bdf1c5aa1083986256c690074ebab/$FILE/150-5200-33.pdf)

## Other Opportunities for Proactive Environmental Stewardship

There are a number of opportunities for small airports to reduce their environmental impact through practices that are not intended to directly meet regulatory requirements. As noted by the Sustainable Aviation Guidance Alliance (SAGA) (1), such “proactive environmental stewardship” practices can offer a number of environmental, social, and financial benefits, including:

- Reduced life cycle costs of capital assets
- Reduced operating costs
- Reduced environmental footprint
- Optimization for new and better technologies
- Reduced costs of asset development
- Enhanced bond ratings
- Reduced environmental, health, and safety risks
- Improved work environment for employees leading to higher productivity
- Better customer service and satisfaction
- Enhanced relationships with the surrounding community

It is important for small airports to recognize that proactive environmental stewardship activities do not always cost more or require increased staff resources. In many cases, the benefits listed above offset the initial investment for these practices. In other cases, practices can be implemented at no or little incremental cost and/or effort. For example, an airport could convert runway lighting to Low Emitting Diode (LED) lights at relatively low cost. By incorporating this environmental stewardship initiative into a larger funded project, like rehabilitation of a runway, the lighting may result in no additional capital cost to the airport.

The topics presented in Chapter 9 include:

- Sustainability Planning
- Other Environmental Stewardship Practices
- Environmental Stewardship Practice Financing

### 9.1 Sustainability Planning

Airport sustainability is defined by Airports Council International-North America as “a holistic approach to managing an airport so as to ensure the integrity of the Economic viability, Operational efficiency, Natural resource conservation and Social responsibility (EONS) of the airport” (2).

Planning for sustainability represents a holistic approach to integrating social and environmental factors into traditional airport decisions, which typically consider airport operations and safety as well as financial factors. With the understanding that the health of our environment and communities is valuable,

### Associated Activities

- Aircraft operation
- Auxiliary power unit operation
- Cargo handling
- Chemical storage/handling
- Demolition/construction/development
- Ground service equipment operation
- Grounds maintenance/landscaping
- Motor vehicle operation
- On-airport power generation
- Property acquisition
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal

integrating environment and community considerations into decision making often results in substantial cost savings.

Developing a sustainability plan, whether formal or informal, a contained effort or phased process is an effective way to incorporate proactive environmental stewardship into all aspects of airport operations, capital improvements, and into the cultural fabric of the airport management and operations organization. Accordingly, sustainability planning should seek to incorporate stakeholders across all departments and levels within the airport organization as well as reaching out to tenants, the public, and sustainability experts within the municipality or county.

A general framework for sustainability planning is presented here. It is important to note that an airport's planning approach can be catered to the needs, resources, and environmental and social contexts of the airport.

- **Develop a Sustainability Vision or Policy**—Developing a sustainability vision or policy is an integral element of sustainability planning, as it sets forth a universal direction for the airport and establishes the groundwork for airport-wide adoption of the principles of sustainability. It is important that the airport's sustainability policy concur with the airport's mission, such that the airport's direction is unified.
- **Conduct a Baseline Assessment/Gap Analysis**—A sustainability baseline assessment determines the airport's impacts, within parameters that are consistent with an airport's resources and vision, and should identify potential opportunities for improvement. The baseline assessment also provides an opportunity to inventory any sustainability initiatives already in practice. The baseline can also inform any further refinement of the scope of the project, based on the findings of the assessment. Lastly, the baseline assessment calculates current airport performance as well as performance trends through time. Airport performance can then inform the goals and objectives as well as the performance targets developed in the plan. The baseline assessment is sometimes referred to as the "gap analysis" within an Environmental Management Systems (EMS).
- **Establish Goals and Objectives**—The findings of the baseline assessment can inform the development of sustainability goals and objectives. The goals and objectives are intended to meet the airport's sustainability vision and can be developed as a collaborative process, involving all airport decision makers and staff as well as the local community and other airport stakeholders. It can be helpful to establish goals within selected environmental categories, such as those defined in this Guidebook.
- **Set Performance Targets**—Based on the airport's current performance identified in the baseline assessment, the airport could set performance targets and metrics to help meet its established goals and objectives. Performance targets can be determined in conjunction with identification of sustainability practices in order to ensure the targets are achievable with practices that can reasonably be implemented. Some commonly used performance metrics include potable water use per building area (gal/s.f.) or per passenger (gal/passenger); electricity consumption per building area (kWh/s.f.) or per passenger (kWh/passenger); and, rate of recycling waste (as a percentage of total waste generated).



- **Identify Sustainability Practices**—Identify sustainability practices that are reasonable and practical based on the airport’s resources. This can include a process for screening practices to determine the most beneficial initiatives for the airport. The screening process would involve assessing each practice that the airport identified as having potential to meet the previously established sustainability goals of the airport. As part of this screening, the airport would identify criteria to evaluate and rank each practice. Criteria can include the priorities of the airport, benefits and costs of each practice, how resource intensive each practice is to implement and maintain, or whether the practice has potential cost savings or a **return on investment**.

SAGA has developed a database of sustainability practices, which airports can use to identify strategies that may help meet its sustainability goals. The database categorizes the practices by airport activity area and also lists associated benefits, which airports could apply to the screening of potential practices.

- **Implement Practices**—Implementation of the practices the airport has identified to meet its sustainability goals involves identifying priority projects, funding them, and developing schedules and individual responsibilities.
- **Regularly Measure, Report, and Reevaluate**—Using sustainability metrics, the airport can measure the progress and performance of its sustainability program. Obtaining this monitoring data plays two important functions: the first is to facilitate reporting to the public and other stakeholders; the other is to provide the necessary information for the airport to evaluate their progress, reevaluate its goals, and take steps to improve its sustainability activities.

This planning framework can be applied as an ongoing, cyclical process, whereby each step is continually revisited and adapted to the airport’s current conditions. In addition, sustainability practices can be implemented on an ongoing basis.

#### *Small Airport Applicability*

Although there is a perception among small airports that sustainability planning is costly to administer and implement, applying an EONS approach to airport planning can help ensure the long term viability and success of the airport. In addition, because it represents an “approach” or a “new way of thinking,” sustainability planning provides the opportunity to scale initiatives to the specific conditions and resources of the airport.

Several small airports have already developed sustainability plans that can serve as guidance for developing a sustainability program. These include, but are not limited to, the following:

- South Bend Regional Airport (IN)
- Aspen/Pitkin County Airport (CO)
- Colorado Springs Airport (CO)
- Stewart International Airport (NY)



#### **Helpful Hint**

The City of Albuquerque Aviation Department instituted a small airport sustainability program at Double Eagle II Airport.

For more information, refer to the Case Study in Appendix B-3.

In addition, some large airports such as San Francisco International Airport, Los Angeles World Airports, and Boston-Logan International Airport have developed comprehensive sustainability plans to guide their development. Although these plans were intended for airports with more resources and financial capacity, there are elements from these plans, both in the strategies described and approach set forth, that small airports can utilize to inform their sustainability activities.

### *Compliance Attainment Strategies*

The recommendations that relate to environmental stewardship are voluntary for airports and there are no mandatory compliance concerns from an airport operator's standpoint. There may be local or state laws and regulations that mandate certain aspects of sustainability planning. Common strategies to implement sustainability planning include:

- Implementation of sustainability initiatives
- Sustainable Master Plans
- Stand-alone Sustainability Management Plans
- Facility design and construction guidelines
- Integration of sustainability into Capital Improvement Plans

### *Key Terms*

- **EONS**—The definition for airport sustainability developed by Airports Council International-North America: "...a holistic approach to managing an airport so as to ensure the integrity of the Economic viability, Operational efficiency, Natural resource conservation and Social responsibility (EONS) of the airport."
- **Return on Investment**—The calculation used to determine the length of time required to recoup an investment.

### *Additional Resources*

- SAGA Guidebook and Database  
[www.airportsustainability.org](http://www.airportsustainability.org)
- *ACRP Report 20: Strategic Planning in the Airport Industry*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rpt\\_020.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_020.pdf)
- *ACRP Synthesis 10: Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)
- ACRP Project 08-01, "Sustainable Airport Construction Practices (*in development*)"  
<http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2582>
- ACRP Project 02-22: Incorporating Sustainability into Traditional Airport Projects (*in development*)  
<http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2793>
- Global Reporting Initiative  
[www.globalreporting.org](http://www.globalreporting.org)
- Joint Service Pollution Prevention and Sustainability Library  
<http://205.153.241.230/>

## 9.2 Other Environmental Stewardship Practices

Proactive environmental stewardship practices, which reduce airport environmental impacts without seeking to meet any specific regulatory requirements, can take on a number of forms. Whether undertaken as part of a sustainability program or as independent initiatives, airports can improve their environmental stewardship performance by considering practices in the following activity or resource areas:

- Administration and Policies
- Alternative Transportation
- Biodiversity
- Climate Change
- Energy Efficiency
- Renewable Energy
- Environmentally Preferable Purchasing
- Performance Tracking
- Public Relations

A list of environmental stewardship practices applicable to small airports in each of these resource areas is listed in Appendix A.

### Administration and Policies

Initiatives directed at administrative or policy changes can have far-reaching effects on an airport by permeating through the organization's activities. Examples of administrative and policy changes range from establishing a sustainability committee to encouraging staff to pursue Leadership in Energy and Environmental Design™ (LEED) accreditation, to specifying purchase of environmentally preferable or “green” products. These types of practices act to gradually build an environmental stewardship culture at the airport and can have small impacts that incrementally build over time. Lastly, airport administration and policy-related practices can often be implemented at no or little expense to the airport, and therefore should be seriously considered by small airports. Administrative and policy-related environmental stewardship practices applicable to small airports are listed and described in Appendix A-24.

### Alternative Transportation

Although some transportation-related impacts are regulated, proactive environmental stewardship practices that address alternative transportation can enhance airport economic activities, address community needs, and reduce ground transportation-related environmental impacts. Alternative transportation-related stewardship practices primarily seek to increase public transportation ridership, use of alternate modes of transportation, such as bicycles, and use of alternatively fueled vehicles. Examples of practices include providing safe bicycle lanes and storage areas or offering public transit incentives to employees. A more comprehensive list of environmental stewardship practices applicable to

### Associated Activities

- Aircraft operation
- Auxiliary power unit operation
- Cargo handling
- Chemical storage/handling
- Demolition/construction/development
- Ground service equipment operation
- Grounds maintenance/landscaping
- Motor vehicle operation
- On-airport power generation
- Property acquisition
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal



### Helpful Hint

Potential organizations with which an airport could partner include larger national nonprofits such as the Sierra Club, the National Wildlife Foundation, or the Nature Conservancy, or the airport could choose to join efforts with local organizations that tend to focus their efforts on local environmental needs.

For more information, refer to Wildlife-11 and Wildlife-12 Practices in Appendix A-13.

small airports and that address alternative transportation are listed and described in Appendix A-24. Implementing alternative transportation initiatives can benefit the community by enhancing connectivity to the airport and reducing the cost of getting to and from the airport. Practices that increase the efficiency of transportation systems and offer alternatives to vehicular modes of transportation further benefit the environment and community by reducing energy demands, air pollutants, and emission of **greenhouse gases (GHG)**.

### Biodiversity

Supporting the diversity of biological systems is integral to maintaining ecosystems and the services they provide. Biodiversity refers to the variation of living organisms within a given ecosystem. This variation is essential to maintaining healthy ecosystems. Maintaining healthy ecosystems, in turn, supports human society: the United Nations Environment Programme estimates that 40% of today's global economy is based on biological products and processes. Many other aspects of human well-being also depend on the services ecosystems provide, such as enhanced air quality, carbon sequestration and local climate regulation, water purification, and erosion prevention. To contribute to maintaining these ecosystem services, airports can seek to promote biodiversity on airport-controlled property and to minimize impacts to local and regional biodiversity that may result from airport activities. There are a number of ways to enhance biodiversity at small airports. Some examples include planting non-wildlife attracting native vegetation or joining in partnerships with local environmental organizations. Proactive environmental stewardship practices relating biodiversity seek to maintain local habitats and diversity of species while considering aviation safety.

### Climate Change

The National Oceanic and Atmospheric Administration (NOAA) Under Secretary of Commerce for Oceans and Atmosphere, Jane Lubchenco, Ph.D, stated, "Climate change is real. It is here, and it is happening now, in our backyards and around the globe" (4). NOAA studies show that GHG may be a contributing factor to climate change. Although small airports may not face immediate or direct regulatory requirements to make changes to operations to reduce GHG emissions, with increased public understanding and awareness of climate change, there may be political and community pressures for airports to address climate change. Small airports should consider ways to reduce energy use or utilize alternative energy sources to reduce GHG emissions. Conducting an energy audit is a good way to determine how and where energy is used at the airport. Implementing a system to turn runway and other facility lights off when not in use, developing no-idling procedures for buses and ground utility vehicles, or purchasing energy star appliances and computers are practices to reduce GHG emissions. Consider including alternative energy sources when planning new buildings, like solar panels to reduce reliance on energy forms that result in GHG emissions. Airports may also be indirectly affected by climate change regulations affecting other industries. As diesel engine standards change, the vehicles the airport purchases in the future may have different engines and require different types of maintenance from engines in service today.

Additionally, as weather patterns are predicted to change, small airports should consider climate change in their planning. Airports should identify potential changes in weather patterns in their region and build to accommodate them. For example, airports in areas that may be affected by hurricanes may consider constructing new facilities to withstand higher winds and flooding than what is currently required and consider oversized storm water infrastructure to accommodate increased flood risks. Airports in areas where increased droughts may be predicted should consider incorporating water conservation practices to accommodate potable water shortages.

Airports should consider disruptions from climate change to reduce the costs and disturbance of climate events. NOAA has established an office, the NOAA Climate Service, devoted to providing information about climate change and strategies to adapting to changing climate. Airports could use this information, available on the NOAA Climate Service website, to inform decision making.

## Energy Efficiency

Practices that enhance energy efficiency represent some of the most promising proactive environmental stewardship practices as they often offer opportunities for cost savings, due to the increasingly high and fluctuating costs of energy. Energy efficiency practices result in other benefits, such as enhanced air quality and reduced GHG emissions, among others. Examples of energy efficiency practices include installing escalator sleep-mode settings, purchasing Energy Star appliances and computers, tracking energy use, or upgrading indoor lighting to more efficient lighting. Energy efficiency practices seek to optimize airport building systems by replacing less efficient building components and ensuring mechanical systems are in optimal working condition. In addition, energy efficiency practices can address airfield energy uses such as runway and taxiway lighting.

## Renewable Energy

Renewable energy is generally defined as energy generated from natural resources (e.g., sunlight, wind, geothermal heat). Renewable energy technology has increasingly developed in the past 20 years, and many airports in the United States, including a number of small airports, have recently installed on-site renewable energy systems (see Appendix B-5). Although the capital cost of installing renewable energy systems can often be prohibitive, renewable energy generation can be a worthwhile long-term investment. Airports can achieve long-term energy savings associated with increased energy costs, and airports can also achieve potential returns from selling surplus energy back into the grid. To address the sometimes high capital costs of installing such systems, small airports should investigate innovative financing strategies (see Section 9.3).



### Helpful Hint

Tracking ongoing electricity use can be used to justify implementation of energy efficiency measures or to calculate the viability of investment in renewable energy systems.

For more information, refer to Energy-20 through 23 Practices in Appendix A-23.





**Helpful Hint**

Fresno Yosemite International Airport’s solar installation will supply 40% of the airport’s energy. This is estimated to save the airport \$13 million over 20 years.

For more information, refer to Energy-24 through 31 Practices in Appendix A-23.

Some examples of renewable energy installations at small airports include the following:

- 2-Megawatt (MW) **photovoltaic (PV) module** installation at Fresno Yosemite International Airport (CA)
- An on-airport wind turbine as well as a 25 kilowatt (kW) PV solar system and a solar hot water thermal system at the Burlington International Airport (VT). The PV system includes 120 solar panels (210 watts each).
- Solar panels integrated into the roof of the passenger terminal at Tallahassee Regional Airport (FL)

**Environmentally Preferable Purchasing**

**Environmentally Preferable Purchasing (EPP)** refers to purchases of products with “green” components, from recycled content, to use of renewable material, to local sourcing. In addition to reducing the environmental impacts of an airport’s purchases and materials it uses in its operations, EPP has numerous benefits for the airport, as well as the community at large, including: improved worker safety and health, reduced liabilities, reduced waste generation and disposal costs, and increased availability of environmentally preferable products in the marketplace.

**Performance Tracking**

Optimizing the performance of an organization requires tracking and monitoring. Whether implementing a comprehensive monitoring system, such as one contained within a formal EMS, or targeting specific environmental categories to track (e.g., energy consumption, water quality levels), tracking performance can have many benefits including the following:

- **Improved environmental performance**—By tracking performance, airport managers are able to proactively address issues that arise prior to them escalating into a more costly or environmentally damaging situation.
- **Increased efficiency and reduced costs**—Monitoring environmental performance enables airport operators to identify opportunities to optimize the efficiency of its operations, minimizing operational costs. Monitoring can show where upgrades and other environmental improvements best fit into an overall business strategy, helping to inform decision-making.
- **Public image**—Having monitoring data readily available also facilitates environmental reporting. Enhancing transparency of environmental performance with the public can significantly boost an airport’s public image and enhance its relationship with the public.

Although there is a perception that monitoring performance is a costly initiative, small airports undertaking monitoring programs that were interviewed as part of the development of this Guidebook all reported significant cost savings, either from optimized energy use or from fewer regulatory infringements. Descriptions of specific strategies for monitoring and tracking airport environmental performance are included in Appendix A-23.



**Helpful Hint**

Public input and support was influential in facilitating the Northeast Florida Regional Airport’s innovative low impact hangar development project.

For more information, refer to the Northeast Florida Regional Airport at St. Augustine Case Study in Appendix B-1.



## Public Relations

Garnering community support is an important aspect of operating any airport. Small airports especially value and benefit from a close and positive relationship with its surrounding community. Public support can be a powerful force: if positive, it can facilitate future development at an airport by reducing public opposition; if negative, it can act as a significant obstacle to the operations, future development, and even the existence of the airport.

Communicating environmental stewardship practices to the public is one way to enhance public perception of the airport. Although there is variation across regions of the U.S., there is generally increased concern and attention from the public on environmental issues. Environmental stewardship practices that promote community support for the airport include reporting environmental performance, developing educational programs related to the environment, or taking steps to showcase the airport in a positive and transparent light.

### *Small Airport Applicability*

Each of the resource areas listed above, although not regulated, apply to small airport activities and development. The benefits of environmental stewardship practices will vary for small airports depending on the resource area being addressed. For example, energy efficiency improvements can result in financial savings, whereas public relations-related practices can serve to enhance the airport's relationship with the surrounding communities and public agencies.

### *Compliance Attainment Strategies*

The recommendations that relate to environmental stewardship are voluntary for airports and there are no mandatory compliance concerns from an airport operator's standpoint. There may be local or state laws and regulations that mandate certain aspects of environmental stewardship described in this section.

### *Key Terms*

- **Environmentally Preferable Purchasing (EPP)**—Products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. Products or services can relate to raw materials, manufacturing, packaging, distribution, use, reuse, operation, maintenance, and disposal.
- **Greenhouse Gases (GHG)**—Any gas emitted into the atmosphere that has the potential to trap heat. The most common GHG occurring at airports are carbon dioxide, methane, and nitrous oxide.
- **Photovoltaic (PV) Modules**—Arrays of cells that contain a material that converts solar radiation into direct current electricity.

*Additional Resources*

- Solar installation at Fresno Yosemite International Airport (CA)  
<http://www.fresno.gov/DiscoverFresno/Airports/PressReleases/2008/FresnoYosemiteInternationalAirportandWorldWaterSolarTechnologiesHostDedicationCeremonytoShowcasetheL.htm>
- Vermont Hosts First On-site Airport Installation of Wind Turbine  
<http://www.ecoseed.org/en/general-green-news/renewable-energy/wind-energy/small-wind/5760-Vermont-hosts-first-on-site-airport-installation-of-wind-turbine>
- Tallahassee Regional Airport (FL)  
<http://www.talgov.com/airport/>
- NOAA Climate Service  
<http://www.climate.gov/>
- EPA's Environmentally Preferred Purchasing website  
<http://www.epa.gov/epp/index.htm>
- Joint Service Pollution Prevention and Sustainability Library  
<http://205.153.241.230/>
- SAGA Guidebook and Database  
[www.airportsustainability.org](http://www.airportsustainability.org)
- ACRP Synthesis 10: Airport Sustainability Practices  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)
- ACRP Project 11-02: Model for Improving Energy Use in U.S. Airport Facilities  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)
- The Natural Resources Defense Council (NRDC) provides a list of links to a number of environmental groups  
<http://www.nrdc.org/reference/enviroGroups.asp>
- U.S. Global Change Research Program Global Climate Change Impacts in the U.S.  
<http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts>
- U.S. Global Change Research Program Adaptation Options  
<http://www.globalchange.gov/component/content/article/67-themes/153-our-changing-planet>
- Westchester County Airport and Northeast Florida Regional Airport at St. Augustine Case Studies (Appendix B)

## 9.3 Environmental Stewardship Practice

### Financing

Most small airports are limited by financial and staff resources. However, many environmental stewardship strategies can be implemented at low or little costs. Financing projects that are not tied to regulatory requirements often represent a substantial obstacle to environmental stewardship. A number of tools and techniques exist, however, to both justify and finance environmental stewardship projects. Note that many of these tools are used for stewardship practices that have a clear financial cost and benefit. Many environmental

stewardship projects, however, have benefits that are difficult to quantify in financial terms.

Some financial assessments and accounting strategies available to small airports include the following:

- Commit to utilizing **life cycle cost analysis (LCCA)**. It is estimated that about 25 percent of a traditional airport project's life cycle costs are associated with the upfront capital costs of the project, while the remaining 75 percent are associated with on-going operations and maintenance as documented by Dillinger (5). LCCA provide important information for an airport to understand long term paybacks relative to the useful life of existing and future infrastructure, an important input for airport decision making.
- Estimate the range of cost savings that each project measure or practice could generate.
- Establish if practices can achieve the desired **ROI**.
- Determine the financial mechanism that will support the project's cash flow requirements.

Some strategies available to small airports for financing environmental stewardship strategies include the following:

- Capture savings from practices for reinvestment in other environmental stewardship practices
- Bond programs
- **Energy Savings Performance Contracts** and Green Performance Contracts
- Government grants
- Public-private partnerships and grants
- Power purchase agreements

#### *Small Airport Applicability*

Financing opportunities is especially important to small airports, which often have limited available resources for capital improvements and costly investments. Unlike large airports with internal financial resources that can be used to improve environmental stewardship activities, small airports must rely on innovative financing and external sources of funding to justify environmental stewardship activities.

#### *Compliance Attainment Strategies*

The recommendations that relate to environmental stewardship are voluntary for airports, and there are no mandatory compliance concerns from an airport operator's standpoint. There may be local or state laws and regulations that mandate certain aspects of environmental stewardship described in this section.

#### *Key Terms*

- **Energy Savings Performance Contract**—A partnership between an organization and an energy service company in which the energy service

#### **Associated Activities**

- Aircraft operation
- Auxiliary power unit operation
- Cargo handling
- Chemical storage/handling
- Demolition/construction/development
- Ground service equipment operation
- Grounds maintenance/landscaping
- Motor vehicle operation
- On-airport power generation
- Property acquisition
- Vehicle/equipment/aircraft maintenance
- Washing
- Waste generation/disposal

company provides capital for an initial energy-related investment and is paid back through the returns obtained through energy savings.

- **Life Cycle Cost Analysis (LCCA)**—A decision-making tool that can provide important information for an airport to understand long term paybacks relative to the useful life of existing and future infrastructure.

#### *Additional Resources*

The following list provides a sample of resources available to identify funding sources for proactive environmental stewardship initiatives. This is not an exhaustive list of resources, as many funding sources are administered by state and local entities across the country.

- ACRP Synthesis 1: Innovative Finance and Alternative Sources of Revenue for Airports  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_001.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_001.pdf)
- ACRP Synthesis Project 11-03, Topic S02-05 Strategies and Financing Opportunities for Airport Environmental Programs. [Estimated completion date: 05/2011]
- Database of State Incentives for Renewables and Efficiency  
<http://www.dsireusa.org/index.cfm?EE=0&RE=1>
- The Office of Energy Efficiency and Renewable Energy  
<http://www1.eere.energy.gov/financing/>
- FAA's Voluntary Airport Low Emissions Program  
<http://www.faa.gov/airports/environmental/vale/>
- Department of Energy Clean Cities Program Assistance  
[http://www1.eere.energy.gov/cleancities/program\\_contacts.html#netl](http://www1.eere.energy.gov/cleancities/program_contacts.html#netl)



## APPENDIX A

# Proactive Environmental Stewardship Practices

## APPENDIX A






# Proactive Environmental Stewardship Practices

The proactive environmental stewardship practices identified in this Appendix are applicable to small airports and are grouped by the following common topics (with the practice identifiers listed in parenthesis).

- Mobile Air Emissions Source Practices (Mobile Air)
- Stationary Air Emissions Source Practices (Stationary Air)
- Construction Air Emissions Practices (Construction Air)
- Air Emissions Evaluation and Reporting Practices (Air Evaluation)
- Indoor Air Quality Practices (Indoor Air)
- Spill Prevention, Response and Notification Practices (Spill)
- Chemical/Hazardous Material Storage Practices (CHM)
- Pesticide Application, Certification, and Disposal Practices (Pesticides)
- Underground Storage Tank Practices (UST)
- Noise Practices (Noise)
- Planning Practices (Planning)
- Public Relations Practices (PR)
- Vegetation and Wildlife Management Practices (Wildlife)
- Property Transfer Practices (Property)
- Waste Minimization Practices (Waste)
- Hazardous/Universal Wastes, Polychlorinated Biphenyls and Used Oil Practices (Haz Waste)
- Deicer Runoff Management Practices (Deicer)
- Water Conservation Practices (Water Conservation)
- Construction Storm Water Discharge Practices (Construction SW)
- Industrial Storm Water Discharge Practices (Industrial SW)
- Storm Water Management Practices (SW Quantity)
- Storm Water Quality Protection Practices (SW Quality)
- Energy Efficiency and Renewable Energy Practices (Energy)
- Administration and Policy Practices (Admin and Policy)

Adjacent to each practice description is a graphical summary of implementation considerations indicating anticipated level of staff and costs, including:

- Staff effort,
- Staff knowledge,
- Suggested frequency of practice implementation/review,
- Relative capital cost,
- Relative operational cost, and
- Potential for long-term cost savings.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 



The following are descriptions of the symbols used in the practice implementation consideration summaries.

*Level of Staff Effort*



= 1 staff person with part-time environmental responsibilities



= 1 staff person with full-time environmental responsibilities

*Staff Knowledge*



= minimal environmental regulatory knowledge



= moderate environmental regulatory knowledge



= detailed environmental regulatory knowledge

*Suggested Frequency*

**Daily** = Completed on an approximate daily basis

**Weekly** = Completed approximately once per week

**Monthly** = Completed approximately once per month

**Annually** = Completed on an approximate annual basis

**Once** = One time installation

**As Needed** = Completed when needed

**Project Planning** = Completed as part of planning for development projects

**Seasonal** = Completed during specific seasons

**Deicing Season** = Completed during winter events or throughout the deicing season

*Costs*

**NC** = No Cost



= <\$10,000



= \$10,001 - \$100,000



= >\$100,000

*Cost Savings*



= No anticipated cost savings and/or payback



= Anticipated cost savings and/or payback

## APPENDIX A-1

## Mobile Air Emissions Source Practices

Practices discussed in this section aim to reduce air emissions from mobile sources commonly in operation at a small airport. Mobile sources of air emissions typically comprise aircraft, APU, GSE, and ground access vehicles.

Overall, the common theme between all of these practices involves limiting the amount and duration of mobile source engine usage or fueling the vehicles with more environmentally friendly fuels. These objectives can be accomplished in one of the following three ways: (1) defraying the total vehicle miles travelled or otherwise limiting the hours of engine operation, including idling; (2) reducing overall fuel usage, or using fuel more efficiently; and (3) encouraging the usage of low-emitting or alternatively fueled vehicles. The following mobile air emissions source practices will help reduce mobile air emissions at airport:

### Applicable Federal Regulatory Programs

- Clean Air Act Title I and III—General Conformity, Transportation Conformity and State Implementation Plans (Chapter 3)
- Clean Air Act Title II—Emissions Standards and Testing Procedures (Chapter 3)




- ✓ Schedule Deliveries Efficiently
- ✓ Encourage Airport Use of Environmentally Friendly Vehicles
- ✓ Implement Terminal Area Congestion Reduction and Anti-idling Measures
- ✓ Provide Commercial Vehicle Holding Area
- ✓ Install Quick Charge Electric Charging Stations
- ✓ Reduce Shuttle Bus Trips
- ✓ Encourage Rental Car Facility Use of “Ready and Return” Systems
- ✓ Use Aircraft Tugs or Tractors to Move Aircraft on Airside
- ✓ Use a Single Engine During Aircraft Taxi
- ✓ Conduct Routine Maintenance of Equipment and Facilities
- ✓ Encourage Airlines and Pilots to De-rate Aircraft Take-offs
- ✓ Implement Parking Facility Emission Reduction Measures
- ✓ Consolidate Rental Car and Hotel Shuttle Bus Fleets
- ✓ Limit Power-back and/or Reverse Thrust During Flight Procedures
- ✓ Convert Airport Fleet Vehicles and Ground Service Equipment to Alternative Fuel and/or Clean Technology
- ✓ Institute Trip Reduction Measures
- ✓ Optimize Roadway Network
- ✓ Reduce Auxiliary Power Units Use
- ✓ Direct Aircraft Exhaust Away from Surrounding Sensitive Areas

### Mobile Air-1: Schedule Deliveries Efficiently

Making deliveries to airport facilities more efficient is an easy way to defray delivery truck vehicle miles travelled and reduce engine usage on airport property, thus reducing overall motor vehicle air emissions. Namely, airport owners and tenants can establish volume restrictions with delivery couriers such that the courier shall only make a delivery to the airport if the amount to be delivered is above a certain quantity. Doing so eliminates unnecessary courier trips (e.g., a trip simply to deliver one box to one tenant).

*Benefits*




- Cost effective
- Easy to implement
- Relieves congestion on airport roadways

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Once	<b>Savings</b> 

### Mobile Air-2: Encourage Airport Use of Environmentally Friendly Vehicles

By encouraging the use of alternatively fueled or low-emitting vehicles, airport operators reduce the frequency by which traditionally fueled or high-emitting vehicles access the airport, ultimately reducing air emissions from this source.

Elements of this practice can be adjusted to match the available budget and specific needs of the facility. For instance, at a minimum, airport operators can provide preferred parking for those employees who own and drive their own low-emitting or fuel-efficient vehicle. If funding is available, the airport could purchase such vehicles for at least one airport employee for use in commuting to work or accessing the airport’s roadways.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Once	<b>Savings</b> 

The preferred parking program benefits can also be realized by rental car facilities or companies choosing to provide environmentally friendly vehicles. Stocking their rental fleet with environmentally friendly vehicles can reduce emissions related to parking queues and check-out/return procedures because these vehicles emit fewer pollutants. Additionally, absent budget constraints, rental companies with the lowest average fleet emissions could be granted operational concessions or discounts (i.e., reduced rent) for operating a cleaner fleet. Providing fiscal incentives might also encourage continued participation.

Finally, the largest emissions reductions could be attained if the preferred parking program is applied airport-wide, so that private passenger vehicles (often the largest motor vehicle emissions source at an airport) would be eligible. Examples of this program implemented at existing airports include dedicated or “priority” parking areas, or an airport-wide discounted parking rate.

*Benefits*

- Preferred parking program reduces air emissions
- Engages tenants in environmentally sustainable activity and provides fiscal incentives

*Additional Resources*






- St. Augustine Airport  
<http://www.staugustineairport.com/>
- Airports Council International-North America Small Airports Conference: “Improving Airport Environmental Performance”  
<http://www.aci-na.org/static/entransit/Small%20Airports%20Conference%20Cavender2.pdf>

**Mobile Air-3: Implement Terminal Area Congestion Reduction and Anti-idling Measures**

Mobile source air emissions are of particular concern in areas of the airport where high traffic volumes and prolonged vehicle idle times intersect. This often occurs at terminal curbsides, accessed by vehicles of all types (i.e., passenger auto, taxi, and shuttle) to pick-up or drop-off arriving or departing passengers. During peak hours of airport activity conditions can become excessively congested, increasing the vehicle dwell times and the overall level of air emissions.

Because the terminal area is one of the most frequented public-use areas, moving the passenger exchange hub to a more remote location helps to keep the level of air pollution occurring around the terminal area from becoming as concentrated. During implementation, airport staff must be careful to not create a situation where motor vehicle activity increases as a result of moving the passenger exchange area. This might occur if the area is too remote, or if shuttle activity increases to move patrons more frequently from the remote location to the terminal.

Motor vehicle volumes on airport roadways surrounding the terminal can be reduced by providing patrons the opportunity and incentive to share taxi-cabs. Airport operators can make arrangements with taxi services to provide fare discounts on shared-ride trips. In addition, a “priority” service where shared-ride participants would wait less time to board a taxi would encourage program use. If taxi ridership was further prioritized to direct passengers into alternatively fueled vehicles, the emissions savings benefits would be substantially increased. Lastly, implementing anti-dwell and anti-idling measures at the curb would help keep traffic moving along. Examples of such measures would include posting signs with the idling limits and staffing the terminal curbs with traffic controllers to enforce dwell limits. Providing an incentive to users who elect to turn off their vehicle engines while dropping off or picking up passengers may also encourage compliance with idling restrictions.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency  Once	Savings 

*Benefits*

- Relieves surface traffic congestion
- Easy to implement
- Relieves congestion and idling around the terminal area

*Additional Resources*



- Massport  
<http://www.massport.com/default.aspx>
- Airports Council International-North America Small Airports Conference titled “Improving Airport Environmental Performance”  
<http://www.aci-na.org/static/entransit/Small%20Airports%20Conference%20Cavender2.pdf>


### Mobile Air-4: Provide Commercial Vehicle Holding Area

Creating a holding area where commercial vehicles can park and turn off their engines while waiting for a drop-off (rather than leave engines idling while inside delivering, waiting for a signature, etc) or pick-up can help other traffic move more freely on the airport roadways. Additionally, this practice would limit the time and frequency that commercial vehicles remain parked and idling in areas of frequent public use. Together with measure Mobile Air-1, mobile source emissions occurring due to courier activity on the airport property can be significantly controlled with little overhead.

*Benefits*

- Cost effective
- Easy to implement
- Relieves congestion around terminal area
- Discourages vehicle idling in public use areas

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Once</b>



<i>Cost</i>
<b>Capital</b> <b>\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 


### Mobile Air-5: Install Quick Charge Electric Charging Stations

Patrons and employees willing to utilize electrically powered vehicles and equipment would be less willing to do so if powering them is cumbersome or requires additional effort. To encourage use of electric vehicles or equipment and reap the maximum benefit, airport operators should install and maintain a series of electric charging stations to help facilitate the activity. However, operators should be careful when considering implementation to acknowledge increased electricity usage that would be needed to provide this service.

*Benefits*

- Reduces conventionally fueled equipment and vehicle use

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Monthly</b> <b>(Inspection and Maintenance)</b>



<i>Cost</i>
<b>Capital</b> <b>\$\$</b>
<b>Operational</b> <b>\$\$</b>
<b>Savings</b> 


### Mobile Air-6: Reduce Shuttle Bus Trips

Shuttle services on the airside are often critical in moving patrons between spatially remote locations (i.e., parking facilities, rental facilities, connecting terminals). Where feasible, airport operators should consider reducing the number of these shuttle bus trips. Possible options include providing larger capacity vehicles that will handle more passengers per trip (i.e., articulated buses), and installing automated walkways.

*Benefits*




- Relieves congestion and idling around the terminal area and on airport roadways

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Once</b>

<i>Cost</i>
<b>Capital</b> <b>\$\$</b>
<b>Operational</b> <b>\$\$</b>
<b>Savings</b> 

**Mobile Air-7: Encourage Rental Car Facility Use of “Ready and Return” Systems**

This practice mainly involves the installation of a dedicated area within rental car facilities for customers to pick up vehicles that are ready to be rented, or park vehicles that they are in the process of returning. Having a dedicated area relieves congestion in the rental car area and eliminates unnecessary vehicle idling. In addition, rental agencies can install wireless communication devices in their fleet vehicles. The devices typically record odometer readings, fuel levels, and other information that is collected at the time of vehicle rental and return such that employees spend less time on each transaction and process vehicles more quickly, thereby streamlining the process.




<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing (where feasible)</b>	<b>Savings</b> 

*Benefits*

- A “ready and return” system minimizes vehicle idling and increases the time efficiency of rental car returns.

**Mobile Air-8: Use Aircraft Tugs or Tractors to Move Aircraft on Airside**

Conventionally, aircraft use engine power to access/egress the gate area and taxi to and from the runway ends. Air emissions resulting from this process can be reduced by using another piece of equipment, either an aircraft tug or tractor, to move the aircraft during this component of its operation. The savings can be maximized if the devices used to move the aircraft in lieu of its engines are electrically powered or run on alternative fuel.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$\$
<b>Frequency</b> <b>Monthly (Inspection and Maintenance)</b>	<b>Savings</b> 

Technology has emerged, and is becoming increasingly available, whereby a small independently motorized device can be mounted directly to the landing gear. This device moves the wheels independently of aircraft engine power, and receives the energy needed to operate either from a charging station at the gate, or from the aircraft engines while in flight.

*Benefits*

- Reduces aircraft taxi emissions
- Reduces aircraft fuel burn

*Additional Resources*

- Redding Municipal Airport, CA  
<http://ci.redding.ca.us/transeng/airports/index.htm>



### Mobile Air-9: Use a Single Engine During Aircraft Taxi






Where safety allows, and with cooperation from airlines, airport operators can request that aircraft use a reduced number of engines while moving across the airfield. This process is called “single-engine taxiing.” It minimizes the aircraft’s engine usage during this mode of operation, lowering overall fuel burn and reducing air emissions. This practice is ultimately up to the pilot’s discretion because runway conditions and airframe parameters might preclude its use.

*Benefits*

- Reduces aircraft taxi emissions
- Reduces aircraft fuel burn

*Additional Resources*

- International Civil Aviation Organization Circular 303 AN/176: “Operational Opportunities to Minimize Fuel Use and Reduce Emissions”

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing (where feasible)</b>	<b>Savings</b> 

### Mobile Air-10: Conduct Routine Maintenance of Equipment and Facilities

(Also applies to: Stationary Air Emissions Sources, Construction Emissions Sources, and Indoor Air Quality)

Routine maintenance of airport vehicles, equipment, and facilities aids in their efficient use and helps reduce emissions. Cleaning aircraft, routinely inspecting the fuselage, and ensuring proper engine function reduces air emissions by helping the aircraft operate using less energy and fuel. Cleaning and inspecting the fuselage reduces aerodynamic drag in flight, allowing the craft to use less fuel to propel itself. A well maintained engine operates with much less burden, improving fuel efficiency and reducing emissions.




The same can be said about many other airport sources of air emissions, including GSE, APU, and airport-owned motor vehicles. As noted, this practice is also applicable to stationary sources on airport property, construction equipment operating during airport improvements, and is relevant to improving indoor air quality as well.

*Benefits*

- Increases longevity of airport vehicles and other holdings
- Ensures efficient operation, creating emissions savings




*Additional Resources*

- International Civil Aviation Organization Circular 303 AN/176: “Operational Opportunities to Minimize Fuel Use and Reduce Emissions”

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>NC</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$\$</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

**Mobile Air-11: Encourage Airlines and Pilots to De-rate Aircraft Take-offs**

De-rating is the process whereby engine power is only applied to the extent necessary during aircraft take-off, rather than applying maximum thrust throughout the entire process. This practice is effective in minimizing fuel burn while the aircraft is on airport property. In the context of air emissions reduction, a trade-off occurs. Studies have shown that operation at lower engine power might decrease some air pollutant emissions (i.e., NO<sub>x</sub>), while others may increase (i.e., carbon monoxide). In addition, airports cannot require pilots to de-rate take-offs. Instead, pilots must use discretion to ensure that FAA safety regulations are followed.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

Considerations specific to the target airport will guide whether this practice is desirable. For instance, if the airport is located in an ozone nonattainment area, the NO<sub>x</sub> emission reduction made possible by de-rating take-offs would be desirable.

*Benefits*

- Cost effective
- Reduces aircraft fuel burn
- Reduces levels of some aircraft air pollutants
- Proactive reductions in aviation gasoline usage will help facilitate compliance with forthcoming emissions standards and other lead regulations




*Additional Resources*

- International Civil Aviation Organization Circular 303 AN/176: “Operational Opportunities to Minimize Fuel Use and Reduce Emissions”

**Mobile Air-12: Implement Parking Facility Emission Reduction Measures**

The benefit in implementing this measure is directly related to reducing the amount of vehicle idling, or “dwell” times, that parking garage patrons would create while waiting to enter the facility, cruising to find a space, or waiting to pay parking fees to the exit cashier.

Airports across the country have already implemented a series of programs to reduce parking emissions, some of which have met with considerable success. One such measure is the “pay on foot” program, whereby deplaning passengers with cars parked on the facility can pay their parking fees at a terminal kiosk. Doing this circumvents the need to pay at the garage exit, allowing the patrons to exit the facility without idling in the exit queue as they wait to pay the cashier.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

In addition, “smart parking” systems embed transponders in each parking space of a garage which communicate with a centralized information system. The system then feeds the locations of unoccupied parking spaces to parking garage signage, enabling the signs to direct patrons in search of open parking spaces toward the correct areas.

Other potential practices could involve Mobile Air-4 and Mobile Air-5, which encourage low or zero emitting vehicles and provide the necessary infrastructure to reward or facilitate their use. Refer to descriptions of these individual practices for more details.

*Benefits*




- Reduces parking facility congestion
- Helps process more passengers faster
- Patron use is highly likely (people don’t like to wait); popular program will create larger emissions savings

*Additional Resources*

- Airports Council International-North America Small Airports Conference titled “Improving Airport Environmental Performance”  
<http://www.aci-na.org/static/enrtransit/Small%20Airports%20Conference%20Cavender2.pdf>

**Mobile Air-13: Consolidate Rental Car and Hotel Shuttle Bus Fleets**

This measure mainly entails the coordination of shuttle bus services to ensure the maximum feasible number of riders per vehicle, thereby reducing overall vehicle miles traveled that would normally be incurred by excessive or unnecessary shuttle trips. Managing shuttle ridership more effectively by reducing the number and frequency of shuttles in operation also relieves congestion on the airport roadways.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Once	Savings 

*Benefits*

- Reduces shuttle vehicle miles traveled and emissions
- Alleviates some roadway congestion, potentially reducing emissions from other vehicles using the roadways




*Additional Resources*

- Massport  
<http://www.massport.com/default.aspx>
- Airports Council International-North America Small Airports Conference titled “Improving Airport Environmental Performance”  
<http://www.aci-na.org/static/enrtransit/Small%20Airports%20Conference%20Cavender2.pdf>

**Mobile Air-14: Limit Power-back and/or Reverse Thrust During Flight Procedures**

During landing, pilots can opt to use reverse thrust to slow the aircraft down and ensure a safe speed is attained before reaching the end of the runway. Reverse thrust entails engaging the aircraft’s engines, often at their maximum power, to slow forward momentum as the aircraft touches down on the runway at high speed. FAA has issued recommendations on the duration of reverse thrust on a per-landing basis.

Similar to the practice of single-engine taxiing, passenger safety is the primary consideration, and as such, this measure is largely at the pilot’s discretion. However, employing this practice whenever possible can lower overall fuel burn, and reduce emissions of air pollutants that are typically high when the engine is operating at full power, such as NO<sub>x</sub>.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing (where feasible)</b>	<b>Savings</b> 




*Benefits*

- Conserves fuel
- Reduces levels of pollutants commonly emitted at high engine power settings

**Mobile Air-15: Convert Airport Fleet Vehicles and Ground Service Equipment to Alternative Fuel and/or Clean Technology**

Airport fleet vehicles and GSE commonly contribute significantly to airside emissions. In the case of GSE, this is largely due to most equipment being older model non-road vehicles that do not typically possess the same level of emissions control as newer model on-road vehicles.

Accordingly, replacing existing equipment with newer vehicles can significantly reduce emissions. Fueling equipment with cleaner fuel, such as compressed natural gas or clean diesel/biodiesel, can accentuate emissions savings. Finally, although sometimes costly, retrofitting equipment and vehicles with aggressive emissions control devices will help reduce the associated emissions.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$\$
<b>Knowledge</b> 	<b>Operational</b> \$\$
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*

- Reduces airside emissions and fuel usage



*Additional Resources*


- FAA VALE Program  
<http://www.faa.gov/airports/environmental/vale/>

### Mobile Air-16: Institute Trip Reduction Measures

Reducing the overall volume of motor vehicle traffic on airport roadways is an effective way to reduce the associated air emissions. Effective means of doing this may include encouraging carpooling programs and incentives for employees and patrons, rideshare programs and incentives for those already at the airport, and the elimination of unnecessary trips associated with airport operation.

Patron-oriented incentives might include fee or fare reductions. Employee-oriented incentives would be geared toward awarding bonuses, credits, or other rewards for participating.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Monthly</b>

<i>Cost</i>
<b>Capital</b> \$
<b>Operational</b> \$
<b>Savings</b> 

*Benefits*



- Reduces landside emissions
- Potentially reduces demand on non-airport roadways surrounding the facility


*Additional Resources*

- Massport  
<http://www.massport.com/default.aspx>

### Mobile Air-17: Optimize Roadway Network

This measure largely involves improving, expanding or re-aligning surface roadways to improve traffic flow, thus eliminating stop-and-go traffic that can contribute significantly to overall levels of motor vehicle emissions. Usually, a detailed traffic analysis is conducted to determine the roadway segments of most frequent use, the times of peak traffic, and whether the network directs patrons to their destinations efficiently.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Monthly</b>

<i>Cost</i>
<b>Capital</b> \$
<b>Operational</b> \$
<b>Savings</b> 

*Benefits*




- Potentially manages peak capacity more effectively
- Reduces levels of motor vehicle emissions related to congestion, or stop-and-go traffic

*Additional Resources*

- Massport  
<http://www.massport.com/default.aspx>

**Mobile Air-18: Reduce Auxiliary Power Units Usage**

Aircraft Auxiliary Power Units (APUs) are commonly operated to provide power and climate control to an aircraft while its main engines are powered down (i.e., when gated at a terminal or taxiing to and from the runway), and often constitute a significant source of operational air emissions. Airports have a few options available to defray the usage of APUs at the gate. Terminal gates can be equipped with a 400 Hz power source and/or pre-conditioned air handlers to replace or supplement the resources that the APUs would normally provide. Reducing APUs usage during taxi operations is not as straightforward as it normally centers on taxi delay, which could involve re-directing airfield traffic or otherwise modifying operational procedures.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Ongoing (where feasible)</b>	<b>Savings</b> 

The ACRP is currently developing a study (ACRP 02-25) on the alternatives available for aircraft ground power, heating, and air conditioning and will involve a detailed analysis of both APU emissions, as well as the effectiveness of each of the alternatives in cost-effectively reducing APU emissions.

*Benefits*

- Conserves fuel and reduces emissions




*Additional Resources*

- International Civil Aviation Organization Circular 303 AN/176: “Operational Opportunities to Minimize Fuel Use and Reduce Emissions”

**Mobile Air-19: Direct Aircraft Exhaust Away from Surrounding Sensitive Areas**

As aircraft wait to depart on a runway, they often idle at what is known as the runway hold line as they wait for clearance to take off. Depending on the geometry of the airfield, this positioning may expose nearby sensitive areas, such as residential communities, to prolonged idling and takeoff emissions.

Depending on the airport, runway hold lines can sometimes be reoriented such that the idling and take off emissions can be redirected onto airport property or moved further away from sensitive areas, potentially defraying exposure of said areas to the emissions burden. Airport operators may consult with FAA and air traffic control personnel to determine if such reorientations are possible without causing runway incursions (instances where aircraft inadvertently cross the hold line and enter the runway or taxiway area without clearance).

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Ongoing (where feasible)</b>	<b>Savings</b> 



*Benefits*

- Can potentially divert aircraft emissions away from nearby sensitive areas
- Demonstrates to surrounding communities that the airport is concerned about its potential air quality impacts

*Additional Resources*

- FAA Guidance on Airport Marking Aids and Signs  
[http://www.faa.gov/air\\_traffic/publications/atpubs/aim/Chap2/aim0203.html](http://www.faa.gov/air_traffic/publications/atpubs/aim/Chap2/aim0203.html)

## APPENDIX A-2

# Stationary Air Emissions Source Practices

Stationary emissions occur from fixed sources on airport property and are comprised of point sources (i.e., boiler stacks and fuel storage tanks) and area sources (i.e., solvent use or open burning). Reducing emissions from these sources is largely accomplished by applying control technology or emissions recovery systems, or replacing existing systems entirely with more environmentally friendly alternatives. The following stationary air emission practices will help airports reduce stationary air emissions through implementation of new procedures and installation of new technologies:

**Applicable Federal Regulatory Programs**

- Clean Air Act Title V—Permits to Operate (Chapter 3)

- ✓ Prohibit Burning of Landscape Waste
- ✓ Replace High Emitting Heating/Ventilation/Air Conditioning and Other Operating Plant Devices with Environmentally Friendly Alternatives
- ✓ Install Vapor Recovery Technology for Fuel Storage and Transfer Facilities
- ✓ Implement Low-smoke Fire Training
- ✓ Encourage Best Practices for Solvent Use
- ✓ Enhance the Controllability of Systems

The following practices related to stationary air emissions are discussed in other sections:

- ✓ Conduct Routine Maintenance of Equipment and Facilities—See Mobile Air Emissions Source Practice Summaries for description
- ✓ Evaluate the Effectiveness of Building Ventilation Systems—See Indoor Air Quality Practices for description




### Stationary Air-1: Prohibit Burning of Landscape Waste

*(Also applies to: Construction Air Emissions)*

Open burning can result in a significant amount of particulate matter, carbon monoxide, and other harmful air emissions, and should be avoided wherever possible. One way airports can accomplish this is to chip and mulch landscape waste (typically the largest constituent of waste disposed of by open burning), instead of disposing of it in burn pits.

#### *Benefits*

- Landscape waste can be reused
- Decreases the occurrence of poor visibility conditions
- Waste incineration requires a permit; recycling waste does not
- Reduces smoke, odor, and air emissions around the airport
- Cost effective

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b>  <b>Ongoing</b>	<b>Savings</b> 




*Additional Resources*

- Naples Airport  
<http://www.flynaples.com/images/docs/general/final%20sustainability%20plan%205-14-09.pdf>

**Stationary Air-2: Replace High Emitting Heating/Ventilation/Air Conditioning and Other Operating Plant Devices with Environmentally Friendly Alternatives**

Replacing existing heating/ventilation/air conditioning components with newer, lower emitting technology is an effective way to reduce airside operation and maintenance costs. To a lesser degree, retrofitting existing equipment can produce similar overall results. Moreover, this tactic facilitates compliance with Title V of the CAA and other stationary source regulations, because these lower-emitting devices require less control technology, and the required operating permits are normally more easily attained.

Airports located in areas where air quality standards are currently violated may be able to “bank” surplus emissions savings associated with these activities, for their own use, or for trade as “emissions reduction credits” with other facilities in need of them.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$\$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b>  Once	<b>Savings</b> 




*Benefits*

- Reduces operations and maintenance costs
- Facilitates compliance with applicable regulations
- May potentially generate income via transactions of “emissions reduction credits” with other facilities

**Stationary Air-3: Install Vapor Recovery Technology for Fuel Storage and Transfer Facilities**

During fuel handling processes, hydrocarbon air pollutants can volatilize and escape from fuel storage tanks, nozzles and other components of storage and transfer vessels. This is largely due to the difference in air pressure within the vessel and the air surrounding it. If uncontrolled, this evaporative process can constitute a relatively large portion of airport-related stationary source air emissions.

However, a significant level of control technology is available to reduce these emissions from fuel storage and transfer vessels and is often required by state agencies before these sources would be permitted to operate. Thus, to comply with existing environmental regulations and to proactively ensure that excess air pollution is not occurring via fuel storage and transfer practices, aggressive vapor recovery technology is recommended.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b>  Once	<b>Savings</b> 




*Benefits*

- Facilitates compliance with Title V and other federal and state-level requirements
- Prevents vapor from escaping and reduces overall fuel loss and lower operational costs

**Stationary Air-4: Implement Low-smoke Fire Training**

Conducting fire training for the benefit of airport rescue and firefighting staff can significantly improve emergency preparedness. However, this practice typically involves the open burning of an aircraft fuselage mock-up with fuel commonly in use by aircraft operating at the airport. As such, this practice can result in largely uncontrolled air and smoke emissions to the surrounding area.

Lower-emitting fuel alternatives (i.e., Tekflame) possess similar physical and chemical properties to aircraft fuel, and have been developed specifically for live fire training exercises. Using these materials during normal fire training practices will constrain the overall associated level of smoke and air emissions. Propane-fueled facilities are also available for low-smoke and more environmentally friendly live fire training.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Ongoing	Savings 




*Benefits*

- Reduces smoke and air-emissions output
- Increases visibility
- Improves relations with regulatory agencies and the public

**Stationary Air-5: Encourage Best Practices for Solvent Use**

*(Also applies to: Construction Air Emissions)*

Hydrocarbons and other air pollutants can evaporate into the atmosphere as a result of airport maintenance processes, including paint booth operation, metal degreasing, and aircraft de-icing. Although emissions capture and control technologies exist for many of these sources and are considered standard to their operation, an easy proactive means of further reducing these emissions would include the application of alternative solvents/materials that do not evaporate as easily, or release less pollution into the surrounding air during the drying or curing process.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

*Benefits*

- Cost effective and proactive
- Facilitates compliance with solvent management regulations
- Reduces water pollution and odors



### Stationary Air-6: Enhance the Controllability of Systems


*(Also applies to: Indoor Air Quality, Air Emissions Evaluation, and Reporting)*

This practice mainly involves ensuring that emissions sources operating at the airport possess the best available emissions control technologies, as well as remaining aware of new technologies that can further reduce the source emissions. Keeping up with technological improvements not only increases the life of airport equipment and facilitates compliance with source permitting programs, but it increases operational efficiency, as well.

*Benefits*

- Cost-effective and encourages efficient operation
- Encourages compliance with permitting programs

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Monthly</b> <b>(Inspection and</b> <b>Maintenance)</b>

<i>Cost</i>
<b>Capital</b> <b>\$\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

## APPENDIX A-3

# Construction Air Emissions Source Practices

Construction-related emissions typically represent a vast array of sources and magnitudes, most of which are dictated by project design parameters and duration of the construction schedule. These emissions include exhaust from equipment and vehicle operation; evaporation from solvent use or asphalt placement; and generation of dust from site clearing, preparation, and demolition activities. Construction emissions are normally considered temporary, constrained within the duration over which the construction is expected to occur. Nonetheless, many proactive measures exist to limit their extent and effect on surrounding areas. The following construction air emissions source practices will reduce air emissions from construction activities at airports:

**Applicable Federal Regulatory Programs**

- Clean Air Act Title I—General Conformity, Transportation Conformity and State Implementation Plans (Chapter 3)




- ✓ Utilize Overland Belt Conveyor System During Construction
- ✓ Provide Alternative Transportation During Construction
- ✓ Use Low-emitting Construction Materials and Equipment
- ✓ Alter Project Construction Schedule to Accommodate Adverse Meteorological Conditions
- ✓ Minimize Fugitive Dust Emissions During Construction

The following practices related to construction air emissions are discussed in other sections.

- ✓ Prohibit Burning of Landscape Waste—See Stationary Air Emissions Source Practices for description
- ✓ Conduct Routine Maintenance of Equipment and Facilities—See Mobile Air Emissions Source Practices for description
- ✓ Encourage Best Practices for Solvent Use—See Stationary Air Emissions Source Practices for description

### Construction Air-1: Utilize Overland Belt Conveyor System During Construction

Of all the air emissions sources associated with a typical construction project, the largest contributor often comprises haul truck trips necessary to move materials on and off site. Development and use of an overland conveyor belt system to move these materials, whenever possible, can significantly reduce the vehicle miles travelled of dump trucks and other in-use equipment. Reducing the haul truck vehicle miles travelled greatly diminishes the overall level of exhaust related construction emissions over the life of the project, especially if borrow sites or quarries to which the trucks may travel are very remotely located.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital <b>\$\$\$</b>
Knowledge 	Operational <b>\$\$\$</b>
Frequency <b>Once</b>	Savings 

Additionally, reducing the haul truck vehicle miles travelled frees up local roadways of construction related congestion, reducing the levels of air emissions associated with stop and go traffic.



*Benefits*

- Fewer haul truck trips means significant fuel and transport cost savings
- Lessens impact on surrounding roadways and traffic
- Promotes project efficiency




*Additional Resources*

- Hartsfield-Jackson Atlanta International Airport  
<http://www.atlanta-airport.com>
- Fresno Yosemite International Airport  
<http://www.fresno.gov/DiscoverFresno/Airports/default.htm>

**Construction Air-2: Provide Alternative Transportation During Construction**

Although the number of vehicles (and vehicle emissions) associated with construction crew trips to and from the work site can be large, especially when considering large projects or accelerated construction schedules, project sponsors can provide or encourage many mass-transportation alternatives that can help greatly reduce this impact.

Such incentives might include providing preferential parking for employees electing to carpool, fare discounts on public transportation, and consolidated parking facilities with free shuttle service. Bike racks could also easily be incorporated into employee parking or staging areas.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Once	<b>Savings</b> 




*Benefits*

- Relieves some project-related congestion on surrounding roadways

**Construction Air-3: Use Low-emitting Construction Materials and Equipment**

The benefits attained by implementing this measure have the most potential to reduce construction-related air emissions because they reduce the emissions at their source. Replacing heavily used, conventionally fueled equipment and vehicles with low emitting equivalents drastically reduces the associated operational emissions. However, a trade-off occurs in that these environmentally friendly equivalents are comparatively costly, limiting the benefit to the budget available for equipment replacement.

An alternative that may be more attractive to equipment replacement, considering budgetary constraints, is retrofitting existing equipment with technology that produces similar emissions benefits to the replacement option. Operators should use caution when considering the retrofit option, because (1) retrofits must be verified by the EPA or equivalent state agency, and (2) not all equipment is readily and cost-effectively compatible with the available retrofit options.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Ongoing (where feasible)	<b>Savings</b> 

Low-emitting materials can also offer significant emissions savings and tend to be more affordable. For instance, engineers have recently refined a lower temperature asphalt, called warm-mix, for use in paving operations. The material has a comparable cost to traditional asphalt, possesses similar physical and chemical properties, bears similar results, and yet emits far fewer air pollutants during both mixing and placement.

*Benefits*




- The source-oriented reduction approach offers the greatest emissions savings, albeit with a potentially higher cost.

**Construction Air-4: Alter Project Construction Schedule to Accommodate Adverse Meteorological Conditions**

This measure is effective in constraining air emissions during times when the weather can intensify their negative effects. For instance, to limit the extent of fugitive dust problems, construction may be halted or curtailed on days when the winds are particularly high, thereby reducing the area impacted by the dust emissions. In addition, if the construction project is located within an area with ozone pollution problems, construction would be restricted on days when atmospheric conditions are conducive to ozone formation (i.e., sunny, warm days).

*Benefits*




- Reduces the airport’s “construction footprint” on surrounding areas

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Monthly (Inspection and Maintenance)	Savings 

**Construction Air-5: Minimize Fugitive Dust Emissions During Construction**

Fugitive dust refers to the dust and other particulate matter entrained into the air during activities such as site clearing, demolition, materials stock-piling, and the movement of vehicles and equipment across unpaved areas. If not mitigated, these activities can generate a large amount of dust that can decrease the visibility and quality of the outdoor air around the project area. Moreover, this material can become a nuisance to surrounding areas once it settles out of the air and becomes deposited on structures and surfaces. Some construction permits require implementation of dust control measures.

Mitigation options are readily available, few of which carry additional costs to the operator. These include: routine watering or application of dust suppressants to unpaved areas; placing aprons at the entrances and exits of the site to prevent track-out; posting vehicle speed limits; creating a “nuisance complaint” hotline; covering stockpiles of raw/waste materials; and re-vegetating cleared areas as expeditiously as possible.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

*Benefits*

- Limits the size of the airport’s “construction footprint” on surrounding areas
- Improves local air quality and visibility during construction

*Additional Resources*

- Fresno Yosemite International Airport  
<http://www.fresno.gov/DiscoverFresno/Airports/default.htm>

## APPENDIX A-4

# Air Emission Evaluation and Reporting Practices

Practices outlined in this appendix largely comprise good faith measures intended to establish rapport with those involved in air quality issues, including environmental regulatory agencies, non-governmental organizations, neighboring communities, and others. By taking a proactive stance on quantifying and reporting emissions associated with airport operation and development, and by establishing voluntary policies to track and manage them, airports can preempt potential air quality problems or issues before they reach the level where they can incite regulatory action or a negative public response. The following air emission evaluation and reporting practices will assist airports with understanding and reducing their air emissions.

- ✓ Prepare an Airport-wide Greenhouse Gas Emissions Inventory
- ✓ Develop an Air Quality Management Plan and Monitoring Program
- ✓ Establish Emissions Limits or Ceilings
- ✓ Coordinate with Air Agencies on Plans and Timelines Affecting the Airport

The following practices related to air emission evaluation and reporting are discussed in other sections.

- ✓ Enhance the Controllability of Systems—See Stationary Air Emissions Source Practices for description
- ✓ Develop an Indoor Air Quality Management Plan—See Indoor Air Quality Practices for description




Practices described herein do not yet directly facilitate compliance with any regulatory programs. However, they are good-faith and due diligence measures that can help ease the burden of compliance in the event that reporting rules or emissions limits target small airports in the future.

Recent moves by the EPA have established GHG reporting rules for select industrial sources generating “significant” quantities of GHG, and proposed more aggressive air monitoring campaigns for select pollutants (i.e., lead) near small airports. Thus, it is important for small airports to demonstrate voluntary willingness to comply with these measurement campaigns, such that if regulations are developed based on them, the airports will know what level of action needs to be taken to ensure compliance in the future.

### Air Evaluation-1: Prepare an Airport-wide Greenhouse Gas Emissions Inventory

In 2009, EPA exercised its authority under Title I of the CAA and declared that GHG endanger the public health and environmental welfare, setting the stage for regulation under the CAA. EPA has several regulatory options available to pursue GHG regulation. Although it is not yet clear how they will choose to regulate GHG, airports should attempt to calculate and assign ownership to airport-related GHG emissions.

Support and guidance are available to assist airports in developing airport-wide GHG emissions inventories, depicting the sum of airport related emissions of the GHG carbon dioxide, methane, and nitrous oxide that would occur due to an airport’s operation. This support and guidance ranges from methods to measure

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Annually	Savings 

and calculate the amounts of GHG to helping an airport assign ownership of the emissions between themselves, their tenants and other parties responsible for their generation. The ACRP has recently published a comprehensive guidebook to address many of these issues, and its use is highly recommended if an airport chooses to conduct an inventory of GHG (6). Additionally, many agencies and companies exist to help airports handle the more technical issues of the matter, if necessary.

Quantifying GHG emissions for each airport source will help facilitate compliance with existing and forthcoming reporting rules, if applicable, and help determine if forthcoming regulations apply to small airports once issued.

*Benefits*






- Makes pertinent information readily available once future regulations, if any, are promulgated (and pertain to small airports)
- Addresses the issue proactively, prior to regulation, and promotes environmental stewardship
- Helps establish rapport with regulatory agencies, the public, and other interested parties
- Provides the airport with foresight and additional time to address problematic issues

*Additional Resources*

- Airports Council International-North America Small Airports Conference titled “Improving Airport Environmental Performance”  
<http://www.aci-na.org/static/enrtransit/Small%20Airports%20Conference%20Cavender2.pdf>
- *ACRP Report 11: Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories*  
[http://www.trb.org/Publications/Blurbs/Guidebook\\_on\\_Preparing\\_Airport\\_Greenhouse\\_Gas\\_Emis\\_160829.aspx](http://www.trb.org/Publications/Blurbs/Guidebook_on_Preparing_Airport_Greenhouse_Gas_Emis_160829.aspx)

**Air Evaluation-2: Develop an Air Quality Management Plan and Monitoring Program**

Although these measures allow airports to make a good faith and due diligence effort to the surrounding area, their primary utility is directed toward airports operating in air quality “nonattainment” areas. See Chapter 3 for additional details about “nonattainment areas.” Airports existing in these areas often have to quantify emissions of EPA-regulated air pollutants, which would occur both from airport operation and development, to be included or accounted in the emissions budgets a state regulatory agency develops to bring the area back into compliance with the air quality rules (i.e., SIPs).

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 

An airport air quality management plan not only documents these emissions, but also summarizes commitments and initiatives developed by the airport operator to reduce emissions from most sources or activities. For example, such commitments might include Memorandums of Agreement with their tenants or state regulators to commit to source-specific emissions reductions (i.e., replacing GSE with electric vehicles).

An air quality monitoring program is useful if an airport (or its emissions sources) is targeted by regulatory agencies as contributing significantly to the violation of applicable air quality rules. By monitoring the levels of the associated pollutants in the air around the airport, the airport will be better equipped to gauge its impact and contribution, as well as applicable consequences. Airports can either install their own monitors to compare readings against nearby state or federal monitors, or help fund and maintain the state/federal monitors, thereby increasing their involvement in the process.

*Benefits*




- Provides enforceable commitments to air quality improvement
- Provides the airport with foresight, tangible options, and concrete timelines with which to address problems
- Increased participation in regulatory issues is good public relations, and can assist in conflict resolution

*Additional Resources*

- *ACRP Synthesis 10: Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)

**Air Evaluation-3: Establish Emissions Limits or Ceilings**

This practice is entirely proactive, encourages improvement of air quality around the airport, and can be an effective regulatory agency and public relations tool. The establishment of an emissions limit, either airport-wide or from a specific source, represents a strong and enforceable commitment to environmental stewardship. Examples of such limits may include: reducing airport-wide GHG emissions by 50% by 2020, limiting sources to a specific quantity (i.e., tons per year), keeping ozone precursors (i.e., NO<sub>x</sub> and VOC) below pre-established thresholds, and other similar measures.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once	Savings 

*Benefits*




- Improves regulatory agency and general public relations
- Effective in constraining future airport environmental impacts
- Fiscally-directed penalties against tenants or users for exceeding the limits might generate additional revenue for the airport

*Additional Resources*

- Massport Air Quality Initiative  
<http://www.massport.com/default.aspx>

**Air Evaluation-4: Coordinate with Air Agencies on Plans and Timelines Affecting the Airport**

The benefit of this measure is relatively simple and straightforward. Frequent communication with regulatory agencies ensures that the airport is aligned to regulatory agendas or plans that may affect them. Establishing a good rapport with agency staff might also keep the airport more aware of future developments, or refinements of rules, agenda, and strategies, as they occur.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency As Needed	Savings 

*Benefits*

- Keeps the airport current with regulatory agenda
- Helps ensure compliance with existing regulations



## APPENDIX A-5

### Indoor Air Quality Practices

Practices discussed in this section mainly involve the elimination of indoor air quality problems before they begin, via inspection and maintenance and the creation of preemptive strategies. If left unchecked, indoor air quality problems (e.g., those associated with mold or asbestos) can affect the airport’s patrons and employees, and create costly remediation for airport operators. The following indoor air quality practices will help airports reduce indoor air pollutants.

- ✓ Prevent Mold and Asbestos
- ✓ Evaluate the Effectiveness of Building Ventilation Systems
- ✓ Install Ductwork Products That Can Be Easily Cleaned, or Those that Protect Against Mold/Fiber Shedding
- ✓ Review Maintenance and Janitorial Programs to Eliminate Toxic Agents in Favor of More Environmentally Friendly Choices
- ✓ Implement Strategies to Limit Tobacco Smoke Exposure Indoors and Adjacent to Entryways
- ✓ Develop an Indoor Air Quality Management Plan
- ✓ Ensure New Building Heating/Ventilation/Air Conditioning Equipment Does Not Use Chlorofluorocarbon or Hydrochlorofluorocarbon Refrigerants






The following practice related to indoor air quality is discussed in other sections.

- ✓ Enhance the Controllability of Systems—See Stationary Air Emissions Source Practices for description

Importantly, no federal regulatory mechanism or program currently directly regulates indoor air quality issues, although agencies such as EPA, U.S. Department of Energy, OSHA, and National Institute for Occupational Safety and Health have developed committees or other services to address best practices in preventing and remediating them. Of these committees, the Federal Interagency Committee on Indoor Air Quality provides the most comprehensive guidance on addressing indoor air quality concerns. The TSCA regulates asbestos content in building materials and other sources. The General Duty Clause of the Occupational Safety and Health Act requires that employees are protected against known hazards that can cause injury or death. Nonetheless, adhering to the following measures both makes good business sense, and protects the health and safety of people using the airport at the same time.

#### Indoor Air-1: Prevent Mold and Asbestos

Once formed, mold can proliferate quickly and efficiently throughout an indoor environment, especially a humid one. Some prevention steps are easy and can be conducted as part of a regular maintenance schedule, while others require the assistance of trained professionals. Easy preventative measures an airport can take on their own include: limiting the occurrence and persistence of excess moisture around pipes, systems, and fixtures; conducting mold testing using commercially available products; and regularly keeping air exchange areas free of dust and debris.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Asbestos is a component of some building materials and does not accumulate in the same fashion as a living organism such as mold. Asbestos can commonly become dislodged from materials that contain it when they are disturbed, and subsequently become entrained in the indoor air, causing breathing problems and potentially long-term health effects. As such, the easiest ways to address concerns of asbestos in the indoor air are to keep all airspaces free of dust and debris, and to replace existing asbestos-containing materials with materials that do not contain asbestos.

It is important to understand that both of these materials, especially mold, can typically persist in an indoor environment unless remediated by a trained professional.

*Benefits*

- Prevention saves the airport costly remediation
- Provides a better environment for staff and patrons




**Indoor Air-2: Evaluate the Effectiveness of Building Ventilation Systems**

*(Also applies to: Stationary Air Emissions Sources)*

Ventilation systems are essential in removing contamination in the indoor environment and should be regularly inspected and maintained. This may include regularly changing air filters, cleaning ducts, removing obstructions, and other maintenance tasks. Inspecting existing ductwork and systems for damage or openings also helps prevent mold intrusion into the air handling systems, and hence into the indoor air. Installing indoor air monitors may help detect ventilation problems early, making them potentially easier to handle.




*Benefits*

- Improves system performance
- Prevents intrusion of unwanted air pollutants
- Provides a better environment for staff and patrons

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Monthly (Inspection and Maintenance)	Savings 

**Indoor Air-3: Install Ductwork Products That Can Be Easily Cleaned, or Those that Protect Against Mold/Fiber Shedding**

Replacing existing ductwork and other ventilation structures with durable, non-porous materials helps minimize mold growth and asbestos dispersal by (1) more easily keeping the areas clean of dust and debris and (2) preventing material fibers and mold spores from shedding off and becoming entrained in the indoor air. In addition, alternative materials exist that have mold and shedding inhibiting agents incorporated into them. Ductwork or materials replacement can be potentially costly, but can produce long-term pay-offs in terms of air quality improvements and the avoidance of future remediation.




<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Once	Savings 

*Benefits*

- Prevention saves the airport costly remediation
- Provides a better environment for staff and patrons

**Indoor Air-4: Review Maintenance and Janitorial Programs to Eliminate Toxic Agents in Favor of More Environmentally Friendly Choices**

Many solvents and other cleaning agents contain potentially toxic chemicals that can accumulate in the indoor air. The market availability of more environmentally friendly alternatives is increasing. As part of a routine inspection and maintenance schedule, airport staff should review maintenance and janitorial programs, as well as chemical inventories to see if any of the chemical agents used in building maintenance can be replaced.




<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency As Needed	Savings 

*Benefits*

- Cost effective
- Provides a better environment for staff (particularly those in direct contact with chemicals) and patrons

**Indoor Air-5: Implement Strategies to Limit Tobacco Smoke Exposure Indoors and Adjacent to Entryways**

Second-hand tobacco smoke can infiltrate indoor public use areas via building entrances, exits, and ventilation systems, causing a serious degradation of indoor air quality. Tobacco smoke typically contains excessive amounts of carbon monoxide, arsenic, and other air toxins that can cause or exacerbate respiratory difficulties.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency As Needed	Savings 

If state- or county-level prohibitions on indoor cigarette smoking do not exist, airport owners should develop their own policies to restrict the activity. The facility should restrict smoking indoors, around ventilation systems, and at building entrances and exits. Smoking lounges can still be provided for the convenience of some patrons but should be located remotely from areas of frequent public use, provided independent ventilation, or located in outdoor areas.

*Benefits*

- Potentially complies with state- or county-level rules
- Provides a better environment for staff and patrons




### Indoor Air-6: Develop an Indoor Air Quality Management Plan

*(Also applies to: Air Emissions Evaluation and Reporting)*

An indoor air quality management plan is effective in identifying and preempting existing and future indoor air quality issues. Many indoor air quality problems are easily remedied if caught early, and doing so prevents the airport from incurring unnecessary costs and damages. Components of an indoor air quality management plan may include: routine mold and asbestos inspections, routine cleaning and maintenance schedules, and policies and strategies that can be preemptively applied to address specific issues as they arise.

*Benefits*

- Promotes staff and patron health and safety
- Increases longevity and functionality of airport systems and holdings
- Reduces maintenance costs in the long run
- Provides “hip pocket” strategies to deal with problems as they arise




<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency As Needed	Savings 

### Indoor Air-7: Ensure New Building Heating/Ventilation/Air Conditioning Equipment Does Not Use Chlorofluorocarbon or Hydrochlorofluorocarbon Refrigerants

As described in Chapter 3, EPA has taken steps to phase out production and use of CFC and HCFC refrigerants as part of their ozone protection program under Title VI of the CAA. Although EPA still currently allows heating/ventilation/air conditioning equipment to use these chemicals, airport operators can be proactive in eliminating their use by inventorying equipment that uses them and adopting a replacement schedule to eliminate them. Phasing these chemicals out early ensures that the airport will be in compliance with EPA’s rules once they take full effect.

*Benefits*

- Ensures that airports comply with future EPA regulations
- Environmentally friendly

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency As Needed	Savings 

## APPENDIX A-6

# Spill Prevention, Response, and Notification Practices

Airport operators, fixed-base operators, and tenants may manage large quantities of fuel, oils, and other chemicals. Spills or releases may occur, but airports can help to minimize the potential for occurrences by proper planning and implementation of spill prevention practices. Properly notifying local agencies of hazardous substances, chemicals, and oils stored or used at airports and preparation of appropriate spill response plans will help to protect airport employees, response personnel, and the surrounding environment. The following proactive spill prevention, response and notification practices will help airports reduce the likelihood of and minimize the potential environmental consequences, and facilitate timely notification for spills that may occur.

### Applicable Federal Regulatory Programs

- Emergency Planning and Community Right-to-Know Act (Chapter 4)
- Clean Water Act (Chapter 8)
- Resource Conservation and Recovery Act (Chapter 4)




- Planning Activities
  - ✓ Develop a Database of Bulk Storage Containers
  - ✓ Develop and Implement a Storage Tank Management Plan
  - ✓ Develop an Airport Spill Prevention, Control, and Countermeasure Policy
  - ✓ Establish a Spill Reduction Training Program
  - ✓ Establish Airport-wide Procedures
  - ✓ Implement a Leak Detection Inspection Program for Bulk Storage Containers
  - ✓ Isolate Oil Storage Areas
  - ✓ Maintain Spill Control Kits
- Design and Construction Practices
  - ✓ Construct Regional Secondary Containment
  - ✓ Install Spill Protection in Storm Drains

## Planning Activities

To avoid potentially significant consequences, such as financial penalties, negative press, or follow-up regulatory actions that result from a spill, an airport should conduct planning activities to help prevent spills from occurring. Alternatively, in the event a spill does occur, planning activities can help minimize the negative effects by providing staff with an understanding of timely notifications and efficient response practices.

### Spill-1: Develop a Database of Bulk Storage Containers

Airports typically maintain and/or manage a number of bulk storage containers (defined for the purposes of this guidebook as storage containers with a capacity of 55 gallons or greater). Typical containers might include drums, totes, ASTs, and underground storage tanks. In many instances the containers are located in remote areas of the airport, basements, or are rarely used. A bulk storage container database can help facilitate confirmation of regulatory applicability (e.g., SPCC, EPCRA Tier I/II) for containers and manage the associated regulatory requirements.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

Developing an airport-wide database for storage containers can be as simple as preparing a spreadsheet that identifies the container, owner, operator, location, contents, and capacity. Additional details worth recording in a database include container construction material (e.g., steel, high-density polyethylene), installation date, overfill prevention measures, type and volume of secondary containment, visual inspection frequency, leak detection methods, testing requirements and frequency, ancillary piping construction material, type of piping secondary containment, piping leak detection methods, and corrosion prevention systems. The database should be reviewed, at minimum, annually and updated as containers are replaced, upgraded, or removed.

#### *Benefits*




- Provides a single information resource location for bulk storage container details
- Tracks the installation or removal of bulk storage containers
- Facilitates evaluating environmental compliance

#### *Additional Resources*

- SPCC Guidance for Regional Inspectors, Appendix G

### Spill-2: Develop and Implement a Storage Tank Management Plan

Airport operations typically involve the use of many different types of storage containers. Examples include underground and aboveground storage containers for emergency generators or fuel tanks, drums, elevator reservoirs, transformers, or mobile refuelers. Developing and implementing a tank management plan can help facilitate obtaining and maintaining compliance with local, state, SDWA, EPCRA, and SPCC requirements.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Components of a tank management plan should include a list of containers at the airport (refer to Spill-1). While a tank database is extremely helpful in specifying the tanks that are present at an airport, a tank management plan expands the list by providing additional tasks to be completed to help ensure compliance. For example, the plan could designate airport employees that are responsible for specific containers, identify when inspections need to be conducted, facilitate information needed during regulatory audits, assist with capital planning efforts, or help determine when containers need to be retrofitted, repaired, or replaced. This type of plan becomes particularly useful when changes to the facility are made, such as the addition or removal of containers.



*Benefits*

- Establishes responsibilities to ensure containers are in compliance with regulatory requirements
- Helps ensure that inspections are performed on a regular schedule
- Allows for repairs or retrofits to be made before a spill or discharge occurs
- Minimizes the potential for containers to be overlooked during inspections
- Increases potential for a spill to be identified
- Increases understanding of airport chemical and oil storage capacity

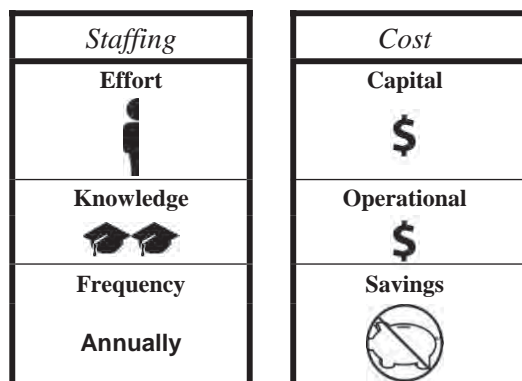
*Additional Resources*

- EPA Operating and Maintaining Underground Storage Tank Systems, Practical Help and Checklists [http://www.epa.gov/swerust1/pubs/O&M\\_Manual\\_Nov07.pdf](http://www.epa.gov/swerust1/pubs/O&M_Manual_Nov07.pdf)

**Spill-3: Develop an Airport Spill Prevention, Control, and Countermeasure Policy**

It is common at small airports to have multiple owners, tenants, or operators that each has their own SPCC plan. Development of an SPCC plan may be a regulatory requirement for some small airports. The plans are usually very different in terms of response measures, procedures, or potential discharge volumes. Because oil spills that reach surface waters could ultimately become the responsibility of an airport owner, consideration should be given for developing and implementing an airport-wide SPCC policy.

Developing an SPCC policy can help establish an airport-wide baseline and minimum acceptable standards for SPCC compliance. Examples of policy components include establishing likely discharge volumes for typical oil transfer operations, required operations (e.g., mobile refuelers, generators, fueling, etc.) to be included in tenant plans, minimum inspection frequencies, minimum reporting measures, clean-up responsibilities, response measures, and minimum amounts of spill response materials that are to be available at any given time.



An airport may elect to be solely responsible for the entire facility’s SPCC compliance needs, including preparation and implementation of an airport-wide SPCC Plan. Alternatively, an airport can mandate that its tenants/fixed-base operators be responsible for their own compliance. For example, an airport operator may choose to develop an SPCC plan for the oil storage and handling operations for which it is directly responsible and have tenants/fixed-base operators responsible for SPCC compliance for their operations. An SPCC policy that delineates compliance between airports and tenants helps to minimize the regulatory burden for the airport operator. However, it is important for airport operators to understand tenant operations and how they are associated with SPCC compliance.






*Benefits*

- Promotes tenant understanding of airport planning and response measures to help prevent releases of oil
- Establishes procedures and responsibilities in the event of a spill
- Minimizes tenant SPCC plan inadequacies
- Provides facility-wide baseline for inspections and training
- Minimizes the need to coordinate responsibilities for shared facilities or drainage

### Spill-4: Establish a Spill Reduction Training Program

Environmental training sessions are critical for new and existing airport staff to learn new skills or reconnect with airport polices for which they are responsible. Specifically, establishing a spill reduction training program helps personnel identify and incorporate methods to reduce or prevent chemical spills during day-to-day operations.

There are a multitude of techniques that can be incorporated into an airport’s spill reduction training program. Examples include implementing storage container techniques that minimize discharges, such as limiting the number of containers in use at any one time or utilizing overpack containers for drums during maintenance activities. Training could also include procedures for securing drainage outlets or valves, maintenance of equipment, general facility operations, rules and regulations, posting of response procedures, and identification of contacts in the event of an emergency.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

#### *Benefits*






- Reduces spills incidents
- Minimizes spills from reaching surface waters
- Reduces the number of containers needed
- Increases awareness of methods to minimize spills, drips, or leaks

#### *Additional Resources*

- Snohomish County Airport, Paine Field  
<http://www.paineairport.com/classes.html>
- Austin-Bergstrom International Airport  
[http://www.ci.austin.tx.us/austinairport/downloads/appf\\_spillplan.pdf](http://www.ci.austin.tx.us/austinairport/downloads/appf_spillplan.pdf)

### Spill-5: Establish Airport-wide Procedures

The best time to develop airport-wide spill response and notification procedures is before your airport needs them. While preparing spill response and notification procedures are regulatory requirements for most airports, some do not have formalized procedures in place for spill discovery, notification, response, or cleanup. Additionally, existing procedures prepared by airports, tenants, fixed-base operators, and emergency responders may be inconsistent. Establishing airport-wide spill response and notification procedures increases the likelihood of timely response and appropriate notifications.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

Preparing thorough written procedures can be time consuming because it may require frequent coordination between airport staff, tenants, fixed-base operators, and emergency responders. However, this coordination is important so that comprehensive procedures can be developed. Key information needed to help develop procedures generally includes identifying potential spill sources, volumes, and locations; airport drainage patterns and infrastructure; and local/state spill reporting requirements. It

should be noted that most states and local municipalities post their spill notification requirements on an internet website.

Once the spill response and notification procedures are developed, the airport should communicate the information to the various stakeholders involved so that each is aware of its particular responsibilities. Additionally, ongoing efforts should be conducted to help ensure the procedures are reviewed and updated, as necessary, and that staff and stakeholders are aware of the procedure updates.

*Benefits*






- Promotes understanding of spill response and notification responsibilities between the airport, tenants, and response personnel
- Preparedness facilitates a timely and appropriate response to help mitigate potential environmental damages

*Additional Resources*

- EPA Storm Water Management Fact Sheet, Spill Prevention Planning  
<http://www.epa.gov/OWM/mtb/spillprv.pdf>

**Spill-6: Implement a Leak Detection Inspection Program for Bulk Storage Containers**

While inspections for aboveground and underground storage containers are regulatory requirements for some airports based on type, capacity, material stored, and end use, most airports storing chemicals or oil in aboveground and underground containers can benefit from the practice of routinely inspecting the containers. Airports may choose to implement a leak detection inspection program to help identify potential issues with storage containers prior to, or at the onset of, a leak rather than after a leak that could result in environmental impacts. Additionally, implementation of a leak detection program may be helpful for airports located in areas with the potential for groundwater interactions or nearby sensitive water resources that could be impacted by a leak.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Visual inspections are typically conducted for aboveground containers, whereas inspections of underground containers usually rely on the use of mechanical leak detection equipment. It is important that inspections are conducted at a regular frequency. For facilities that do not have to perform regular leak detection, it is suggested that the program calls for monthly container inspections. Longer inspection intervals may not capture a leak early enough to prevent a discharge, and shorter intervals may present an operational burden. It is also recommended that the program include a means for recordkeeping. This aspect of the program becomes important as leak detection records can be used for comparison to help detect slow changes in volume over time.

*Benefits*

- Detects leaks early before they result in a reportable discharge requiring costly remediation
- Identifies when containers need to be replaced or repaired
- Requires minimal time to perform inspection




*Additional Resources*

- EPA Preventing Underground Storage Tank Releases  
<http://www.epa.gov/OUST/fsprevnt.htm>

**Spill-7: Isolate Oil Storage Areas**

Storm drains are the primary route where leaks or spills have the greatest potential to reach surface waters. Additionally, leaks or spills that drain to sanitary drains may also impact surface waters. Guidance documents explain that since sanitary sewer systems are typically conveyed to a waste water treatment plant, which ultimately discharges to surface water, spills to the sanitary sewer system are of concern.

In the event a spill reaches a storm or sewer drain, it may be too late to prevent a discharge of oil offsite. Therefore, isolating oil storage areas from storm and sanitary sewer drains helps minimize the potential for spills and leaks of oil to reach surface waters. This practice can be especially important when fueling operations, maintenance activities, or existing oil storage containers are located within the vicinity of storm or sewer drains. The practice could be implemented by physically locating oil storage containers from drains or constructing barriers to prevent oil discharges from leaving a confined area. Airport operators should determine a reasonable distance that oil storage areas can be from drains. Spills and leaks from oil transfers (e.g., tank filling, emptying) could also be isolated by plugging nearby drains during the operation, and reopening after the operation is complete.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Benefits*

- Minimizes spills from leaving the facility
- Minimizes containers located in remote locations to be overlooked during inspections
- Increases potential for spill identification
- Confines spills to a localized area
- Minimizes areas requiring cleanup or remediation




*Additional Resources*

- EPA BMP Manual  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

**Spill-8: Maintain Spill Control Kits**

Airport activities involving chemicals or oil can result in small spills, drips, and leaks. Maintaining spill control kits in readily accessible areas can help minimize or prevent spills from reaching sanitary or storm drains or from migrating outdoors.

Spill control kits are usually plastic containers that are filled with spill response materials and can be easily purchased online or from local vendors. Some airports maintain mobile spill control trailers that are equipped with spill response materials and dispatched to an area in the event of a spill.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Spill control kits should be placed near all oil storage areas and other strategic areas where spills could occur, such as fuel farms and maintenance areas. The kits should also contain enough material to contain a spill from a typical spill source. Spill response materials include clay-type absorbent, kitty litter, or absorbent booms and pads. Kits should be periodically inspected to ensure adequate amounts of response materials are available and restocked as needed. If airport operators are concerned that spill response materials are disappearing, utilizing custody seals on the kits may discourage these occurrences.

*Benefits*






- Minimizes spills from reaching surface waters
- Minimizes cleanup operations to a localized area
- Increases awareness of methods to minimize spills, drips, or leaks

## Design and Construction Practices

Rather than depending on planning activities alone to help prevent and minimize spills, airports may choose to implement design and construction practices. These practices include physical structures or equipment to help prevent or minimize spills or discharges from occurring. Typically, these practices are specially designed or installed based on the airport’s needs. Since these methods are site-specific, design and construction information needs include the airport’s existing chemical or oil storage volumes, spill locations, and drainage features. Implementation of these practices could also result in identifying spills or leaks before they occur and could greatly reduce clean up costs or other regulatory-required actions that result from spill events.

### Spill-9: Construct Regional Secondary Containment

Airport operations may include staff, tenants, or fixed-base operators working in common areas throughout the airport property. Common use areas include terminal aprons, deicing areas, fueling ramps, or chemical/fuel storage areas. Additionally, uncontained spills or leaks at outdoor remote areas may not be detected until long after the spill or leak has occurred and drained offsite to a receiving water. Therefore, airport operators should consider constructing secondary containment for specific areas at the airport. This practice becomes especially important in the event a chemical or oil spill reaches surface waters and become the responsibility of the airport operator, even if it was not directly responsible for the discharge.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

Secondary containment is a means of preventing accidental discharges from leaving the facility. Airports could choose to provide one or more types of constructed containment for common use areas, which may be used by multiple tenants. For example, some airports provide secondary containment for shared fuel farms through runoff detention basins equipped with oil-skimming capabilities. These detention basins are similar to oil/water separators at fuel farm loading or unloading areas. Alternatively, airports could choose to provide airport- or area-wide secondary containment, such as detention basins equipped with valved outlets that are closed in the event of a spill. Outlets may be equipped with an electronic device that signals the valve to close when oil or hydrocarbons are detected.

*Benefits*




- Reduces tenant concerns about the potential inability to effectively provide adequate containment
- Reduces potential concerns about the airport’s containment capabilities
- Confines spills and discharges to a localized area
- Minimizes spills from leaving the facility
- Minimizes cleanup and remediation

*Additional Resources*

- Airport Business, Storm water Management  
[http://www.airportbusiness.com/print/Airport-Business-Magazine/Stormwater-Management/1\\$12984](http://www.airportbusiness.com/print/Airport-Business-Magazine/Stormwater-Management/1$12984)

**Spill-10: Install Spill Protection in Storm Drains**

Prevention of discharging polluted runoff into local waterways can be accomplished by installing catch basin inserts in critical storm drains. Typical catch basin inserts are designed to restrict drainage from an area by impeding flow. Catch basin inserts should be installed in areas that are identified as primary conveyance points or near potential spill areas (e.g., fuel farms). During fuel transfer operations, catch basin inserts are closed to restrict drainage and, in the event of a spill, contain the spill to a localized area (refer to Spill-5 and Spill-8). Once operations are complete and no discharges have occurred or spills have been adequately cleaned up, the drain is opened.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Daily</b>	<b>Savings</b> 

Another type of catch basin insert includes one that absorbs oil over a period of time, and when at capacity, impedes the flow of water. Inserts of this type should be periodically inspected to help ensure they have adequate absorbing capacity for the area and are replaced in the event of a large spill.

*Benefits*

- Confines spills to a localized area
- Minimizes spills from reaching surface waters
- Minimizes cleanup operations
- Considered a storm water BMP
- Relatively easy installation or removal within existing drainage system

*Additional Resources*

- Safe Drain®  
<http://www.safedrain.com/>
- Ab Tech Industries, Inc.  
<http://www.abtechindustries.com/index.asp?mid=80>



## APPENDIX A-7

# Chemical/Hazardous Material Storage Practices






The implementation of hazardous material and chemical management practices at small airports not only reduces the risk of releases of chemicals and hazardous materials to the environment, but can also mitigate the risk for unintentional harmful exposure to personnel. Chemicals and hazardous materials are used in many areas at an airport, including fueling, building construction, landscaping, and maintenance. Management of chemicals and hazardous materials includes proper storage, transport, disposal, documentation, training, and record-keeping. The following chemical/hazardous material storage practices will help prevent spills and leaks from reaching the storm water system at the airport.

Applicable Federal Regulatory Programs
<ul style="list-style-type: none"> <li>• Toxic Substances Control Act (Chapter 7)</li> <li>• Hazardous Material Transportation Act (Chapter 7)</li> <li>• Federal Insecticide, Fungicide, and Rodenticide Act (Chapter 4)</li> <li>• Safe Drinking Water Act (Chapter 8)</li> </ul>

- ✓ Develop a Chemical Storage Policy
- ✓ Maintain a Chemicals Database
- ✓ Isolate Chemical/Hazardous Material Storage

### CHM-1: Develop a Chemical Storage Policy

A policy on chemical storage requirements facilitates proper storage of hazardous materials and chemicals. The policy should include requirements for proper labeling, storage, and transport of chemicals. Information about which chemicals should be stored in flammables cabinets, and the proper storage practices for acids, bases, and other incompatible chemicals should be included. Appropriate storage containers that are compatible with the chemicals stored should be indicated. Be sure to consider all types of chemicals used on site in the policy (batteries, fuels, paints, maintenance fluids, cleaners, etc.). All chemicals and hazardous materials, including spent chemicals, used oil, and used paint should be appropriately labeled. Chemicals that will be transported off site need to be stored and labeled according to U.S.DOT requirements.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

In addition, proper secondary containment measures for drums and other storage containers should be included in the policy and should mimic what is stated in the airport SWPPP for materials stored in areas that could affect storm water. Utilize storage locations that are indoors in areas without floor drains wherever possible. Consider implementing purchasing practices designed to maintain only the amount of chemical that is needed on site. Include proper disposal or recycling practices for used and unused chemicals. The chemical storage policy should be reviewed during annual storm water pollution prevention training.

*Benefits*

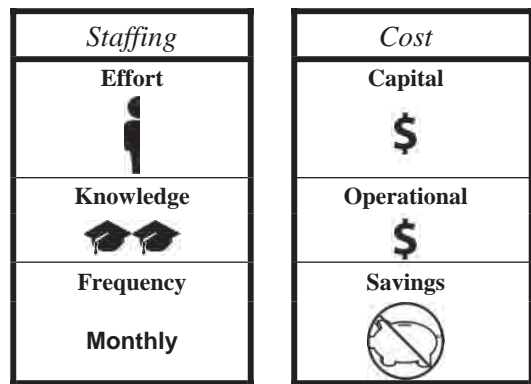
- Increases employee knowledge of chemical storage requirements
- Reduces leaks and spills from chemicals stored in inappropriate containers or without secondary containment
- Reduces risk of spills reaching the storm water system by storing chemicals indoors away from floor drains, when possible
- Reduces amount of chemicals and hazardous materials purchased and stored on site
- Reduces the likelihood of inappropriate disposal of chemicals
- Reduces the risk of reactions between incompatible chemicals stored in close proximity

*Additional Resources*

- National Laboratory Chemical Hygiene and Safety Plan  
<http://www.lbl.gov/ehs/chsp/html/storage.shtml>
- Pennsylvania Department of Environmental Protection EMS BMPs  
<http://www.dep.state.pa.us/dep/deputate/pollprev/Iso14001/BPManual/manual.htm>

**CHM-2: Maintain a Chemicals Database**

Maintaining a chemicals database keeps employees informed of the chemicals stored on site, encourages proper storage of chemicals, and provides information for the appropriate response in case of a spill. The database should include information about the storage container type (e.g., drums, totes, bags, etc.), secondary containment requirements, amount of chemical stored, and MSDS. Many companies offer off-the-shelf database software to maintain the appropriate information about chemicals and hazardous materials on site. When considering an on-line database, consider employee access to computers in the areas where the chemicals are used. If chemicals and hazardous materials are stored or used in remote areas, consider keeping a hard copy of the information contained in the database at these remote locations, and update the hard copy whenever the chemicals stored or used in that location change.



The information contained in the database should be referenced on a map of the facility indicating the chemical storage locations. The airport SWPPP should also contain information contained in the chemicals database for chemicals and hazardous materials stored in areas where spills or leaks could occur outdoors or in areas that reach storm drains. For each storage location shown on the map, the appropriate response in case of a spill, including use of storm drain covers, booms, or pads, and the pathway for spills to reach the storm system, should be indicated.

*Benefits*

- Reduces chance for spilled or leaked chemicals reaching the storm system due to appropriate response to spills
- Increases employee knowledge of chemical storage requirements
- Reduces risk of injury to employees from proper response to unintentional chemical exposure

*Additional Resources*

- OSHA/EPA Occupational Chemical Database  
<http://www.osha.gov/web/dep/chemicaldata/>

**CHM-3: Isolate Chemical/Hazardous Material Storage**

Isolating chemical and hazardous material storage areas not only promotes organization of these chemicals, but also facilitates spill response. Use MSDS to determine the appropriate containers for storage of chemicals and hazardous materials to ensure the container is compatible with the chemical stored. Properly label all chemicals and hazardous materials, including used chemicals, and store incompatible chemicals like bleach and ammonia separately.

Store chemicals and hazardous materials indoors and away from floor drains when possible. If it is not possible to store materials indoors, ensure storage areas are covered and located away from storm drains. Designate specific chemical and hazardous materials storage areas and ensure the areas are well-marked indicating the type of chemicals stored. Keep spill kits in chemical storage areas, and stock them with spill response materials appropriate for the chemicals stored and the potential spill pathways (i.e., granular absorbent for indoor maintenance areas, booms for outdoor fuel storage areas near storm ditches.). Include descriptions of all chemical and hazardous material storage areas where spills or leaks could affect storm water or surface water in the airport SWPPP and include information about the appropriate storage areas in the annual SWPP training.






Provide secondary containment for drum storage areas. Regularly inspect chemical and hazardous materials storage areas and secondary containment for leaking containers, inspect and remove fluids found in secondary containment and dispose of collected materials properly, and replace leaking or compromised containers.

*Benefits*

- Reduces likelihood of spills and leaks reaching storm system by storage of materials in areas that are unlikely to affect storm water or surface water
- Faster response to spills in materials storage locations by stocking spill kits with appropriate spill response materials based on the chemicals stored
- Mitigates risk of leaking drums and storage containers from affecting storm water or surface water by providing secondary containment

*Additional Resources*

- National Laboratory Chemical Hygiene and Safety Plan  
<http://www.lbl.gov/ehs/chsp/html/storage.shtml>
- Pennsylvania Department of Environmental Protection EMS BMPs  
<http://www.dep.state.pa.us/dep/deputate/pollprev/Iso14001/BPManual/manual.htm>

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b>	<b>Savings</b> 
<b>Ongoing</b>	

## APPENDIX A-8

# Pesticide Application, Certification, and Disposal Practices






The amount of pesticides and herbicides used by small airports and the areas where they are applied may rival larger airports due to the amount of grassy areas at small airports. Implementing smart pesticide and herbicide application practices will increase the effectiveness of the chemicals, reduce the likelihood that the chemicals will be washed into nearby receiving waters during rain events, and reduce the amount of pesticides and herbicides used, saving the airport money. The following pesticide application, certification, and disposal practices will help reduce the amount of pesticides applied at the airport, and provide procedures for proper and efficient pesticide application, certification and disposal.

Applicable Federal Regulatory Programs
<ul style="list-style-type: none"> <li>• Toxic Substances Control Act (Chapter 7)</li> <li>• Hazardous Material Transportation Act (Chapter 7)</li> <li>• Federal Insecticide, Fungicide, and Rodenticide Act (Chapter 4)</li> <li>• Safe Drinking Water Act (Chapter 8)</li> </ul>

- ✓ Reduce Herbicide/Pesticide Use
- ✓ Utilize Low-toxicity Pesticides/Herbicides

### Pesticides-1: Reduce Herbicide/Pesticide Use

Reducing the application of herbicides and pesticides reduces the likelihood that these chemicals may infiltrate into groundwater or be washed into receiving streams. To accomplish this, airports should consider utilizing pest resistant landscape materials and native species as these materials are less likely to require frequent herbicide or pesticide application. Conducting a soil test to determine the amount of fertilizer needed for the type of vegetation will help avoid over application. Instead of broad application, spot applications, in areas where needed, will reduce the use of herbicides and pesticides. Mulching or composting grass clippings will further reduce the amount of artificial fertilizer needed.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b>	<b>Savings</b> 
<b>Ongoing</b>	

Airport staff or contractors should avoid applying herbicides when a rain event is likely so that the chemical is not immediately washed into nearby receiving waters. Applications in areas prone to flooding or rapid storm water runoff, and near storm water catch basins, ditches, wetlands, lakes, streams, or coastal waterways should be avoided so that the chemicals are less likely to affect these sensitive areas.

When applying fertilizer in newly vegetated areas, airport staff or contractors should use erosion control measures to keep fertilizers in place, and incorporate the fertilizer into the soil to reduce the chances it will erode. They should avoid applying fertilizer and herbicides in high wind conditions so that chemicals are only applied where needed.

*Benefits*

- Reduces the amount of herbicides and pesticides used
- Reduces the chance of herbicides and pesticides contaminating surface water and ground water






*Additional Resources*

- EPA regulations on pesticides  
<http://www.epa.gov/pesticides/regulating/laws.htm>
- City of Knoxville BMPs on Pesticides Herbicides and Fertilizers  
[http://www.cityofknoxville.org/engineering/bmp\\_manual/AM-13.pdf](http://www.cityofknoxville.org/engineering/bmp_manual/AM-13.pdf)
- Michigan Department of Environmental Quality—Pesticide Management for Turfgrass and Ornamentals  
[http://www.michigan.gov/documents/deq/deq-wb-nps-pm\\_250893\\_7.pdf](http://www.michigan.gov/documents/deq/deq-wb-nps-pm_250893_7.pdf)

**Pesticides-2: Utilize Low-toxicity Pesticides/Herbicides**

Utilizing pesticides and herbicides that have low-toxicity to animals and aquatic life will reduce the unintended effects pesticides and herbicides have on receiving waters and local wildlife. Staff or contractors responsible for grounds maintenance should review the pesticides and herbicides used on site annually to determine if a better low-toxicity product is available. Management must ensure that staff are properly trained and certified to apply the pesticides used at your airport.

Switching from restricted-use to general-use pesticides and herbicides will reduce the toxicity of chemicals used that may affect surface water runoff or infiltrate and affect groundwater. Airports should consider the use of organic pesticides that are typically less toxic and present a lower risk of storm water pollution. They should carefully select the type of pesticides and herbicides based on the pest, and choose the chemical that will yield the desired results with the lowest environmental impact.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

*Benefits*

- Reduces toxicity of runoff reaching receiving waters and ground water

*Additional Resources*

- EPA regulations on pesticides  
<http://www.epa.gov/pesticides/regulating/laws.htm>
- City of Knoxville BMPs on Pesticides Herbicides and Fertilizers  
[http://www.cityofknoxville.org/engineering/bmp\\_manual/AM-13.pdf](http://www.cityofknoxville.org/engineering/bmp_manual/AM-13.pdf)
- Michigan Department of Environmental Quality—Pesticide Management for Turfgrass and Ornamentals  
[http://www.michigan.gov/documents/deq/deq-wb-nps-pm\\_250893\\_7.pdf](http://www.michigan.gov/documents/deq/deq-wb-nps-pm_250893_7.pdf)

## APPENDIX A-9

# Underground Storage Tank Practices




Unlike aboveground storage systems (AST) where visual inspections are possible and spills and leaks are easy to identify, underground storage tank (UST) systems are more difficult to manage. Leaks cannot be identified by visual inspection, and releases occur directly to soil or groundwater making them more difficult to clean up than spills from aboveground tanks. Utilizing aboveground storage instead of underground storage, upgrading underground storage systems, and implementing procedures to prevent or quickly detect leaks from underground systems will help mitigate the risk of environmental impacts associated with utilizing underground storage. The following practices will help airports develop procedures to reduce the likelihood of undetected releases of materials from USTs:

Applicable Federal Regulatory Programs
<ul style="list-style-type: none"> <li>• Clean Water Act (Chapter 4)</li> <li>• Resource Conservation and Recovery Act (Chapter 4)</li> </ul>

- ✓ Utilize Aboveground Storage Tanks in Lieu of Underground Storage Tanks
- ✓ Upgrade Underground Storage Tanks
- ✓ Implement a Leakage Detection System
- ✓ Develop and Implement a Hazardous Material Storage Tank Management Plan

### UST-1: Utilize Aboveground Storage Tanks in Lieu of Underground Storage Tanks

When planning for new chemical or fuel storage, or when replacing USTs, airports should consider using ASTs instead of USTs. Because they can be visibly inspected, it is easier to detect and mitigate leaks from ASTs. Additionally, leaks from ASTs occur on the surface or into secondary containment where they can be captured, and USTs leak directly into the subsurface causing soil or groundwater contamination that can be difficult and costly to remedy. Height and space constraints around aircraft movement and non-movement areas may ultimately affect an airport’s selection of tank type.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Project Planning	Savings 

Replacing USTs with ASTs may result in the need for an SPCC plan. If the total aboveground storage capacity of ASTs storing typical airport petroleum products exceeds 1,320 gallons, an SPCC plan is required. An airport should provide secondary containment for aboveground storage, and regularly inspect, empty, and properly dispose of accumulated fluids collected in secondary containment.

#### *Benefits*

- Facilitates detection of leaks
- Reduces potential for leaks to reach soil and groundwater



### UST-2: Upgrade Underground Storage Tanks

Airports should consider upgrading aging single-wall USTs with double-wall USTs accompanied by automated monitoring. This will enable a monthly leak detection monitoring program consisting of monitoring the interstitial space between the inner and outer wall of the tank, automatic gauging of the tank, and reconciliation of tank content inventory.

Leak detection is equally important for UST piping. Pressurized piping should be equipped with an automatic shutoff device, flow restrictor, or continuous alarm. Annual line tightness testing or monthly monitoring is also required.

Suction piping typically requires monthly monitoring and line tightness testing every 3 years.

UST catchment basins keep spills that occur while filling the tank from reaching the environment. Because underground tanks cannot be visually monitored during filling, automatic shutoff devices, overflow alarms, or ball float valves should be used to prevent overflowing of the tank.




Corrosion on USTs can lead to cracks and holes in the tank that can eventually leak tank contents into surrounding soil and ground water. Corrosion protection is designed to prevent these cracks and holes from forming. New tanks are constructed of fiberglass reinforced plastic, or steel tanks coated and cathodically protected, or clad with fiberglass reinforced plastic. Existing steel tanks can be lined on the interior and cathodically protected.

#### Benefits

- Reduces likelihood of leaks from USTs
- Detects leaking USTs sooner and reduces the amount of material released




#### Additional Resources

- EPA Office of Underground Storage Tanks  
<http://www.epa.gov/oust/>
- Federal Regulations for Underground Storage Tanks  
<http://www.epa.gov/swerust1/fedlaws/40cfr280.pdf>

Staffing	Cost
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Project Planning	Savings 

### UST-3: Implement a Leakage Detection System

Fuel hydrant systems simplify operations around an airport ramp or terminal. There is reduced need for refueling trucks to maneuver around aircraft, and the risk of refueling truck-related incidents and spills are greatly reduced. Although efficient, fuel hydrant systems pose a risk for environmental impacts. Underground fuel pipes for hydrant systems often run long distances across the airport from the fuel tanks to the fueling points placing large areas at risk for subsurface leaks. If a leak is detected in a fuel hydrant system, determining the exact location can be very difficult without excavating the line.

Staffing	Cost
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Monthly	Savings 

Fuel hydrant systems constructed of double-wall piping will contain leaks between the inner and outer walls and will not contaminate soil or ground water. Fuel hydrant systems should also undergo annual line tightness testing to determine if there are any cracks or leaks in the piping. While not infallible, line leakage detection systems are designed to facilitate detection of leaks in fuel hydrant systems to minimize the environmental impact and potential cleanup required to remedy leaks. Leak detection systems may include tracer wires installed in the ground around the pipes, or systems that track the change in volume and pressure in the lines with temperature changes to determine if product is leaking from the lines. When selecting a leak detection system, airports should consider the leak detection system accuracy and minimum detectable leak rate, as leaks occurring below this detectable rate may still present a long-term environmental threat.

*Benefits*




- Facilitates identification of leaks
- Minimizes discharges to soil and groundwater

*Additional Resources*

- Federal Regulations for Underground Storage Tanks  
<http://www.epa.gov/swrust1/fedlaws/40cfr280.pdf>
- EPA Office of Underground Storage Tanks  
<http://www.epa.gov/oust/>

**UST-4: Develop and Implement a Hazardous Material Storage Tank Management Plan**

Implementing a hazardous material storage tank management plan will facilitate tracking of UST inspections and monthly monitoring, and can serve to identify tanks that need replacement. The plan can also include ASTs, piping associated with storage tanks, airport hydrant systems, fuel pumps, equipment fuel tanks, refueling vehicles, heating oil tanks, emergency generator tanks, fire pump tanks, oil-filled transformers, and hydraulic lift oil tanks. This plan can draw from an airport’s SPCC plan and include each storage container listed in the SPCC plan. A map should be included that indicates the location of all storage containers and the fuel hydrant system pipelines.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b>  <b>Annually</b>	<b>Savings</b> 

Including the following information about each storage tank will help facilitate tank inspections and identification of tanks for replacement:

- Location referenced on the map
- Contents
- Capacity
- Age of tank
- Tank construction
- Leak detection
- Corrosion prevention
- Overfill protection
- Spill protection
- Dates and results of monthly monitoring and annual tightness testing

The plan should also include a schedule for conducting monthly monitoring and annual testing, as applicable. Records of monthly monitoring and tank inspections should be kept with the plan, as reviews of past monitoring records can reveal UST system leaks over time.

*Benefits*

- Manages monthly monitoring and annual tightness testing
- Facilitates review of leak detection monitoring to detect leaks
- Maintains an inventory of tanks

*Additional Resources*

- EPA Office of Underground Storage Tanks  
<http://www.epa.gov/oust/>

## APPENDIX A-10

## Noise Practices

Noise is typically a sensitive issue for small airports when it comes to the surrounding local community. Therefore, to maintain valuable airport and community relations, airport operators should have an understanding of the types and levels of noise generated from their airports. Identification of noise characteristics can be accomplished through noise studies. In cases where noise is unavoidable, airport policies or mitigation measures can be implemented to minimize noise. These proactive noise practices are grouped into the following categories:

### Applicable Federal Regulatory Programs

- Aviation Safety and Noise Abatement Act (Chapter 5)
- Airport Noise and Capacity Act (Chapter 5)

- Planning Activities
  - ✓ Conduct an Aircraft Noise Study
  - ✓ Conduct a Part 150 Study
  - ✓ Conduct a Part 161 Study
- Community Involvement
  - ✓ Establish a Noise Complaint System
  - ✓ Produce a “Fly Quiet” Report
  - ✓ Establish a Community Noise “Roundtable”
  - ✓ Develop and Maintain a Community Noise Resource Website
  - ✓ Track Noise Complaints through a Geographic Information System
- Mitigation Measures
  - ✓ Construct a Ground Run-up Enclosure
  - ✓ Implement a Sound Insulation Program
  - ✓ Implement a Preferential Runway Use System
  - ✓ Construct Noise Walls
  - ✓ Identify Aircraft Engine Run-up Areas
  - ✓ Implement a Voluntary Curfew or Voluntary Restraint from Flying
  - ✓ Discourage Use of Reverse Thrust
  - ✓ Establish Real Estate Disclosures

The practices described in the following sections will help develop procedures to understand airport noise characteristics and identify potential solutions to mitigate unavoidable noise issues at the airport. Conducting noise compatibility studies is a voluntary measure for airports (unless the study is a required mitigation measure specified in a NEPA document). Although studies are not normally required, a Part 150 Study is necessary so that federal funding for mitigating aircraft noise impacts to the surrounding community can be authorized by FAA.




### Planning Activities

Airport operators can conduct planning activities to identify aircraft noise characteristics at their airport. Planning activities associated with aircraft noise consist of formal studies to define the aircraft noise environment, identify potential mitigation measures, and/or restrict access to the airport.

### Noise-1: Conduct an Aircraft Noise Study

Aircraft noise studies are voluntarily conducted by airports to define the aircraft noise environment surrounding the airport. An aircraft noise study conducted outside the formal requirements of a Part 150 Study provides an airport some leeway with regard to the scope and detail of the plan. However, since these studies are outside Part 150 requirements, federal funding through FAA's AIP planning grants is not available for the study or to fund potential noise mitigation measures (as with a Part 150 Study).

Aircraft noise studies performed outside of the Part 150 process can inform area residents of aircraft noise levels and assist in creating a dialogue between the airport and the surrounding community. The study could be tailored to an airport's and community's needs, such as the inclusion of noise monitoring and supplemental noise metrics (other than the DNL). Aircraft noise contour updates can be performed on an annual basis to account for changes in aircraft operations and fleet mixes.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

#### *Benefits*

- Establishes areas of predicted aircraft noise exposure levels
- Allows flexibility in choosing noise metrics that are applicable to the specific location and airport use
- Opens communication with residents affected by aircraft noise




#### *Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)

### Noise-2: Conduct a Part 150 Study

A Part 150 Study includes Noise Exposure Maps that define the existing and future (at least 5 years from the existing condition) aircraft noise exposure boundaries surrounding the airport. Part 150 Noise studies may be a requirement for some projects. The study also consists of a Noise Compatibility Plan to identify mitigation measures that could correct surrounding non-compatible land uses. Funding to conduct a Part 150 Study may be available through an FAA AIP planning grant. Recommended noise mitigation measures may also be eligible for FAA funding.

The basis for determining non-compatible land uses is the comparison of noise contours developed by the Integrated Noise Model and underlying land uses. Residential land uses are typically incompatible with aircraft noise levels of DNL 65 dB or greater.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b> If not eligible for federal funding
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>Project Planning</b>	<b>Savings</b> 

*Benefits*

- Establishes areas of predicted aircraft noise exposure levels for existing and future conditions
- Identifies non-compatible land uses
- Federal funding may be available to conduct a Part 150 Study and for implementing FAA-approved mitigation measures

*Additional Resources*

- Title 14 CFR Part 150, *Noise Control and Compatibility*  
[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150\\_main\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150_main_02.tpl)
- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)

**Noise-3: Conduct a Part 161 Study**

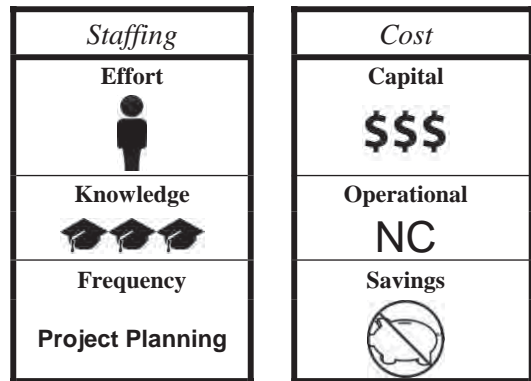
A Part 161 study must be performed to restrict particular aircraft from operating at an airport based on noise levels. This type of study is typically done after lengthy community opposition to noise surrounding an airport. Smaller airports have a high use by business jet aircraft that are less than 75,000 pounds, and therefore exempt from the phase-out of Stage 2 aircraft as prescribed by the ANCA.

*Benefits*

- Addresses strong community opposition to aircraft noise
- Aircraft restrictions can substantially decrease aircraft noise in areas surrounding an airport

*Additional Resources*

- Title 14 CFR Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*  
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=14:1.0.1.3.19&idno=14>
- Title 14 CFR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*  
[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=9eea2835dca447270645f9582d872924&c=ecfr&tpl=/ecfrbrowse/Title14/14cfrv3\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=9eea2835dca447270645f9582d872924&c=ecfr&tpl=/ecfrbrowse/Title14/14cfrv3_02.tpl)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)



**Community Involvement**

Active community involvement can be effective in addressing concerns regarding aircraft noise at airports. Residents of communities surrounding airports need to feel that they are part of the process and that their voice is being heard, or airports risk the potential for larger scale community opposition. TRB’s ACRP Report 15: *Aircraft Noise: A Toolkit for Managing Community Expectations* explores ways to improve communications with the public about issues related to aircraft noise exposure.



It is also important for an airport to understand that aircraft noise does not stop at the airport property boundary or a contour line, and personal annoyance to aircraft noise is subjective. Therefore, a noise problem can exist even at small airports where technically there are no incompatible land uses (according to 14 CFR 150) if area residents are annoyed by aircraft noise and are compelled to complain to the airport operator. The following practices facilitate community involvement to understand aircraft noise issues around airports.

**Noise-4: Establish a Noise Complaint System**




Residents of communities surrounding airports need to have a mechanism to register noise complaints. The implementation of a web- or telephone-based system to accept noise complaints lets concerned residents know that the airport is interested in hearing from them. Following up on complaints, either by telephone or e-mail, is also an important part of the process so residents know that their complaints are important.

*Benefits*

- Establishes a method for residents to document their noise complaints
- Long-term documentation can be analyzed for noise event patterns

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)




<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Monthly	Savings 

**Noise-5: Produce a "Fly Quiet" Report**

A Fly Quiet report typically scores and awards aircraft operators and airport tenants for noise abatement and/or minimization efforts. This type of reporting is important to foster an awareness of sensitive noise areas surrounding an airport by its users. A Fly Quiet report also facilitates community understanding of the measures taken by airport users to minimize noise impacts to the community.

*Benefits*

- Opens communication with residents affected by aircraft noise
- Provides a means for an airport to notify the local public about noise-reduction initiatives

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Monthly	Savings 

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

**Noise-6: Establish a Community Noise "Roundtable"**

A community noise roundtable is an ongoing coordination effort with the community to help respond to noise issues. A roundtable usually consists of community leaders that can disseminate information to residents. The setting should allow for open and honest discussions to provide the community leaders a better understanding of airport activities. It should also provide the airport with a better understanding of the community’s concerns so they can be addressed, if possible.

*Benefits*

- Opens communication with residents affected by aircraft noise
- Facilitates discussions with a number of different neighborhoods
- Provides a means for an airport to notify the local public about noise-reduction initiatives

*Additional Resources*




- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)




**Noise-7: Develop and Maintain a Community Noise Resource Website**

Establishing and maintaining a website to share information about airport operations and noise mitigation efforts allows residents to better understand airport operations. The transparency of airport and aircraft flight operations can be greatly enhanced by offering web-based flight tracking. With web-based flight tracking residents can identify where aircraft are flying and which aircraft are causing specific noise events.

*Benefits*

- Enables residents to identify specific aircraft events that are considered obtrusive
- Provides a means for an airport to notify the local public about noise-reduction initiatives
- Provides a forum for residents to understand airport operations

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Additional Resources*






- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

**Noise-8: Track Noise Complaints through a Geographic Information System**

Through use of a Geographic Information System, an airport may better identify where sensitive noise areas are located around the airport. With known noise complaint locations, an airport can develop effective mitigation strategies to minimize noise impacts.

*Benefits*

- Enables an airport to identify specific aircraft noise events reported by residents
- More clearly identifies noise sensitive areas

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

**Mitigation Measures**

Effective mitigation measures can be developed after proper planning and sufficient community involvement to define the aircraft noise environment, sensitive land uses, and causes of noise impacts. Each airport serves different aircraft types with different levels of operational demand. Some small airports have a much wider variety of aircraft and types of operations than larger commercial service airports. For example, some small airports have flight training activity consisting of touch-and-go operations during which aircraft continually arrive and depart the runway to practice landings and takeoffs. Small airports also may accommodate helicopter traffic, banner-towing activities, and business jet operations. Each type of operation affects the aircraft noise environment differently and needs to be considered when developing and implementing an effective noise abatement plan.



Because many small airports are not required to conduct Part 150 or Part 161 noise studies, land uses surrounding the airport are technically not considered incompatible. The TRB’s *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65* explores alternative actions currently used by airports to address noise outside the 65 DNL contour.


### Noise-9: Construct a Ground Run-up Enclosure

A ground run-up enclosure can help attenuate noise from engine run-up activity. Engine run-up operations are typically performed after aircraft maintenance is performed. They are conducted on the ground with the engine frequently running at maximum power.

*Benefits*

- Reduces ground-based aircraft noise exposure at sensitive areas close to the airport property line

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Once</b>

<i>Cost</i>
<b>Capital</b> <b>\$\$\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

### Noise-10: Implement a Sound Insulation Program



A sound insulation program can be developed and implemented for residences, schools, and other non-compatible land uses if these buildings are located in areas deemed incompatible with aircraft noise levels (according to 14 CFR Part 150). Sound insulation programs typically involve replacement of windows and doors and installation of central air conditioning and heating systems. Pre-installation and post-installation tests are performed to confirm the effectiveness of the insulation program. Sound-insulated residences and schools are considered compatible with aircraft noise levels greater than DNL 65 dB. These programs are usually recommended in a Part 150 Study and funded by FAA because implementation costs can be high.


*Benefits*

- Converts non-compatible land uses to compatible land uses

*Additional Resources*



- Title 14 CFR Part 150, *Noise Control and Compatibility*  
[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150\\_main\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150_main_02.tpl)
- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)


<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Once</b>

<i>Cost</i>
<b>Capital</b> <b>\$\$\$</b>
<b>Operational</b> <b>\$\$\$</b>
<b>Savings</b> 

### Noise-11: Implement a Preferential Runway Use System

Noise modeling using the integrated noise model can determine if changes in runway use could affect noise exposure over sensitive areas. If different runway use can safely and effectively reduce noise exposure in certain areas without shifting noise to other sensitive areas, then a voluntary preferential runway use system can be implemented. Preferential runways can only be used when wind conditions allow aircraft operators to choose which runway to use. Coordination with aircraft users and the Airport Traffic Control Tower is necessary to ensure effective participation.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Once</b>

<i>Cost</i>
<b>Capital</b> <b>\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

*Benefits*

- Shifts aircraft noise from non-compatible land-use areas to areas with compatible land uses

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

**Noise-12: Construct Noise Walls**




Near runway ends where takeoff roll is started and pre-flight engine run-ups occur, install noise walls using fabricated acoustical barriers or engineered earthen berms to mitigate noise for sensitive areas close to the airport property line.

*Benefits*

- Reduces ground-based aircraft noise exposure at sensitive areas close to the airport property line

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$\$
Knowledge 	Operational \$
Frequency Once	Savings 

**Noise-13: Identify Aircraft Engine Run-up Areas**




If the development of a ground run-up enclosure is impractical, then the establishment of specific areas on the airfield for aircraft engine run-up operations related to maintenance and pre-flight engine checks can reduce excessive noise levels in predetermined sensitive areas immediately surrounding an airport.

*Benefits*

- Reduces ground-based aircraft noise exposure at sensitive areas close to the airport property line

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once	Savings 

**Noise-14: Implement a Voluntary Curfew or Voluntary Restraint from Flying**






The implementation of a voluntary restraint from flying program to limit loud noise events during late nighttime and/or early morning time can reduce noise exposure and community annoyance. Coordination and communication with aircraft users is necessary to ensure effective participation.

*Benefits*

- Reduces noise exposure resulting from night flights
- Reduces overall DNL noise exposure due to the nighttime penalty for obtrusiveness

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- Title14 CFR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*  
[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=9eea2835dca447270645f9582d872924&c=ecfr&tpl=/ecfrbrowse/Title14/14cfrv3\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=9eea2835dca447270645f9582d872924&c=ecfr&tpl=/ecfrbrowse/Title14/14cfrv3_02.tpl)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

**Noise-15: Discourage Use of Reverse Thrust**






If an airport has a full-length taxiway(s), then minimizing the use of reverse thrust after landing can reduce the level of ground noise from aircraft operations close to the airport. Coordination and communication with aircraft users is necessary to ensure effective participation.

*Benefits*

- Reduces ground-based aircraft noise exposure at sensitive areas close to the airport property line

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 



**Noise-16: Establish Real Estate Disclosures**



The addition of language in real estate closing documents that discloses the location of the airport to the home buyer can enhance the understanding of new residents to the area. This type of notification requires a clear definition of the area in which disclosures are required and coordination with the local governments to ensure proper compliance.




*Benefits*

- Provides notification to home-buyers in areas potentially affected by aircraft noise and enables home buyers to make an informed decision

*Additional Resources*

- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b>
<b>Ongoing</b>

<i>Cost</i>
<b>Capital</b> 
<b>Operational</b> 
<b>Savings</b> 

## APPENDIX A-11

## Planning Practices

Implementing planning practices can be a challenge for small airports due to limited resources. However, proactive planning practices should be considered to assist with effective airport project implementation. The planning practices identified below may facilitate compliance with the regulatory requirements associated with historic, archaeological, and ethnological resources; NEPA; public relations planning; and sustainability planning, as summarized in this Guidebook. The following proactive practices related to planning and development are applicable to small airports and are grouped by topic.

- General Planning Practices
  - ✓ Maximize Light-colored or Vegetated Surfaces on Roof and Non-roof Areas
  - ✓ Implement Green Buildings Construction and Design/Leadership in Energy and Environmental Design™ Standards
  - ✓ Redevelop Previously Developed Sites
  - ✓ Proactively Evaluate Environmental Resource Conditions
  - ✓ Establish a Proactive Land Acquisition Program
  - ✓ Partner with Municipalities to Develop Compatible Land Uses
  - ✓ Consider Smart Growth/Density/Complete Streets for All On-airport Development
  - ✓ Local/Regional Transit Coordination/Cooperation
  - ✓ Develop a Noise and Land Use Compatibility Policy
- Cultural Resources Practices
  - ✓ Develop an On-site Cultural Resources Management Plan
  - ✓ Develop an On-site Unanticipated Discovery Plan
- Public Involvement Planning Practices
  - ✓ Develop a Public Involvement Program for Master Planning
  - ✓ Develop a Scoping Plan
  - ✓ Develop a Plan for Conducting Public Hearings, Workshops, and Meetings




### Applicable Federal Regulatory Programs

- National Environmental Policy Act of 1969, as Amended (Chapter 6)
- FAA Order 1050.1E, Change 1 Environmental Impacts: Policies and Procedures (Chapter 6)
- FAA Order 5050.4B, National Environmental Policy Act Implementing Instructions for Airport Actions (Chapter 6)
- National Historic Preservation Act of 1966 (Chapter 6)
- Department of Transportation Act of 1966 (Chapter 6)
- Archeological and Historic Preservation Act of 1974, as Amended (Chapter 6)
- Archeological Resources Protection Act of 1979, as amended (Chapter 6)
- American Indian Religious Freedom Act of 1978 (Chapter 6)
- Native American Graves Protection and Repatriation Act of 1990 (Chapter 6)
- Executive Order 13007, Indian Sacred Sites (1996) (Chapter 6)
- Executive Order 13175, Consultation with Indian Tribal Governments (2000) (Chapter 6)
- AC No. 150/5070-7, The Airport System Planning Process (Chapter 6)

## General Planning Practices

### Planning-1: Maximize Light-colored or Vegetated Surfaces on Roof and Non-roof Areas

Heat islands (thermal gradient differences between developed and undeveloped areas) are caused in large part by materials commonly used in urban areas, such as concrete and asphalt, which due to their unique thermal properties tend to absorb heat instead of reflecting it back into the atmosphere. Heat islands can have an adverse impact on the microclimate and human and wildlife habitat around the airport. It is because of the heat island effect that cities tend to be warmer than surrounding rural areas. Increased temperatures in developed areas can have the following impacts:

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Once</b> <b>(with new construction)</b>	<b>Savings</b> 

- Amplification of extreme hot weather events, which can impact public health, especially for vulnerable populations such as the elderly
- Increased energy demand for air conditioning in the summertime raises power plant emissions of harmful air pollutants. Higher temperatures also accelerate the chemical reaction that produces ground level ozone, or “smog.” The increased demand for summertime cooling can raise energy consumption. For every 1° F (0.6° C) increase in summertime temperature, peak utility loads in medium and large cities increase by an estimated 1.5 to 2%.

To reduce heat island effects, airports should consider maximizing the use of vegetation or light colored pavement for all airport surfaces such as roofs, roadways, parking lots, and sidewalks areas. Increased vegetation and/or lighter roofing or paving materials reflect more sunlight, thereby reducing the heat retained by building materials. This will also reduce cooling loads in the summer. Use caution when implementing reflective materials so as to not affect a pilot’s ability to safely operate the aircraft.

Potential strategies include shading constructed surfaces with landscape features, replacing constructed surfaces (i.e., roof, roads, sidewalks, etc.) with vegetated surfaces such as garden roofs and open grid paving or specifying high-albedo materials to reduce the heat absorption.

#### *Benefits*

- Reduces heat island effect
- Reduces energy consumption
- Reduces emissions of air pollutants associated with power plants
- Reduces ozone and smog in the atmosphere

#### *Additional Resources*

- EPA EnergyStar. *frequently asked questions about EnergyStar qualified roof products*  
[http://www.energystar.gov/index.cfm?c=roof\\_prods.pr\\_roof\\_faqs#s5](http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_faqs#s5)
- U.S. Green Building Council LEED™ for New Construction rating system, Heat Island effect  
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220>

## Planning-2: Implement Green Buildings Construction and Design/Leadership in Energy and Environmental Design™ Standards

Greening buildings and supporting infrastructure minimizes use of resources, reduces harmful effects on the environment, and creates healthier environments for people. Green buildings are facilities designed, constructed, renovated, and operated in an environmentally responsible and energy-efficient manner, making use of sustainable materials where possible. Due to the increased efficiencies and sensitivity to environmentally friendly products, green building design and construction often make both environmental and economic sense.






The LEED Green Building Rating System™ encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria (7).

Establish a policy to pursue LEED Certification (or similar standards) for New Construction, Existing Buildings, Commercial Interiors, as applicable. For example, develop a policy that states that new development projects obtain certification under the LEED Green Building Rating System™ and include LEED accredited professionals on the design team. Certification under the LEED Green Building Rating System™ is a way for an airport to be recognized for their commitment to environmental issues. Many airports that have created airport-specific sustainability guidelines using LEED have made their programs available to the public. These documents can be a very helpful tool for airports planning their first sustainability policies and planning to integrate LEED into the process.

For related material, see Admin and Policy-10 in Appendix A-24. In construction activities reuse materials, use materials with recycled content, and/or use local/regional suppliers of rapidly renewable resources, certified wood, and salvaged materials.

### *Benefits*

- Enhances and protects ecosystems and biodiversity
- Improves air and water quality
- Reduces solid waste
- Conserves natural resources
- Reduces operating costs
- Enhances asset value and profits
- Improves employee productivity and satisfaction
- Optimizes life-cycle economic performance
- Improves air, thermal, and acoustic environments
- Enhances occupant comfort and health
- Minimizes strain on local infrastructure
- Contributes to overall quality of life

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b> <b>(with new construction)</b>	<b>Savings</b> 




*Additional Resources*

- *Eco-friendly Terminal Opens at Greenville-Spartanburg Airport*  
<http://www.modernecohomes.com/blog/eco-friendly/eco-friendly-terminal-opens-at-greenville-spartanburg-airport/>
- Information about the LEED™ Certification process and the various Green Building Rating Systems is available on the U.S. Green Building Council’s website  
[www.usgbc.org](http://www.usgbc.org)

**Planning-3: Redevelop Previously Developed Sites**

When developing new facilities, build on a previously developed site or close to existing infrastructure to preserve undeveloped land and minimize impacts to the natural and cultural environments. Locate new buildings to reduce environmental impacts, protect habitat and open space, protect cultural resources (both above and below the surface), and retain productive agricultural lands. Structure locations should consider potential impacts not only from construction, but also from subsequent impacts that would occur during routine operations.

In addition, reuse of existing buildings extends the life cycle of existing building stock, conserves resources, retains cultural resources, reduces waste and environmental impacts from materials manufacturing and transport necessary for new buildings.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Once</b> <b>(with new construction)</b>	<b>Savings</b> 

*Benefits*




- Preserves and protects the integrity of natural and cultural resources
- Reduces environmental impacts to wildlife habitat and open space
- Retains productive agricultural land

*Additional Resources*

- PHX Mesa Gateway Airport, *Celebrating History, Envisioning the Future*  
<http://www.phxmesagateway.org/Content/Marketing/15YrAnniversaryBooklet.pdf>
- Dane County Regional Airport Earns Green Building Award  
<http://www.countyofdane.com/press/details.aspx?id=869>

**Planning-4: Proactively Evaluate Environmental Resource Conditions**

Performing a pre-NEPA analysis of environmental resources during the planning process could help identify potential environmental impacts early on in the process. Identifying environmental issues early on gives planners an opportunity to tailor development to minimizing environmental impacts. Identifying environmental issues early on can also result in reduced time and costs to complete the development project. For example, a pre-NEPA analysis may identify a wetlands or endangered species habitat within the proposed development area. Discovering these resources early on gives airports an opportunity to develop plans that minimize impacts.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

Incorporating environmental considerations into the planning process reduces the time and cost that would go into minimization or mitigation efforts, were the environmental issues to arise after the project has been developed. If possible, the airport should include the data gathered in a GIS database. When GIS is not available, the airport should archive the data for potential GIS use in the future.

If master planning is required, potential on- and off-airport impacts should be documented during the master planning process, as specified in FAA’s AC 150/5070-6B.

*Benefits*

- Reduces environmental impact associated with development
- Reduces time to evaluate environmental impacts, if they have been identified early on and will be avoided or minimized
- Reduces cost to mitigate environmental impacts if impacts are avoided/minimized




*Additional Resources*

- FAA AC 150/5070-6B, *Airport Master Plans*  
[http://www.faa.gov/regulations\\_policies/advisory\\_circulars/index.cfm/go/document.information/documentID/22329](http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/22329)

**Planning-5: Establish a Proactive Land Acquisition Program**

Hazards can arise when there is a demand for non-aviation land development in the vicinity of an airport. This can include incompatible residential land use and development of land creating wildlife attractants. By establishing an aggressive land acquisition program that seeks to prevent residential encroachment and preserve wetlands, green spaces, and other natural and cultural resources (in a manner that does not create hazardous wildlife attractants), these threats are mitigated.

The benefits of preserving wetlands include flood protection. Green space is shown to enhance employer and passenger well-being. These lands also serve as a natural buffer, providing separation between the airport and businesses/communities. However, preservation of wetlands and development of green space at airports must take into account the potential for the creation of hazardous wildlife attractants. Therefore, careful planning and design is required to avoid interaction of wildlife and aircraft operations to the greatest extent practical.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

Land acquisition for residential compatibility is addressed in Planning-9 Develop a Noise and Land Use Compatibility Policy, as well as in the noise practices provided in Appendix A-10.

*Benefits*

- Improves employee and passenger well-being
- Undeveloped land acts as a natural buffer between the airport and neighboring communities
- Increases land uses that provide flood protection, noise attenuation, pollution filters, and other positive environmental impacts
- Ensures land use compatibility which is more cost effective than retroactively converting land to compatible land uses






*Additional Resources*

- *ACRP Synthesis 10: Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)

**Planning-6: Partner with Municipalities to Develop Compatible Land Uses**

Airports typically do not have control over land outside the airport boundary. Local zoning and land use policies are typically within the authority of the adjacent jurisdictions. Airports should work with local municipalities to develop properties near the airport with the objective of discouraging the development of incompatible land uses such as residences, schools, and detention facilities.

Proactive zoning ordinances can prevent incompatible development. Considerable cost, time, and resource savings can be realized as the airport would not have to consider mitigation measures. It is important for airports to continually partner with the local jurisdictions to help ensure that appropriate ordinances are being developed and/or enforced.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

*Benefits*

- Minimizes incompatible development around the airport
- Prevents construction of new homes within the DNL 65 dB noise contour




*Additional Resources*

- Colorado Airport Operators Association, *Airport Overlay Zoning*  
<http://www.psrc.org/transportation/airtrans/compatible/biblio/>
- Airport Compatible Land Use Planning References  
<http://www.psrc.org/transportation/airtrans/compatible/biblio/>

**Planning-7: Consider Smart Growth/Density/Complete Streets for All On-airport Development**

Airports should consider the density and the ability to walk to commercial office, retail, and hotel zones on airport property. Ensure that sidewalks are present and provide direct and safe access to bus stops and rail stops. Airports should also provide bicycle lanes and paths to/from the airport and encourage transit authorities to operate bicycle-friendly vehicles. For related material, see Energy-1 and Energy-3 in Appendix A-23.

Connectivity and transit-oriented, walk-able, and bicycle-friendly development leads to less automobile use and fewer environmental impacts. Airports with complete street design have the ability to improve safety by reducing pedestrian risk.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> NC
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

An airport may want to consider building in a compact space and developing vertically rather than horizontally in order to minimize building footprint(s). Fresno Yosemite International Airport, for example, sited its new consolidated rental car facility adjacent to the baggage pick-up area to eliminate the need for ground transportation to and from the rental car facility. This initiative saved the airport the costs associated with the ground transportation and avoided air and GHG emissions that would have otherwise occurred.

*Benefits*

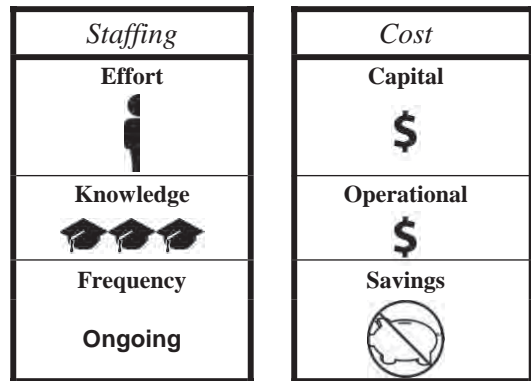
- Decreases automobile congestion
- Increases pedestrian safety
- Reduces environmental impacts including air and water pollution
- Preserves open space

*Additional Resources*

- Fresno Yosemite International Airport, *Parking and Ground Transportation Initiatives* in the following Airport Information Document  
[http://www.fresno.gov/NR/rdonlyres/06865FBE-317F-493D-84FE-16860C830874/11260/AirportHistory\\_Oct2008.pdf](http://www.fresno.gov/NR/rdonlyres/06865FBE-317F-493D-84FE-16860C830874/11260/AirportHistory_Oct2008.pdf)
- EPA Smart Growth website  
<http://www.epa.gov/dced/index.htm>
- National Complete Streets Coalition  
<http://www.completestreets.org/>

**Planning-8: Local/Regional Transit Coordination/Cooperation**

Airports should communicate with local and regional transit authorities to advance transit connection opportunities. Work with local planners and transit agencies to coordinate long term regional and local transportation plans. These entities should be aware of future growth scenarios and redevelopment plans for the airport so they can anticipate the transportation needs of employees and customers. The redevelopment goals of the airport should be presented to state and local agencies and coordinated with any current and future intermodal transportation initiatives to help the airport attain a more prominent status in the regional transportation system.



During communications, available data relating to trip origins and destinations for employees and passengers, or projections of future use should be shared among all interested transportation and planning entities to aid in this process.

In coordination with local/regional transit agencies and officials, develop and implement a program to promote increased use of public transit by employees and passengers as a means of reducing traffic congestion and parking demand at the airport. The program could include educating employees and the public about the transit options to/from the airport in the form of an annual “Transportation Awareness Day” or similar event to attract public interest. The program would also include providing employees with discounted public transit passes, or reimburses employees for this charge, to encourage the use of public transportation. For related material, see Energy-2 in Appendix A-23.

*Benefits*

- Provides easier access to the airport
- Encourages use of public transportation
- Reduces traffic around the airport
- Improves airport/community relations by working closely with local and regional agencies






*Additional Resources*

- Multi-modal Coordination—Transit Schedule Coordination  
[http://www.consystem.com/florida/integrated/web/files/mppdfs/mpSH\\_452.pdf](http://www.consystem.com/florida/integrated/web/files/mppdfs/mpSH_452.pdf)

**Planning-9: Develop a Noise and Land Use Compatibility Policy**

Airports can determine non-compatible land use by comparing airport noise contours with underlying land uses. Residential land and similar land uses are typically incompatible with aircraft noise levels of DNL 65 dB or greater. Some measures, such as operational procedures, can be recommended even without producing noise contours

Airports could establish a compatible land use plan in conjunction with local jurisdictions as a preventive measure, to maintain compatible land uses in the vicinity of the airport. Zoning restrictions are the most common way to prevent non-compatible land uses.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b> <b>(with periodic review)</b>	<b>Savings</b> 

Zoning is not retroactive. Therefore, the noise and land use compatibility policy may include acquiring land beyond the DNL 65 dB noise contour to prevent residential encroachment and preserve natural systems. Acquisition of land can be costly. However, if local ordinances have established a lower noise limit for compatible land use, federal funding may be available to assist in acquiring non-compatible land through a FAA-approved Part 150 Study. For related material, see Noise-2 in Appendix A-10.

Other preventive measures can be included in the noise and land use compatibility policy such as operational procedures and local building codes. These, and other preventive measures, are discussed in more detail in *ACRP Synthesis 16, Compilation of Noise Programs in Areas Outside DNL 65* and FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*.

*Benefits*

- Ensures land use compatibility which is more cost effective than retroactively converting land to compatible land uses
- Fosters a positive public perception of the airport’s initiatives
- Reduces the possible impacts of future noise

*Additional Resources*




- FAA AC 150/5020, *Noise Control and Compatibility Planning for Airports*  
[http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/F4FAE43A49D9F2FE86256C720077AD35?OpenDocument)
- *ACRP Synthesis 16: Compilation of Noise Programs in Areas Outside DNL 65*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_016.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_016.pdf)

## Cultural Resources Practices

### Planning-10: Develop an On-site Cultural Resources Management Plan

Both development and routine operations at an airport can have an impact on archaeological, historical, and ethnographic sites and places. Of most concern are cultural resources listed or eligible (or potentially eligible) for listing on the NRHP. A Cultural Resources Management Plan is a management guide to the treatment of these resources and to the process of resource identification required in areas not previously surveyed for cultural resources on site.

Develop a Cultural Resources Management Plan prior to development as a proactive approach to managing cultural resources at the airport. The plan should be developed in coordination with a preservation planner and should include a process for identifying cultural resources (including a contact person) and determining eligibility on the NRHP. The Cultural Resources Management Plan should comply with applicable archaeological, historical, and ethnographic regulations, as outlined in Chapter 6, including the Antiquities Act of 1906; NHPA; Executive Order 11593, Protection and Enhancement of the Cultural Environment; AHPA; and ARPA.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once	Savings 

#### *Benefits*

- Ensures compliance with applicable regulations
- Facilitates more efficient and cost effective handling of NRHP eligible/potentially eligible resources by providing a standard approach for resources at the airport
- Ensures a consistent approach to management of cultural resources

#### *Additional Resources*

- ACHP, NRHP evaluation criteria  
<http://www.achp.gov/nrcriteria.html>
- *Antiquities Act of 1906*  
<http://www.nps.gov/history/local-law/anti1906.htm>
- *NHPA*  
<http://www.achp.gov/nhpa.html>
- Executive Order 11593, *Protection and Enhancement of the Cultural Environment*  
<http://www.archives.gov/federal-register/codification/executive-order/11593.html>
- *Archaeological and Historic Preservation Act of 1974*, as amended  
<http://www.thecre.com/fedlaw/legal13/archpreserv.htm>
- *ARPA*  
<http://archnet.asu.edu/Topical/CRM/usdocs/arpa79.html>

### Planning-11: Develop an On-site Unanticipated Discovery Plan




The unanticipated discovery of cultural resources during construction or routine maintenance actions can cause significant construction or schedule delays to a project. An Unanticipated Discovery Plan, which is usually an appendix to the Cultural Resources Management Plan (see Planning-10), provides the response framework for the environmental manager in the event that unanticipated finds are discovered.

#### Benefits

- Ensures compliance with applicable regulations
- Facilitates more efficient and cost effective handling of unanticipated cultural resources if a plan is set up prior to identification of such resources
- Ensures consistent process for managing unanticipated cultural discoveries

#### Additional Resources




- ACHP, NRHP evaluation criteria  
<http://www.achp.gov/nrcriteria.html>
- *Antiquities Act of 1906*  
<http://www.nps.gov/history/local-law/anti1906.htm>
- *NHPA*  
<http://www.achp.gov/nhpa.html>
- Executive Order 11593, *Protection and Enhancement of the Cultural Environment*  
<http://www.archives.gov/federal-register/codification/executive-order/11593.html>
- *Archaeological and Historic Preservation Act of 1974*, as amended  
<http://www.thecre.com/fedlaw/legal13/archpreserv.htm>
- *ARPA*  
<http://archnet.asu.edu/Topical/CRM/usdocs/arpa79.html>

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once	Savings 

## Public Involvement Planning Practices

### Planning-12: Develop a Public Involvement Program for Master Planning

FAA AC 105/5070-6B, Airport Master Plans requires the development of a public involvement program at the beginning of the airport planning process. Per the AC, the public involvement program should be designed to encourage information-sharing and collaboration among the airport sponsor, users and tenants, resource agencies, elected and appointed public officials, residents, travelers, and the general public. The program should also provide stakeholders with an early opportunity to comment, before major decisions are made; provide adequate notice of opportunities for their involvement; and should provide for regular forums throughout the study.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once (with periodic updates)	Savings 

To efficiently comply with AC 105/5070-6B, airports should develop a comprehensive public involvement program that can be implemented as needed during the master planning process. The plan should include guides for keeping the public up to date periodically during the master planning process (annually or whatever is most appropriate based on the scale of development) and provide example forums (e.g., meetings, small group discussions, newsletters, etc.). For example, public involvement could be achieved through the publication of annual reports, public open house events, and/or the creation of a website that summarizes the master plan development status, next steps, and future opportunities for public involvement. Master plans should be made available to the public for review and comment, with clear instructions on how and when to provide comments. When appropriate, public meetings with an open house format should be held to answer questions and receive public comments and input.

After the program has been implemented, the effectiveness of the process should be evaluated and revised as necessary for future master plans. The master planning public involvement program should be revised to highlight activities that are most effective at attracting public input, incorporate new technologies as they become available, and limit practices that have not been successful in reaching the public.

*Benefits*

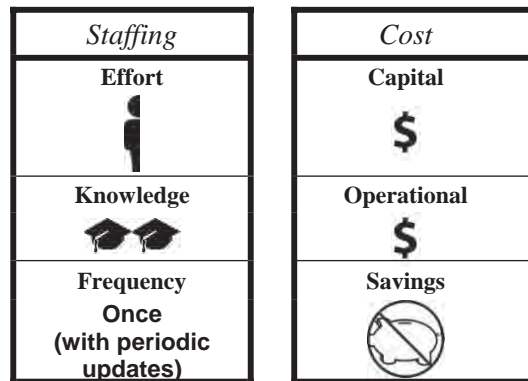
- Improves community profile by consistently and openly involving the public in the master planning process
- Complies with FAA AC 150/5070-6B, Airport Master Plans
- Facilitates early and open public input in the master planning process
- Facilitates a collaborative approach to master planning

*Additional Resources*

- FAA AC 150/5070-6B, *Airport Master Plans*  
[http://www.faa.gov/airports/resources/advisory\\_circulars/index.cfm/go/document.current/documentNumber/150\\_5070-6](http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5070-6)

**Planning-13: Develop a Scoping Plan**

Both the NEPA and CEQ regulations require public involvement, including scoping, as part of the planning process when an EIS is required, and is optional for an EA. An EIS is required when development activities are expected to result in significant impacts to environmental, social, and/or cultural resources. Scoping is defined by CEQ as an early and open process for determining the scope of issues to be addressed in an EA or EIS and identifying the significant issues related to a proposed action (40 CFR 1501.7). The purpose of scoping is to identify significant environmental issues to be analyzed in greater depth, identify and eliminate issues that are insignificant or which have been covered by prior environmental review, and set the temporal and geographic boundaries of the EIS. Scoping (with agencies and/or the public) also allows the responsible FAA official to identify available technical information and additional reasonable alternatives.



As part of the planning process, airports should develop a scoping plan to be carried out during the early stages of airport planning and development. Even if an EIS (or EA) is not required, public



involvement in the form of scoping can be a helpful tool for identifying public concerns about the project, addressing questions, identifying potential alternatives, and, as a result, improving public relations. Scoping is designed to facilitate early and open communications between the public and the agency responsible for development (i.e., the airport or FAA). Scoping may also be extended to include the involvement of affected federal, state, and local agencies and tribal representatives (required under NEPA).

The public should be involved in the scoping process through public meetings and/or small group discussions, which provide a forum for questions, comments, and feedback. Project information may also be published on a website, including contact information and links to provide comments/concerns and to submit questions. The scoping plan should identify the parties to be included in the scoping process and how the public will be included (i.e., via meetings, website, public mailings, combination of means, etc.).

After completing project scoping, the effectiveness of the process should be evaluated and revised, as necessary for future scoping events. The scoping plan should be revised to highlight activities that are most effective at attracting public input, incorporate any new technologies as they become available, and limit practices that have not been successful in reaching the public.

*Benefits*

- Facilitates early and open communication with the public
- Identifies the environmental, social, and cultural issues of most concern to the public
- Improves community relations by consistently and openly involving the public in the planning process






*Additional Resources*

- CEQ *Regulations for Implementing NEPA*, Section 1501.7—Scoping  
[http://ceq.hss.doe.gov/nepa/regs/ceq/toc\\_ceq.htm](http://ceq.hss.doe.gov/nepa/regs/ceq/toc_ceq.htm)
- FAA, Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (March 2006), Section 208 – Public Involvement  
[http://www.faa.gov/documentLibrary/media/order/energy\\_orders/1050-1E.pdf](http://www.faa.gov/documentLibrary/media/order/energy_orders/1050-1E.pdf)
- FAA, Order 5050.4B, *NEPA Implementing Instructions for Airport Actions* (April 2006), Chapter 5 – Public Participation  
[http://www.faa.gov/airports/resources/publications/orders/environmental\\_5050\\_4/media/5050-4B\\_complete.pdf](http://www.faa.gov/airports/resources/publications/orders/environmental_5050_4/media/5050-4B_complete.pdf)

**Planning-14: Develop a Plan for Conducting Public Hearings, Workshops, and Meetings**

Both the NEPA and CEQ regulations require public involvement as part of the planning process if an EIS is required. Public participation is an optional part of an EA. CEQ defines a public hearing as a gathering under the direction of a designated hearing officer for the purpose of allowing interested parties to speak and hear about issues of concern. Title 40 CFR 1506.6I states that public hearings should be held whenever appropriate or to meet statutory requirements applicable to an agency.

Public involvement can be a beneficial tool for keeping the public up to speed about airport planning and development

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency Once (with periodic updates)	Savings 

projects, identifying public concerns about these projects, and addressing questions. Meetings, hearings, and/or workshops serve as excellent forums to:

- Update the community on project status
- Identify issues of concern (and identify issues of concern)
- Identify next steps
- Ensure the public is aware of any documents available for public review
- Discuss other opportunities for public involvement related to the project

Although each project will be different, having a plan in place will allow for consistent levels of public involvement during planning activities and can serve as a valuable reference. The plan could include reference information relative to potential means of involvement (i.e., suggested forums), meeting locations, frequency of involvement, interested parties (based on past experience or other area projects), and format of event advertisements. Public meetings, workshops, and/or hearings should be conducted periodically during planning and development at the airport. If the public meetings (or workshop or hearing) are to be conducted in connection with an EA or EIS, the document should be available to the public 30 days prior to the event.

The frequency of public involvement will be determined based on the size of a particular project and the potential risk for impacts. For example, a project expected to be completed in six months with no impact to environmental resources would require less public involvement than a project spanning a few years and potentially impacting wetlands and endangered species. The more complex the project, the more beneficial the public involvement is likely to be. Public events related to planning and/or development should be advertised in advance using means such as newsletters, website announcements, community center, or church bulletins, and/or a public notice in local newspapers. Giving attention to all populations, particularly those with environmental justice considerations, will ensure everyone is invited and provided access to the public participation process.

After completing the public involvement for a project, an airport should evaluate the effectiveness of the process and revise it, as necessary, to highlight activities that are most effective at attracting public input, incorporate any new technologies as they become available, and limit practices that have not been successful in reaching the public.

#### *Benefits*

- Facilitates open communication with the public
- Improves community relations by consistently and openly involving the public in the planning process
- Reduces timeframe of the planning process if impacts/concerns are identified early in the process by the public

#### *Additional Resources*

- CEQ Regulations for Implementing NEPA, Section 1506.6, *Public Involvement*  
[http://ceq.hss.doe.gov/nepa/reg/ceq/toc\\_ceq.htm](http://ceq.hss.doe.gov/nepa/reg/ceq/toc_ceq.htm)
- FAA, Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (March 2006), Section 208—Public Hearings, Workshops, and Meetings  
[http://www.faa.gov/documentLibrary/media/order/energy\\_orders/1050-1E.pdf](http://www.faa.gov/documentLibrary/media/order/energy_orders/1050-1E.pdf)
- FAA, Order 5050.4B, *NEPA Implementing Instructions for Airport Actions* (April 2006), Chapter 5 – Public Participation  
[http://www.faa.gov/airports/resources/publications/orders/environmental\\_5050\\_4/media/5050-4B\\_complete.pdf](http://www.faa.gov/airports/resources/publications/orders/environmental_5050_4/media/5050-4B_complete.pdf)

## APPENDIX A-12

### Public Relations Practices

The public relations practices summarized below do not have federal regulatory requirements, but guidance is included in FAA regulatory programs. For example, AC 150/5070-7 provides practical guidelines for involving the community in a variety of aviation planning situations. These practices will assist with public relations outreach that is common with small airport activities. Airports should select those practices in areas of most concern to the airport and the community as a whole. The following proactive practices related to public relations are applicable to small airports.






**Applicable Federal Regulatory Programs**

- FAA AC No. 150/5070-7, The Airport System Planning Process (Chapter 6)
- FAA Order 1050.1E, Change 1 Environmental Impacts: Policies and Procedures (Chapter 6)
- FAA Order 5050.4B, National Environmental Policy Act Implementing Instructions for Airport Actions (Chapter 6)

- ✓ Adopt a Sustainability Communication Plan
- ✓ Establish a Recycling Education Program
- ✓ Showcase Airport Initiatives
- ✓ Report Annual Energy Consumption
- ✓ Make Environmental Monitoring and Reporting Data Available to the Public
- ✓ Construct an Observation Area

#### PR-1: Adopt a Sustainability Communication Plan

Airports should consider developing an internal and external communication plan to report on sustainability performance at the airport. Components of this plan could identify the benefits of each measure, focusing on those elements that are most important to the airport and surrounding community. Holding forums or soliciting written public comments is an effective means for identifying which topics related to sustainability are of most interest/concern to the community. Forums should be advertised through various means in order to reach as many people as possible in the community if the airport is seeking feedback. Outreach could include newsletters, website announcements, e-mails, community center or church bulletins, and/or in local newspapers. As part of this effort, an airport should publish an annual sustainability report and make it available to the public. If the airport already has a public outreach plan, it should integrate communication of sustainability plans and practices into the existing public outreach plan.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b>  <b>Once</b>	<b>Savings</b> 

*Benefits*

- Encourages feedback from the local community
- Determines information that will be provided to the public

*Additional Resources*

- The State of Sustainability Communication  
<http://www.greenbiz.com/sites/default/files/document/StateOfSustainabilityCommunications.pdf>

**PR-2: Establish a Recycling Education Program**




Airports can educate airport staff on everyday ways to reduce waste and save energy while at work by distributing informational signs and flyers that contain details on the types of materials that can be recycled at work and providing strategies for saving energy on a daily basis. For example, an energy-savings measure may be as simple as turning off lights when leaving a conference room or office, and turning computers off at night.

*Benefits*

- Reduces waste and saves energy

*Additional Resources*

- EPA’s *How to Start a Recycling Program at Your Airport*  
<http://www.epa.gov/osw/conserve/rrr/rogo/documents/airports.htm>

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once (with annual follow-up)	Savings 

**PR-3: Showcase Airport Initiatives**

Airports can showcase key airport initiatives to the local community as a demonstration and commercialization launch pad for alternative energy technologies and products. This effort can be achieved through methods such as marketing and press releases. An annual sustainability and/or energy consumption report could serve as a first step in promoting airport initiatives.




An airport can engage and educate its customers by creating a display within the terminal(s) or other frequented facilities explaining sustainability in general and publicizing current and/or planned sustainable initiatives at the airport.

*Benefits*

- Presents positive information that can be provided to the public






*Additional Resources*

- Naples Municipal Airport. *Sustainability, Conservation and Social Responsibility Plan*  
<http://www.flynaples.com/index.php/naples-airport-authority/sustainability>
- South Bend Regional Airport Sustainability Initiatives  
<http://www.sbnair.com/>

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once (with annual follow-up)	Savings 

### PR-4: Report Annual Energy Consumption

After implementing energy reduction strategies at an airport, the public can be informed about annual energy consumption and cost saving through an annual report or brochure. The report/brochure should provide information on existing energy consumption and cost reduction measures and compare energy consumption and costs before and after implementation of energy reduction strategies, as well as project future savings. This serves not only as a marketing mechanism but also provides the airport with an important tool to set and track energy goals and manage strategies. Providing this information to the public will make the airport accountable for carrying through with planned initiatives, increasing the likelihood that reductions will continue. Publicizing an annual energy consumption report will also aid in showcasing airport initiatives.






<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

*Benefits*

- Enhances transparency of airport activities
- Enhances relationship with the local community and other airport stakeholders

### PR-5: Make Environmental Monitoring and Reporting Data Available to the Public

Airport can use environmental monitoring and reporting data to showcase initiatives. The focus should be on initiatives that reduce costs and promote sustainability. Data that could be incorporated into the public report includes air quality/emissions reductions, noise abatements, energy consumption and costs, recycling measures, airport planning, water quality, and ground transportation options.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

To maximize public interest in this information, airports should gauge public interests in sustainable initiatives by soliciting public comments on the reports (either written or by holding forums for interested parties) and tailoring subsequent reports accordingly.

*Benefits*






- Enhances transparency of airport activities
- Enhances relationship with the local community and other airport stakeholders

*Additional Resources*

- Global Reporting Initiative’s A Snapshot of Sustainability Reporting in the Airports Sector  
<http://www.globalreporting.org/NR/rdonlyres/2B127FFE-16FC-4F3E-BC7C-9794F873270A/0/SnapshotAirportsSector.pdf>
- Massport’s *Airport Programs, Environmental*  
[http://www.massport.com/logan/airpo\\_envir.html](http://www.massport.com/logan/airpo_envir.html)

## PR-6: Construct an Observation Area

Constructing an observation area can showcase an airport as a location of interest where the public can come observe airplane departures, landings, and other operations. To attract the public, create a recreational area close enough to the airfield so the public can observe airport operations, but not within any protected airfield surfaces. An additional feature of some observation areas is speakers that are tuned to the frequency of the Airport Traffic Control Tower or the Universal Integrated Communication System frequency to hear Air Traffic Control Tower personnel and pilot communications.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

When creating a recreational area on airport property, consideration should be given to the implications of Section 4(f) of the U.S.DOT Act of 1966. Section 4(f) of the U.S.DOT Act states that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance unless there is no feasible and prudent alternative to the use of such land and such program. Therefore, future airport development may be affected by the development of a public-use recreational facility at an airport. Airport operators should be aware that recreational facilities are only subject to the requirements of Section 4(f) of the U.S.DOT Act if:

- A federal, state, or local agency having jurisdiction over the land determines that one of the facilities' major purposes and functions is for a park or recreation, and
- The entire recreation area permits visitation by the general public at any time during the normal operating hours of the facility.

### *Benefits*

- Provides a recreational area for the public
- Engages the public and showcases airport operations in a positive manner
- Enhances transparency of airport activities
- Enhances relationship with the local community and other airport stakeholders

### *Additional Resources*

- Raleigh-Durham International Airport, *Raleigh Durham International Airport Observation Park*  
<http://www.rdu.com/whileatairport/obpark.htm>
- The Baltimore Washington International Airport Trail  
[http://www.dnr.state.md.us/greenways/bwi\\_trail.html](http://www.dnr.state.md.us/greenways/bwi_trail.html)
- Gerald R. Ford International Airport  
<http://www.grr.org/Viewin.php>
- FAA, Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* (March 2006), Section 208 – Public Involvement  
[http://www.faa.gov/documentLibrary/media/order/energy\\_orders/1050-1E.pdf](http://www.faa.gov/documentLibrary/media/order/energy_orders/1050-1E.pdf)



## APPENDIX A-13

# Vegetation and Wildlife Management Practices

The implementation of vegetation and wildlife management practices at small airports not only reduces the risk of impacts to protected species and can be beneficial to the environment, but can also reduce the risk of aircraft incidents and accidents. Management of vegetation and wildlife should occur on all airport-owned land. The practices described in the following sections will assist with proper vegetation and wildlife management actions that are common with small airport activities. The practices related to vegetation and wildlife management are a proactive approach applicable to small airports, and are grouped by topic.






- Threatened and Endangered Species/Biodiversity Practices
  - ✓ Develop an On-site Conservation Area for Species of Concern
  - ✓ Establish a Tree Bank
- Vegetation and Wildlife Management Practices
  - ✓ Develop a Wildlife Hazard Management Plan
  - ✓ Choose Non-wildlife Attractant Plants
  - ✓ Conduct Long-term Vegetation Management
  - ✓ Avoid the Creation of Natural Open Water Features on or Near Airfield Sites that Attract Wildlife
  - ✓ Install Perforated Underground Drains or Dry Wells
  - ✓ Manage Vegetation to Maintain Rare and Non-hazardous Wildlife Habitat
  - ✓ Develop and Implement an Integrated Pest Management Plan
  - ✓ Plant Nitrogen-fixing Vegetation
- Biodiversity Practices
  - ✓ Replace Vegetation with Native Species During Construction or Mitigation Projects
  - ✓ Join in Partnerships with Environmental Nonprofit Organizations

Applicable Federal Regulatory Programs
• Endangered Species Act of 1973 (Chapter 6)
• Magnuson-Stevens Act of 1976, as amended (Chapter 6)
• Marine Mammals Protection Act of 1972 (Chapter 6)
• Migratory Bird Treaty Act of 1918 (Chapter 6)
• Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (2001) (Chapter 6)
• Bald Eagle and Golden Eagle Protection Act (Chapter 6)

### Threatened and Endangered Species/Biodiversity Practices

#### Wildlife-1: Develop an On-site Conservation Area for Species of Concern

Development and routine operations at an airport can have an impact on local biodiversity, including any threatened and endangered species in the area, when habitat for these species is reduced to accommodate airport development. To offset such impacts, an airport could establish conservation areas for species of concern and maintenance of local biodiversity. The conservation areas should be designed toward attracting non-hazardous species or be established a safe distance from airport operations and in compliance with the airport’s wildlife management plan (see Wildlife-3). For additional related information, see Wildlife-11.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency  Once	Savings 




Airports should coordinate with a wildlife biologist as well as officials at local parks, preserves, and forests to design the conservation area and ensure continued safe operations. For example, the airport could develop a habitat in a portion of airport property for tortoises with barriers to prevent access to the airfield.

*Benefits*

- Maintains area biodiversity with a focus on species of concern
- Offsets development with green space
- May assist with future permitting efforts

**Wildlife-2: Establish a Tree Bank**

Tree banking using native species may serve to offset impacts to trees from airport development or maintenance activities and to mitigate noise and air quality impacts. The tree bank could be established using native species in an area around the airport where residences have been demolished for noise mitigation purposes. The trees may further reduce noise pollution in the vicinity of the airport by serving as a sound barrier between the airport and neighboring communities. The tree bank should be designed toward attracting non-hazardous species or be established a safe distance from airport operations, in compliance with the airport’s wildlife management plan (see Wildlife-3).

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

A tree bank could also be achieved through the designation of an off-site public area for the planting of trees when it is not feasible to plant the required trees within their site’s project area. An alternative could be a tree preserve, already in place on public or private land, designated as a tree bank for the airport through the transfer of title to a public agency, the use of conservation easements or deed restrictions, or other methods.

In addition to offsetting airport development/tree loss, and improving ambient noise, tree banks also help to improve air quality by removing harmful pollutants from the air and, if located close to airport facilities, could help reduce energy costs by providing natural shade/cooling in summer months.

*Benefits*

- Offsets trees lost during airport development
- Maintains native species
- Reduces ambient noise
- Improves air quality
- Reduces energy costs
- Increases tree cover/green space




*Additional Resources*

- TreeLink  
<http://www.treelink.org/>

## Vegetation and Wildlife Management Practices

### Wildlife-3: Develop a Wildlife Hazard Management Plan

In recognition of the potential risk of serious aircraft damage or the loss of human life that could result from a wildlife strike, greater emphasis is being placed on preparing airport Wildlife Hazard Management Plans that effectively address potential aircraft safety hazards. 14 CFR Part 139.337 requires airports to develop a Wildlife Hazard Management Plan and secure approval for the plan from FAA. Airports that do not meet the requirements of 14 CFR Part 139 are not required to develop a wildlife hazard management plan, although they would still benefit from such a document.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$\$
<b>Frequency</b> Once	<b>Savings</b> 

Habitat management is a critical element in an airport hazard management program. The wildlife hazard control plan should specify all vegetated areas of the airport and document how the areas should be maintained so that they do not become attractants to wildlife potentially hazardous to airport operations. Other considerations in the wildlife hazard management plan should include the potential hazards resulting from dumpsters and buildings. For example, buildings have the potential to become roosting sites and should be routinely inspected; unsecured trash has the potential to attract wildlife. FAA AC 150/5200-33, *Hazardous Wildlife Attractants on or near Public Use Airports* provides guidance on land uses that have the potential to attract wildlife. The AC also discusses development projects affecting operations near wildlife attractants.

FAA AC 150/5200-33 recommends a distance of 5 miles between the farthest edge of an airport’s air operations area and a hazardous wildlife attractant. This is particularly important if the attractant could result in wildlife movement within the approach or departure airspace for an airport. For airports serving piston-powered aircraft, hazardous wildlife attractants must be 5,000 feet from the nearest air operations area, while for airports serving turbine-powered aircraft, hazardous wildlife attractants must be 10,000 feet from the nearest air operations area.

#### *Benefits*

- Reduces wildlife hazards to aircraft, such as bird strikes (increase safety)
- Complies with 14 CFR Part 139 and FAA AC 150/5200-33




#### *Additional Resources*

- 14 CFR Part 139 Section 139.337, *Certification of Airports, Wildlife Hazard Management*  
[http://rgl.faa.gov/REGULATORY\\_AND\\_GUIDANCE\\_LIBRARY/RGFAR.NSF/0/d7aff358f3b62a9486256ebb005c3c40!OpenDocument](http://rgl.faa.gov/REGULATORY_AND_GUIDANCE_LIBRARY/RGFAR.NSF/0/d7aff358f3b62a9486256ebb005c3c40!OpenDocument)
- FAA AC 150/5200-33, *Hazardous Wildlife Attractants on or near Public Use Airports*  
[http://www.faa.gov/airports/resources/advisory\\_circulars/index.cfm/go/document.current/documentNumber/150\\_5200-33](http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5200-33)
- USDA Wildlife Damage Management  
[http://www.aphis.usda.gov/wildlife\\_damage/index.shtml](http://www.aphis.usda.gov/wildlife_damage/index.shtml)
- FAA Wildlife Management  
<http://wildlife-mitigation.tc.faa.gov/wildlife/wildlifemanagement.aspx>
- FAA *Wildlife Strike Database*  
<http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx>

- Wildlife Hazard Management, The Wisconsin Airport Owner’s Perspective  
<http://www.dot.wisconsin.gov/library/publications/topic/air/wildlife-owners.pdf>

**Wildlife-4: Choose Non-wildlife Attractant Plants**

When selecting plants for the airport, airports should choose vegetation that does not attract wildlife to avoid hazards to aircraft. If applicable, plant selection protocols could be included in a Wildlife Hazard Management Plan developed for the airport. Hazardous wildlife is dependent on the location of the airport and could include birds such as geese, waterfowl, gulls, pigeons, doves and starlings, or migratory wildlife such as deer, coyotes, or moose. For example, tall fescue (a grass species) is recommended for use on temperate airfields because it may be unattractive to wildlife. Feeding on tall fescue may also discourage the presence of small mammals which are a primary attractant to soaring predatory birds.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

Vegetation found on airports should have low attraction to birds, small mammals, and insects; have hardy growth and good survival; and provide good ground coverage without being a fire hazard as documented by Seamans (8). Airports can work in cooperation with officials at local parks, preserves, and forests to advance forest and grassland management strategies meant to discourage species known to conflict with airport operations. Airport plans should be reviewed by a wildlife management biologist to minimize attracting hazardous wildlife consistent with FAA AC 150/5200-33, *Hazardous Wildlife Attractants on or near Public Use Airports*.

*Benefits*




- Reduces wildlife hazards to aircraft (increase safety)
- Complies with FAA AC 150/5200-33

*Additional Resources*

- FAA AC 150/5200-33, *Hazardous Wildlife Attractants on or near Public Use Airports*  
[http://www.faa.gov/airports/resources/advisory\\_circulars/index.cfm/go/document.current/documentNumber/150\\_5200-33](http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5200-33)

**Wildlife-5: Conduct Long-term Vegetation Management**

According to Barras and Seamans, wildlife strikes pose safety risks to aircraft and cost civil aviation over \$390 million annually in the United States. (9). A vegetation management plan would help reduce wildlife strike hazards and maintain protected airspace around the airport. Long-term vegetation management favors meadow or shrubs over periodic tree cutting in portions of the airport where trees are undesirable and often includes mowing techniques to maintain a set vegetation height. Mowing grass to an optimum height has been shown by Seamans to at least temporarily reduce small mammal populations, which in turn may reduce the attractiveness of the area to birds of prey

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

and predatory mammals that pose hazards to aircraft (8). Optimum vegetation height management strategies are site-specific and should be developed in coordination with officials at local parks, preserves, and/or forests and included in a wildlife management plan, if applicable.

Vegetation maintenance techniques include alternating mechanical mowing, hand cutting, and herbicide treatments. Mechanical mowing is used to control the plant community height to promote a safe, navigable airport protection zone.

*Benefits*

- Reduces wildlife hazards to aircraft (enhance safety)
- Maintains protected airspace around the airport




*Additional Resources*

- U.S. Department of Agriculture National Wildlife Research Center, *Vegetation Management Approaches for Reducing Wildlife-Aircraft Collisions*  
[http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1153&context=icwdm\\_usdanwrc](http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1153&context=icwdm_usdanwrc)

**Wildlife-6: Avoid the Creation of Natural Open Water Features on or Near Airfield Sites that Attract Wildlife**

In urban areas, airports may provide some of the only remaining open space and open waters for wildlife. Open water may be available at the airport in the form of natural water bodies (i.e., wetlands, streams, ponds, etc.), manmade water bodies/basins (i.e., retention basins, reservoirs, etc.), or standing storm water.

Avoiding the creation of natural open water features on or near airfield sites minimizes wildlife attractants, thereby reducing safety risks to aircraft and wildlife. These water bodies attract many species of birds that are considered hazardous to aircraft/airport operations as well as hazardous mammals such as deer or coyotes that may be attracted to the source of drinking water.




<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Once	Savings 

*Benefits*

- Reduces wildlife hazards to aircraft (increases safety)

**Wildlife-7: Install Perforated Underground Drains or Dry Wells**

For storm water management, perforated underground drains or dry wells can provide infiltration without attracting hazardous wildlife. Both systems can take in water quickly then distribute it over a larger area, thus reducing surface water. The ground supporting the drains typically has gravel, rocks, or similar debris to help funnel the water away. Drainage systems would reduce standing water, which is a wildlife attractant.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Once	Savings 




*Benefits*

- Reduces wildlife hazards to aircraft (increases safety)



**Wildlife-8: Manage Vegetation to Maintain Rare and Non-hazardous Wildlife Habitat**

Where rare non-hazardous wildlife habitat is present on an airfield, such as butterflies, manage vegetation to maintain its habitat. While it is important to limit vegetation that attracts hazardous wildlife to the airport, it is also essential to maintain the habitats of non-hazardous wildlife, particularly rare species. In highly developed areas, airports often are the only remaining providers of large expanses of grasslands and/or shrub/scrub cover, which provide habitat for rare species, including local and migratory wildlife populations. Maintaining these habitat areas can help to promote the sustainability of existing rare species communities.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b>  <b>Once</b>	<b>Savings</b> 




Airports can work in cooperation with officials at local parks, preserves, and forests to advance certain forest and grassland management strategies to enhance habitats for bird species which do not pose a threat to aircraft at the local airport.

*Benefits*

- Maintains area biodiversity
- Reduces safety hazards

**Wildlife-9: Develop and Implement an Integrated Pest Management Plan**

Integrated Pest Management Plans seek to treat and manage pest damage economically, and with the least possible hazard to people, property, and the environment. Integrated Pest Management is an approach to pest control that uses regular monitoring and record keeping to determine if and when treatments are needed. It also employs a combination of strategies and tactics to keep pest numbers low enough to prevent damage and annoyance as much as possible. Biological, cultural, physical, mechanical, educational, and chemical methods are used in site-specific combinations to solve the pest problem. Chemical controls are used only when needed, and in the least toxic formulation that is effective against the pest. For example, as an alternative to spraying harsh chemicals on a rodent infestation, an Integrated Pest Management approach would be more proactive and would be geared toward eliminating potential causes before the infestation occurred (i.e., open food containers, dirty facilities, holes in exterior walls).

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b>  <b>Once</b>	<b>Savings</b> 

An Integrated Pest Management Plan should also seek to significantly reduce or eliminate widespread use of pesticides. Instead of blanket treatments to prevent or eliminate pests, an Integrated Pest Management Plan could be designed to first determine what the most likely pests are and what the specific threat may be, and then to treat only for the specific problem areas, not the entire airport. For example, don't spray all soil before laying a foundation during new construction, but rather check the soil for evidence of pests before applying pesticides and spray only as needed. For related information, see pesticide application, certification, and disposal practices in Appendix A-8.



*Benefits*

- Reduces use of pesticides or other chemical pest control measures




*Additional Resources*

- EPA, *Integrated Pest Management for Schools* (See Chapter 2, What is Pest Management) <http://www.epa.gov/pesticides/ipm/schoolipm/>
- U.S. Code Title 7 Chapter 6, *Insecticides and Environmental Pest Control* <http://www4.law.cornell.edu/uscode/7/ch6.html>

**Wildlife-10: Plant Nitrogen-fixing Vegetation**

Nitrogen-fixing vegetation converts atmospheric nitrogen into a plant-usable form, which offers an alternative to the use of fertilizers. Planting such vegetation provides an economically attractive and environmentally sensitive means of reducing fertilizer use.

Excessive fertilizer use can result in nitrogen runoff into surface waters, causing algal blooms and excessive plant growth, which in turn can cause anoxic conditions that hinder fish survival. In addition, nitrogen runoff into groundwater and drinking supplies can be detrimental to human health. For related information, see pesticide application, certification, and disposal practices in Appendix A-8.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Once	<b>Savings</b> 

*Benefits*




- Reduces fertilizer use
- Reduces risk of surface and groundwater contamination from fertilizer

**Biodiversity**

**Wildlife-11: Replace Vegetation with Native Species During Construction or Mitigation Projects**

Airports could plant non-wildlife attracting native vegetation on site to restore local biodiversity. Native vegetation can be purchased locally, thereby supporting the local economy.

Native vegetation is typically low-maintenance as it is already adapted to the local climate, and native plants grow well together. An airport’s native vegetation will vary widely depending on its location and regional climate. Vegetation in the southwest is used to higher temperatures and drought conditions, whereas vegetation in the northeast can withstand harsher winters. Because native vegetation is adapted to its local climate, it often requires less irrigation and tends to have lower maintenance and upkeep costs than non-native species. Lastly, native vegetation often requires far less fertilizers and pesticides, reducing human exposure to chemicals as well as costs associated with fertilizer application. For related information, see Wildlife-5.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Once/Ongoing	<b>Savings</b> 

Because vegetation has the potential to attract wildlife that can pose a threat to aviation safety, airports should consult Table 1 of FAA AC 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*, which details wildlife threats and associated hazard score. Not all airports are required to comply with the requirements; however the AC is a valuable tool when addressing wildlife attractants. For related information, see Wildlife-4.

*Benefits*

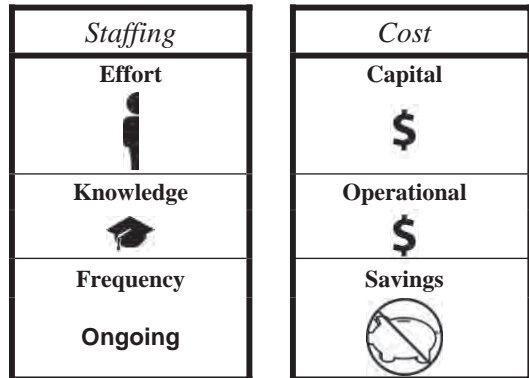
- Reduces maintenance costs
- Benefits the local economy
- Reduces wildlife hazards

*Additional Resources*

- EPA *Landscaping with Native Plants*  
<http://www.epa.gov/greenacres/>
- FAA AC 150/5200-33, *Hazardous Wildlife Attractants on or Near Airports*  
[http://www.faa.gov/documentLibrary/media/advisory\\_circular/150-5200-33B/150\\_5200\\_33b.pdf](http://www.faa.gov/documentLibrary/media/advisory_circular/150-5200-33B/150_5200_33b.pdf)

**Wildlife-12: Join in Partnerships with Environmental Nonprofit Organizations**

Many environmental nonprofit organizations devote their efforts to maintaining environmental quality, equity, and conservation. Partnering with environmental non-profit organizations therefore enables airports to contribute to efforts to maintain local and regional biodiversity, as well as support the other efforts of environmental non-profit organizations. Airports can choose to partner with larger national nonprofits such as the Sierra Club, the National Wildlife Foundation, or the Nature Conservancy, or can choose to join efforts with local organizations that tend to focus their efforts on local environmental needs.



*Benefits*

- Provides support for environmental initiatives
- May assist with future permitting efforts

*Additional Resources*

- The Natural Resources Defense Council provides a list of links to a number of environmental groups  
<http://www.nrdc.org/reference/enviroGroups.asp>

## APPENDIX A-14

### Property Transfer Practices





Property transfer practices are intended to help airport operators identify past or existing environmental issues at a site and the potential effect these issues can have before, during, and after a property is transferred to an airport. If these issues are not investigated by the airport before a property is purchased, the property may be devalued and the airport may become liable for cleanup or remediation needs at the site. The following proactive property transfer practices will help airports recognize environmental concerns before liabilities are accepted through a property transfer.

<p><b>Applicable Federal Regulatory Programs</b></p> <ul style="list-style-type: none"> <li>• Comprehensive Environmental Response, Compensation and Liability Act (Chapter 6)</li> </ul>
---

- ✓ Review Environmental Documents Prepared by Property Owner
- ✓ Perform Environmental Property Assessments
- ✓ Perform Detailed Review of Property Transfer Deed as it Pertains to Remediation for Environmental Contamination
- ✓ Perform Evaluation of Environmental Remediation Closure Level and Future Use of Land
- ✓ Implement Procedures and Practices to Prevent Environmental Contamination, Prevent Contamination from Spreading, or Remediate Site

#### Property-1: Review Environmental Documents Prepared by Property Owner

It is important for airports to review available environmental documents prepared by a property owner prior to property transfers. Examples of documents that should be reviewed include Phase I and II ESAs, remediation and mitigation reports, asbestos or PCB investigations, and spill reports. The review will help disclose potential environmental issues or identify contaminated areas that were previously unknown to the airport.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational <b>NC</b>
Frequency <b>As Needed</b>	Savings 

This practice is especially important in the event that previously unknown issues become evident. In cases where environmental issues/risks are suspected, property transfer negotiations may include identifying responsible parties, property values, needed remedial activities and responsibilities, and ownership of future legal liabilities. Ultimately, an airport needs to weigh the benefits of the property purchase with the potential risks and liabilities associated with environmental issues that may be discovered. An airport is in a much better position to assess and consider these aspects prior to the purchase of property.

#### *Benefits*

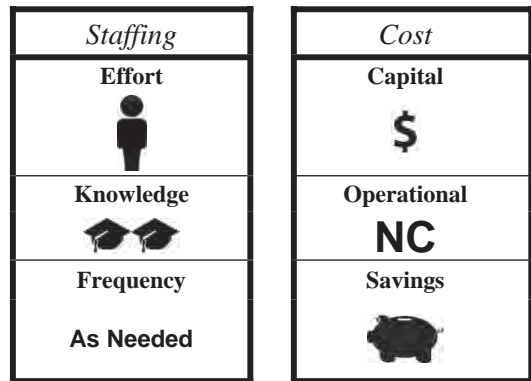
- Recognizes cost implications of environmental conditions prior to property purchase
- Protects the airport against future environmental liabilities and risks
- Isolates areas of potential environmental concern on a property

*Additional Resources*

- Former Fort Ord Environmental Cleanup—Reports Under Review  
<http://www.fortordcleanup.com/docreview/docreview.asp>
- ASTM E1527-05, *Standard Practice for ESAs: Phase I ESA Process*
- ASTM E2247-08, *Standard Practice for ESAs: Phase I ESA Process for Forestland or Rural Property*
- ASTM E1903-97, *Standard Guide for ESAs: Phase II ESA Process*
- FAA Order 1050.19B, *Environmental Due Diligence Audits in the Conduct of FAA Real Property Transactions*

**Property-2: Perform Environmental Property Assessments**

Environmental property assessments, such as Phase I or Phase II ESAs, should be performed prior to property transfers to help protect an airport from buying property that may have existing environmental contamination. A Phase I or Phase II ESA may be required for NEPA compliance with some projects. The intent of conducting these assessments is to help disclose potential environmental issues or identify contaminated areas unknown to the airport. The EPA has established standard practices for conducting All Appropriate Inquiries for Phase I ESAs. Examples of potential issues that an ESA may uncover include onsite impacts from previous industrial operations (e.g., soil contamination from LUSTs, past chemical spills, former landfills, or potential impacts from adjacent or nearby property activities).



The level of detail reviewed for a piece of land should depend on the type or number of environmental issues identified from the initial assessment. For example, if no environmental issues are noted, it may only be necessary to conduct a Phase I Site Assessment. However, if the site was previously a heavy industrial site involved with the use of many different types of chemicals, or a Phase I indicated potential environmental issues may be evident, it may be necessary to conduct a Phase II Site Assessment consisting of additional document review and site-specific environmental sampling.

*Benefits*

- Recognizes cost implications of environmental conditions prior to property purchase
- Protects the airport against future environmental liabilities and risks
- Isolates areas of potential environmental concern on a property

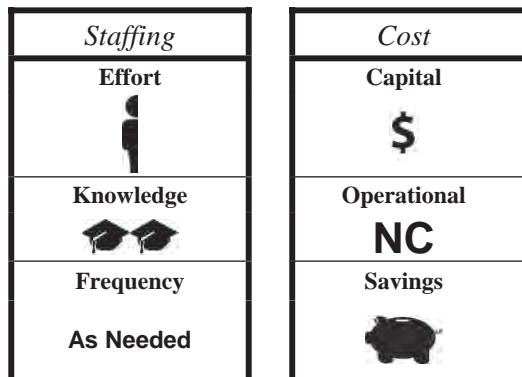
*Additional Resources*

- ASTM E1527-05, *Standard Practice for ESAs: Phase I ESA Process*
- ASTM E2247-08, *Standard Practice for ESAs: Phase I ESA Process for Forestland or Rural Property*
- ASTM E1903-97, *Standard Guide for ESAs: Phase II ESA Process*
- FAA Order 1050.19B, *Environmental Due Diligence Audits in the Conduct of FAA Real Property Transactions*
- EPA Enforcement & Compliance History Online Database  
<http://www.epa-echo.gov/echo/>

**Property-3: Perform Detailed Review of Property Transfer Deed as it Pertains to Remediation for Environmental Contamination**

Prior to deciding to purchase a property, airports should negotiate with property owners and environmental resource agencies to identify the responsible parties in cases where future environmental remediation activities are anticipated. After negotiations have taken place and property deeds are drafted, a detailed review of the deed should be conducted by the airport prior to closing. Particularly, the language for future remediation, if necessary, should be reviewed in detail.

The review for remediation should confirm the agreement(s) made between each party during the negotiations. It is also advisable to establish financial assurances/responsibilities for remediation efforts and document them in transfer deeds. This practice becomes particularly important when a site has the potential for ongoing environmental issues after a property is purchased by the airport.



*Benefits*

- Protects the airport against future environmental liabilities and risks

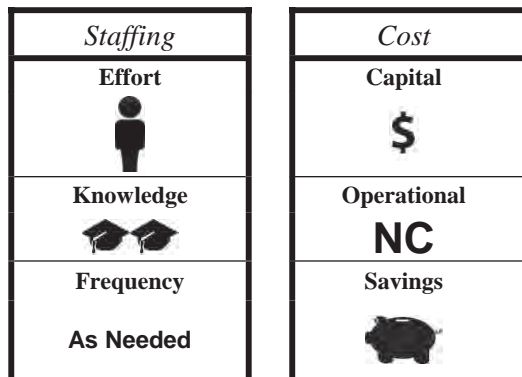
*Additional Resources*

- FAA Order 1050.19B, *Environmental Due Diligence Audits in the Conduct of FAA Real Property Transactions*
- EPA Guidance on the Transfer of Federal Property by Deed Before All Necessary Remedial Action Has Been Taken Pursuant to CERCLA Section 120(h)(3)—(Early Transfer Authority Guidance) <http://www.epa.gov/fedfac/documents/hkfin.htm>

**Property-4: Perform Evaluation of Environmental Remediation Closure Level and Future Use of Land**

Contaminated sites that require environmental remediation are typically subject to specific soil or water cleanup standards. Cleanup standards, also known as closure levels, can vary depending on the type of contamination, degree of contamination, or state-specific requirements. Additionally, the level at which sites are remediated can be based on land use type. For example, more stringent cleanup standards may be implemented for residential or educational sites compared to industrial sites.

If an airport is involved with environmental site remediation, an evaluation of the site’s closure level should be conducted. The closure level should identify future land use plans for the site to determine the appropriate level of cleanup. Consideration should be given to what type of individuals will access the site, proposed buildings, water use, or site activities/operations. Once the closure level is determined to be suitable, it should be agreed upon by the appropriate regulatory authority.



*Benefits*




- Minimizes the potential for additional remediation requiring more stringent cleanup criteria

*Additional Resources*

- Selection Of Carcinogenic Target Risk Levels For Soil And Groundwater Remediation by Mark Malander, Mobil Oil Corporation  
<http://www.epa.gov/oust/rbdlm/sctrlsgw.htm>
- Superfund Remediation Technologies  
<http://www.epa.gov/superfund/remedytech/remed.htm>
- Superfund Characterization and Monitoring  
<http://www.epa.gov/superfund/remedytech/char.htm>

**Property-5: Implement Procedures and Practices to Prevent Environmental Contamination, Prevent Contamination from Spreading, or Remediate Site**

Airports must implement procedures to prevent environmental contamination from occurring. Daily procedures, such as monitoring usage from USTs, can be relatively easy to implement and help prevent costly soil or groundwater remediation. Many different types of procedures or practices can be adapted into routine airport practices, including spill prevention and timely response practices after a spill; proper container handling and storage techniques; conducting activities in areas that minimize the potential for contamination (i.e., indoors); designating certain areas for activities to help minimize environmental impacts (e.g., concrete barriers); or performing routine inspections. For related information, see the spill prevention, response, and notification practices in Appendix A-6.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency As Needed	Savings 

In cases where a site has been contaminated, the airport should take steps to help prevent contaminant migration. Studies may be required to identify the area of contamination. Once the area of concern is identified, the airport should decide how it will prevent contaminant migration. Examples of activities that can help minimize the migration of contaminants include encapsulation, restricting flows, containment and removal, or prohibiting activities from taking place in the contaminated area.

*Benefits*

- Relatively easy to implement daily procedures and practices to help prevent contamination
- Limits the amount of future remediation needs
- Minimizes future remediation costs

*Additional Resources*

- EPA Preventing Underground Storage Tank Releases  
<http://www.epa.gov/OUST/fsprevnt.htm>
- EPA Innovative Technologies, Remediation  
<http://www.epa.gov/tio/remed.htm>



## APPENDIX A-15

### Waste Minimization Practices

Airport operations generate many different types of waste streams. As airport operators develop their understanding of how wastes are managed, there are opportunities to reduce the amount of wastes generated and increase recycling. Airports around the country are beginning to incorporate these practices into their routine operations and are being recognized for their efforts. The following proactive waste minimization practices will assist with minimizing wastes generated at airports, identifying beneficial reuses of materials, or presenting alternative disposal methods for typical airport wastes:

#### Applicable Federal Regulatory Programs

- Resource Conservation and Recovery Act (Chapter 7)
- Toxic Substances Control Act (Chapter 7)




- Planning Activities
  - ✓ Understand the Airport's Waste Streams and Use Information to Facilitate Waste Reduction and Recycling
  - ✓ Conduct an Audit for Recyclable Materials and Establish an Airport-wide Recycling Program
  - ✓ Purchase Equipment to Facilitate Recycling
  - ✓ Increase the Number of Recycling Containers and Locate Strategically Around Airport
  - ✓ Encourage Onboard Recycling Programs for Airlines
  - ✓ Establish a Centralized Waste and Recycling Management Program
  - ✓ Coordinate Recycling Collection Infrastructure with Hauler Capabilities
  - ✓ Utilize Waste Reducing Innovative Building Materials and Techniques
  - ✓ Establish a Food Waste Diversion Program
  - ✓ Establish a Food Donation Program
  - ✓ Establish a Food Waste Composting Program
- Active Practices
  - ✓ Require the Use of Compostable or Reusable Tableware
  - ✓ Implement Incentives to Minimize Plastics
  - ✓ Develop Recycling and Waste Reduction Competitions Between Different Airport Departments
  - ✓ Segregate and Recycle or Reuse Construction/Demolition Debris
  - ✓ Minimize Removal of Trees or Vegetation and Reuse
  - ✓ Recycle Hot-drained or Crushed Non-terne Plated Used Oil Filters

#### Planning Activities

Although the volume of wastes generated at airports may vary greatly by airport, understanding the types of wastes generated; alternative materials, techniques, or products available for use; and opportunities to modify existing waste management operations can help to reduce the amount of waste at any airport. Planning activities can help ensure that airport operators recognize waste minimization opportunities, incorporate them into everyday operations, and potentially help reduce the overall impact on the environment.

### Waste-1: Understand the Airport’s Waste Streams and Use Information to Facilitate Waste Reduction and Recycling

Airport operations, staff, tenants, fixed-base operators, and airlines generate many different types of waste streams. Examples of typical airport wastes include used oil, aircraft lavatory waste, cardboard, paper, electronic equipment, used absorbent materials, batteries, and paint. Depending on the type of waste generated, many different regulatory requirements could apply, each requiring different disposal methods. Airport operators should have a thorough understanding of their activities, projects, and facilities so that opportunities for waste recycling or beneficial reuse practices are recognized.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational NC
Frequency Annually	Savings 

To help identify an airport’s waste streams, a baseline waste audit should be conducted for the entire airport. The audit should result in an inventory of each of the airport’s waste streams, which will be used to determine if enough waste is generated to justify a waste reduction or recycling program. The inventory can also help facilitate establishing procedures for adequately managing wastes, identifying infrastructure needs, or additional recycling opportunities. Additionally, the results of the inventory may help an airport understand inefficiencies and identify opportunities to enhance its waste management program. For example, with adequate information (e.g., waste volumes, types), the airport has the ability to negotiate waste hauling/disposal contract terms and conditions to help improve the program’s cost-effectiveness. Annual reviews of the inventory should be performed to help identify changes in the airport’s waste streams or other efficiencies that could be made to the airport’s waste management program.

*Benefits*

- Increases understanding of airport operations
- Increases opportunity for recycling
- Simplifies waste collection
- Reduces cost and better contract terms for waste hauling and disposal
- Reduces volume of materials diverted to landfills




*Additional Resources*

- Wisconsin Department of Natural Resources, Waste Inventory Sheet  
[http://www.dnr.state.wi.us/permitprimer/solidwaste/waste\\_inventory\\_sheets.pdf](http://www.dnr.state.wi.us/permitprimer/solidwaste/waste_inventory_sheets.pdf)

### Waste-2: Conduct an Audit for Recyclable Materials and Establish an Airport-wide Recycling Program

Airport departments, fixed-base operators, or tenants may have individual established recycling programs. However, consideration should be given to establishing an airport-wide recycling program that targets passengers, tenants, and airport-wide operations. This practice has the potential to significantly increase the amount of materials recycled at an airport (see Waste-6).

To begin to establish an airport-wide recycling program, an audit of recyclable waste streams should be conducted for the entire airport. The audit can also be phased to include all

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Annually	Savings 

operations within a given area (e.g., airside or landside), and later expanded. The audit should result in an inventory of the airport’s recyclable materials and help identify those areas where recycling collection can begin or be increased. For example, an audit could identify terminal concessions food and beverage container wastes. If these materials are not currently recycled, the airport may target this area for recycling by adding recycling bins in restaurant areas.

Once the airport identifies the most beneficial and cost-effective recycling options, the airport can negotiate hauling fees with a collection hauler. Generally, once the centralized waste and recycling management program is established, airport staffing needs are decreased. Annual reviews of the audit should be performed to help identify changes in the airport’s recyclables or other efficiencies that could be made to the airport’s recyclable material management program.

*Benefits*

- Simplifies collection of waste
- Reduces cost for waste hauling and disposal
- Increases opportunity for recycling
- Reduces amount of materials diverted to landfills






*Additional Resources*

- EPA Developing and Implementing an Airport Recycling Program  
<http://www.epa.gov/osw/consERVE/rrr/rogo/documents/airport-recycling-guide.pdf>

**Waste-3: Purchase Equipment to Facilitate Recycling**

Traditional recycling includes collection of recyclable materials in designated containers that are consolidated into a container picked up by haulers. As more wastes are able to be recycled, new equipment is becoming available to facilitate collection. By purchasing this equipment to facilitate recycling, airports can more easily incorporate recycling into everyday practice.

Equipment for recycling can include specialized recycling chutes, antifreeze recycling units, bailers specifically for recyclables, or plastic shredders.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 

*Benefits*




- Increases opportunity for recycling
- Reduces amount of materials diverted to landfills
- Relatively easy to implement
- Beneficial reuse of materials

*Additional Resources*

- National Resources Defense Council, *Trash Landings, How Airlines and Airports Can Clean Up Their Recycling Programs*
- Seattle-Tacoma International Airport Recycling Program  
<http://www.epa.gov/waste/consERVE/rrr/rogo/documents/seatac.pdf>

### Waste-4: Increase the Number of Recycling Containers and Locate Strategically Around Airport

Airports can improve the collection of recyclables by increasing the number of available recycling containers for passengers, fixed-base operators, tenants, and airport employees. Before additional containers are purchased, airports should identify the types and volume of recyclable waste that is generated. Containers should be appropriately sized to meet the expected recycling volume. Locations throughout the airport where waste is generated should also be identified, and containers should be strategically located in these areas. When identifying container locations, consideration should be given for areas that are easily accessible for collection and storage. For example, additional recyclable containers could be added to airport parking lots which allow for easy access for passengers. However, the difficulty of waste pick-up by haulers and other security issues (i.e., explosion proof containers) needs to be considered. Airports should also consider how increasing the number of containers could result in changes to waste collection and removal costs.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Weekly</b>	<b>Savings</b> 

*Benefits*

- Increases opportunity for recycling
- Reduces amount of materials diverted to landfills
- Relatively easy to implement




*Additional Resources*

- EPA Developing and Implementing an Airport Recycling Program  
<http://www.epa.gov/osw/consERVE/rrr/rogo/documents/airport-recycling-guide.pdf>
- EPA How to Start a Recycling Program at your Airport  
<http://www.epa.gov/waste/consERVE/rrr/rogo/documents/airports.htm>

### Waste-5: Encourage Onboard Recycling Programs for Airlines

Passengers, flight crews, and cleaning services onboard aircraft can generate substantial volumes of recyclable materials, such as plastic cups, newspapers, and aluminum cans. As a result, airlines and associated aircraft cleaning companies have an opportunity to recycle these materials at airports.

For example, Delta Air Lines, Alaska Airlines, and Southwest Airlines have an established onboard aircraft recycling program. However, consideration should be given to encouraging all airlines to establish a recycling program, which has the potential to result in significantly increased amounts of materials recycled at an airport. If an airport decides to implement this practice, it should consider if the airport will provide recycling containers for airline use, or encourage airlines to implement a program of their own.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 






*Benefits*

- Simplifies collection of waste
- Reduces cost for waste hauling and disposal
- Increases opportunity for recycling
- Reduces amount of materials diverted to landfills

**Waste-6: Establish a Centralized Waste and Recycling Management Program**

Airport operators, airport tenants, fixed-base operators, and their customers generate substantial volumes of waste and recyclable materials. Airport operators, airport tenants, and fixed-base operators may separately contract with waste hauling and disposal companies to manage waste from their respective facilities. By doing so, financial incentives for establishing a centralized waste and recycling management program may be lost.

Airport operators can work with airlines, fixed-base operators, tenants, and employees to combine individual waste and recycling streams into one that the airport manages (see Waste-2). Combining waste streams could be accomplished by having a centralized waste collection area, or designating bins around the airport for waste recycling and disposal. The consolidation may require merging individual waste hauling contracts into one, which could allow for greater negotiating power for hauling and disposal fees. This practice also has the potential to simplify waste collection, increase environmental awareness, and increase the volume of materials that are recycled.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency <b>As Needed</b>	Savings 

*Benefits*






- Simplifies collection of waste
- Reduces cost for waste hauling and disposal
- Increases opportunity for recycling
- Reduces amount of materials diverted to landfills

*Additional Resources*

- EPA Developing and Implementing an Airport Recycling Program  
<http://www.epa.gov/osw/conserves/rrr/rogo/documents/airport-recycling-guide.pdf>

**Waste-7: Coordinate Recycling Collection Infrastructure with Hauler Capabilities**

Typically, airport recyclables are collected using a contracted hauler that may require certain types of collection infrastructure. These haulers may have specific collection capabilities such as sized dumpsters or containers or may require the use of only their equipment for collection. When contracting with a recycling hauler, airports should understand waste volumes, types, and locations where recyclables are generated to help negotiate contracts such that the most cost-effective collection option that meets the airport's needs is established. Consider negotiating a contract in terms of weight to avoid being charged the same

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency <b>As Needed</b>	Savings 

amount for a full dumpster as a half empty dumpster. If charged by weight, cover recyclable collection containers (e.g., roll offs) to prevent increased weight due to precipitation. If charged by volume, consider using a compactor to maximize the amount of material in the recyclable collection container.

*Benefits*

- Reduces cost for waste hauling and disposal
- Reduces amount of materials diverted to landfills
- Relatively easy to implement

*Additional Resources*

- EPA Developing and Implementing an Airport Recycling Program  
<http://www.epa.gov/osw/consERVE/rrr/rogo/documents/airport-recycling-guide.pdf>
- EPA How to Start a Recycling Program at your Airport  
<http://www.epa.gov/waste/consERVE/rrr/rogo/documents/airports.htm>





**Waste-8: Utilize Waste Reducing Innovative Building Materials and Techniques**

There are a number of innovative building materials and techniques available to airports that can offer waste reducing benefits. For example, structural insulated panels are building materials that combine structural and insulating requirements into one. They arrive on site prefabricated to the correct dimensions, provide a strong and efficient envelope with little to no construction waste, and can be erected very quickly.

Insulated concrete forms are a building system that uses rigid foam insulation to form and encase concrete walls. On the job site, interlocking insulated concrete forms blocks, or panels are assembled and held in place at a desired thickness with engineered ties. Reinforcing is often added before concrete is poured into the cavity. Along with systems for easy mounting of finishes and channeling of utilities, the insulation remains in place with the concrete to provide insulated concrete forms’ advanced economic, thermal, safety, environmental, and comfort benefits. Formwork is eliminated as is the process of installing insulation, which reduces construction waste on site.

Tilt wall construction on permanent casting beds allows building segments to do double duty. After a slab is poured, it can be used as a casting bed for large panels of concrete which are allowed to cure and then tilted up into place. The thermal mass inherent in concrete reduces the heating and cooling peaks and loads. Insulation systems are available that enable the construction of integral sandwich walls or lightweight interior insulation. These benefits will have some pay back for the life of the building, and waste generated during construction can be significantly reduced.

The Design for Deconstruction movement is intended to responsibly manage end-of-life building materials to minimize consumption of raw materials. By capturing materials removed during building renovation or demolition and finding ways to reuse them in another construction project or recycle them into a new product, the overall environmental impact of end-of-life building materials can be reduced. Architects and engineers can contribute to this concept by designing buildings that are flexible and allow for easy deconstruction.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 



*Benefits*

- Energy efficient building practice
- Potential for reduced energy costs
- Potential LEED™ credit






*Additional Resources*

- EPA Green Building, Reducing Energy Use  
<http://www.epa.gov/greenhomes/ReduceEnergy.htm>

**Waste-9: Establish a Food Waste Diversion Program**

Food waste may contribute significantly to an airport’s waste generation. Examples of food waste include food scraps, cooking oil, and coffee grounds. Depending on the amount of food waste that is generated, airports may choose to establish a program to collect food waste and divert it to specialized entities for beneficial reuse.

Waste cooking oil is one of the primary types of food waste from airports that can be diverted to other entities that reuse the oil. For example, some companies reuse the oil to formulate biofuels such as biodiesel. Airports may choose to establish a program for its restaurants that calls for consolidating waste cooking oil for collection and reuse.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 

Airport food waste can also be collected and transported to facilities that reuse it for animal feed. Portland International Airport and Denver International Airport have food waste diversion programs. State-specific regulations may be applicable for this type of food diversion. Farmers may provide containers or pick up airport food waste at little to no cost to the airport. This type of program must be carefully managed to restrict diversion of only certain types of food waste, as some wastes can be harmful to livestock.

*Benefits*



- Beneficial reuse of materials
- Reduces pollution created from vehicle and equipment emissions
- Reduces volume of waste generated at an airport


*Additional Resources*

- EPA Food Waste  
<http://www.epa.gov/waste/conserves/materials/organics/food/index.htm>

### Waste-10: Establish a Food Donation Program

Establishing an airport food donation program can help contribute leftover consumable food from airport restaurants or concessionaires to local food banks and the associated community. Some airports have developed a food donation program where pre-packaged and unused food from food and beverage vendors or airport employees can be donated. The Seattle-Tacoma International Airport has a food donation program. The program could also incorporate unwanted food from airlines. Additionally, collection bins could be installed at the airport to allow for airport personnel to donate non-perishable food items to a local food bank.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Monthly</b>

<i>Cost</i>
<b>Capital</b> <b>\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

*Benefits*



- Benefits local community
- Reduces amount of materials diverted to landfills
- Relatively easy to implement
- Potentially reduces volume of waste generated at an airport


*Additional Resources*

- EPA Food Donation: Feed People—Not Landfills  
<http://www.epa.gov/epawaste/conserves/materials/organics/food/fd-donate.htm>

### Waste-11: Establish a Food Waste Composting Program

Some types of airport food waste can be composted into usable materials. Examples of compostable food wastes include food scraps, coffee grounds, paper napkins, and cardboard containers. These materials, compostable for natural landscaping materials and organic-rich compost, can contribute to beautifying an airport’s landscape.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Ongoing</b>

<i>Cost</i>
<b>Capital</b> <b>\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

An airport may choose to establish a program for airport staff, fixed-base operators, airlines, and food and beverage tenants that separates food waste for composting. Portland International Airport and Denver International Airport have a food waste composting program. Composting at airports is typically not conducted onsite due to the potential wildlife hazard issue. Some airports have specifically contracted with a composting collection vendor to transfer compostable materials offsite for beneficial reuse. Food waste composting could be performed at airports on site; however, covered compost containers should be used, and an evaluation for hazardous wildlife issues associated with the composting should be conducted.

*Benefits*

- Beneficial reuse of materials
- Reduced amount of materials diverted to landfills
- Relatively easy to implement
- Reduced volume of waste generated at an airport

*Additional Resources*




- EPA Food Waste  
<http://www.epa.gov/waste/consERVE/materials/organics/food/index.htm>

**Active Practices**

Active practices for waste minimization include those activities that, if implemented, could potentially result in direct reductions of airport wastes that are disposed of in a landfill. These practices may require the use of different types of materials, practices, or procedures compared to those being used at the airport today. The practices explained in this section are not difficult to implement but may require some adjustments to existing operations or purchasing so that the benefits of these practices can be realized.

**Waste-12: Require the Use of Compostable or Reusable Tableware**

Typical breakroom tableware includes plastic utensils, plates, or Styrofoam cups, which may take years to biodegrade in landfills. Small changes in the type of tableware that is purchased for employee use is easy to implement and can positively impact the environment. Compostable tableware includes items such as utensils, bowls, plates, cups, and napkins that are biodegradable. Since these products readily breakdown upon disposal, landfill space is preserved and the need for chemicals and oils to manufacture non-compostable products is reduced. Alternatively, these items could be composted on site at an airport (see Waste-12), thus reducing the overall volume of trash requiring removal.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

*Benefits*

- Reduces amount of materials diverted to landfills
- Relatively easy to implement
- Reduces volume of waste generated at an airport




*Additional Resources*

- Dunedin International Airport Limited (UK)  
<http://www.greenoproducts.com>

**Waste-13: Implement Incentives to Minimize Plastics**

Airport concessionaires, restaurants, and businesses within terminal areas typically provide customers with packaging or bags that are made from plastic. Airport operators can reduce the amount of waste plastic generated by establishing a policy that provides minor economic incentives for plastic waste reduction. For example, airports may encourage concessionaires to ask customers if a plastic bag is needed for purchased products. Airports may also encourage restaurants to provide reusable tableware.

Airports can promote policies that result in individual employees being recognized for their actions directly linked to plastic waste reduction. These “social incentives” contribute to changes in individual attitudes or behaviors. Airports can also offer economic incentives to employees for minimization of plastic waste. For example, airport operators may hold free lunches for airport employees in recognition of their efforts; provide coupons for local businesses; or present prizes and awards for tenants that have the greatest reduction in plastics.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Monthly	Savings 

*Benefits*




- Reduces amount of plastics diverted to landfills
- Reduces cost for waste hauling and disposal
- Relatively easy to implement social incentives

*Additional Resources*

- EPA Pollution Prevention  
<http://www.epa.gov/p2/pubs/assist/sbg.htm>

**Waste-14: Develop Recycling and Waste Reduction Competitions Between Different Airport Departments**

Encouraging airport employees to increase recycling efforts or reduce wastes can be fun, improve interactions between employees, and boost employee morale. Some airports hold regular “competitions” between departments to promote these efforts. Examples of activities could include holding “paper-free Fridays” or similar campaigns. Departments that win could receive special picnics, casual days, free breakfast, or reusable coffee mugs.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency As Needed	Savings 

*Benefits*

- Boosts employee morale
- Potentially increases recycling and waste minimization
- Relatively easy to implement




*Additional Resources*

- Recyclemania Competition  
<http://www.recyclemaniacs.org/overview.htm>

**Waste-15: Segregate and Recycle or Reuse Construction/Demolition Debris**

Construction and demolition debris consumes a major portion of landfill space due to the size and volumes of materials generated. Removal by waste haulers and disposal of these materials can also be extremely costly. Certain types of construction and demolition debris are able to be recycled or reused at other areas at an airport. Salt Lake City International Airport and Oakland International Airport have construction/demolition debris programs.

Examples of reuse of construction and demolition debris include asphalt millings or crushed concrete reused as aggregate for new pavement construction. Items such as doors, windows, sinks, or cabinets can be selectively removed from buildings and reused onsite in other areas, donated, or sold for reuse. Scrap steel collected from buildings can also be salvaged for reuse. This practice can potentially contribute to lower construction costs, sustainable design techniques, and may reduce vehicle emissions associated with the transport of construction or demolition materials off site.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 




*Benefits*

- Beneficial reuse of materials
- Reduces amount of materials diverted to landfills
- Reduces construction costs

**Waste-16: Minimize Removal of Trees or Vegetation and Reuse**

Trees and vegetation reduce noise, act as carbon sinks to minimize GHG, reduce storm water runoff, provide valuable landscaping, and shade and cool areas. If a project has the potential to remove existing trees or vegetation, airport operators should consider project site alternatives that have the least impact to these and other natural resources. If it is determined that tree or vegetation removal is necessary as part of construction or development projects, trees and vegetation should be replaced in numbers or acreage equivalent to the amount removed.

Since the cost of landscaping can be quite expensive, trees or vegetation removed from development sites could be reused in new development areas at the airports if they are removed and replanted properly. Airport construction teams can also mulch vegetation for reuse onsite. Airports may also consider donating the trees, vegetation, or mulch to the local community, where schools, businesses, parks, or recreational areas can benefit from this practice. For related information, refer to the vegetation and wildlife management practices in Appendix A-13.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 

*Benefits*

- Contributes to aesthetics of airport landscape
- Beneficial reuse of materials
- Benefits local community
- Reduces amount of materials diverted to landfills






*Additional Resources*

- Value of Trees  
<http://www.louisvilleky.gov/GoGreen/CommunityofTrees/ValueofTrees/>
- King County, Washington Native Plant Salvage Program  
<http://www.kingcounty.gov/environment/stewardship/volunteer/plant-salvage-program.aspx>

**Waste-17: Recycle Hot-drained or Crushed Non-terne Plated Used Oil Filters**

Used oil filters may be generated from airport vehicle and equipment maintenance activities. Oil filters are either terne plated or non-terne plated. Non-terne plated filters do not contain lead in the metal portion of the filter. Certain states have specialized procedures or practices for managing used oil filters so that they can be recycled.

Typical procedures for recycling oil filters include hot-draining. Generally, hot-draining requires the vehicle or equipment engine to be brought up to normal operating temperature just before draining. The filter should be drained for a designated period of time (e.g., 8 to 12 hours or as specified by state requirements). Once the filter is completely drained, it can be recycled. Used oil filters can also be crushed using specialized oil filter crushing equipment. Used oil is collected in a container or drum, and the filter is ready to be collected for recycling.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Benefits*

- Increases opportunity for recycling
- Reduces amount of materials diverted to landfills

*Additional Resources*

- Ventura County, California Airports  
<http://portal.countyofventura.org/portal/page/portal/airports/Pilot%20Information/Used%20Oil%20Recycling%20at%20Ventura%20County%20Air>



## APPENDIX A-16

# Hazardous/Universal Wastes, Polychlorinated Biphenyls, and Used Oil Practices

Certain wastes generated from airports may require special handling and disposal based on waste type, disposal method, and associated regulatory requirements. These wastes include hazardous wastes, universal wastes, and used oil. The regulatory burden can be minimized if airport operators recycle, implement practices to reduce these types of wastes generated, or beneficially reuse the wastes.

**Applicable Federal Regulatory Programs**

- Resource Conservation and Recovery Act (Chapter 7)
- Toxic Substances Control Act (Chapter 7)






The following proactive hazardous/universal waste, polychlorinated biphenyl, and used oil practices present opportunities for airport operators to help minimize regulatory burdens associated with wastes generated at their facilities.

- ✓ Product Substitution for Materials that Result in a Hazardous Waste When Disposed
- ✓ Utilize Vendors that Reclaim Products
- ✓ Conduct a Polychlorinated Biphenyls Audit
- ✓ Institute a Universal Waste Handling and Disposal Policy
- ✓ Recycle Used Oil
- ✓ Utilize Used Oil for Heating Purposes

### Haz Waste-1: Product Substitution for Materials that Result in a Hazardous Waste When Disposed

Certain materials used at airports can result in the generation of hazardous waste. For example, flammable solvent used for aircraft, equipment or vehicle maintenance; oil-based paint for building maintenance; or pesticide used in grounds maintenance all may become hazardous waste.

There are alternative products that airports can use to avoid generating a hazardous waste. Airports should consider performing an evaluation of their operations to identify what types of wastes are currently generated so that an assessment of alternative materials can be completed. Substituting for non-hazardous materials is intended to result in a suitable replacement for routine operations. This practice has the potential to minimize hazardous wastes generation, reduce the regulatory burden for airport personnel, and minimize hazardous waste disposal.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

#### *Benefits*

- Cost benefit for hazardous waste disposal needs
- Relatively easy to implement
- Reduces volume of hazardous waste generated
- Minimizes regulatory burden for personnel




*Additional Resources*

- EPA EPP Program  
<http://www.epa.gov/epp/>

**Haz Waste-2: Utilize Vendors that Reclaim Products**

If a hazardous waste is generated and disposed, it must be disposed of in accordance with the hazardous waste regulatory requirements. However, there are opportunities for airports to minimize the volume of hazardous wastes that are generated by contracting with vendors that collect and reclaim/recycle these types of materials. Generally, if a vendor reuses, or recycles materials so that they can be reused, a waste has not been generated.

Airports can implement this practice for spent solvent associated with maintenance activities. Vendors are available to collect spent solvent and reprocess it so that it can be reused. Changing to vendors that reclaim an otherwise hazardous waste has the potential to minimize hazardous wastes generation, reduce the regulatory burden for airport personnel, and minimize hazardous waste disposal.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Monthly	Savings 

*Benefits*

- Beneficial reuse of materials
- Cost benefit for hazardous waste disposal needs
- Relatively easy to implement
- Reduces volume of hazardous waste generated
- Minimizes regulatory burden for personnel




*Additional Resources*

- EPA Hazardous Waste Recycling  
<http://www.epa.gov/osw/hazard/recycling/index.htm>

**Haz Waste-3: Conduct a Polychlorinated Biphenyls Audit**

Airport owners may not be aware that some of the electrical equipment on their property contains PCBs. PCBs may be present in older electrical equipment, such as lamp ballasts, transformers, and capacitors. Additionally, PCB-containing equipment may be located within buildings or on property purchased by an airport. Consequently, airport owners should consider conducting an audit to inventory and document PCB-containing equipment.

The audit will help ensure proper labeling and planning for potential releases or equipment removal. Also, for equipment that remains onsite, the audit will facilitate

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational NC
Frequency Annually	Savings 

regulatory compliance by helping to identify equipment that requires periodic inspections, proper markings, and records. An airport should update its audit annually or when new property is purchased to help ensure the list of PCB-containing equipment at the airport remains current.

*Benefits*

- Documents information available during airport planning
- Identifies locations of PCB-containing equipment






*Additional Resources*

- EPA PCBs  
<http://www.epa.gov/epawaste/hazard/tsd/pcbs/index.htm>

**Haz Waste-4: Institute a Universal Waste Handling and Disposal Policy**

Wastes that are regulated under the Universal Waste Rule include batteries, pesticides, mercury-containing equipment (including thermostats), and lamps, all of which may be found at airports. If universal wastes are not managed as specified by the Universal Waste Rules, they are considered hazardous wastes.

To minimize the regulatory burden for airport personnel, fixed-base operators, and tenants, and to facilitate proactive environmental practices, airports should consider instituting a universal waste handling and disposal policy. The policy should call for airport employees and tenants to manage used batteries, pesticides, mercury-containing equipment (including thermostats), and lamps as universal waste rather than hazardous waste.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Benefits*

- Beneficial reuse of materials
- Reduces amount of materials diverted to landfills
- Reduces volume of hazardous waste generated
- Cost benefit for universal waste disposal
- Minimizes regulatory burden for personnel






*Additional Resources*

- EPA Universal Wastes  
<http://www.epa.gov/waste/hazard/wastetypes/universal/index.htm>

### Haz Waste-5: Recycle Used Oil

Used oil is often generated from aircraft, vehicle, and equipment maintenance activities. The used oils (e.g., engine oil, brake fluid, transmission fluid, hydraulic fluid, insulating oils, etc.) are typically stored in drums or bulk storage containers.

When used oil is recycled properly, it does not need to be treated as a hazardous waste that requires costly disposal. Used oil is readily recyclable for reuse as lubricants, fuels, or materials for chemical industries. Since airport operations may create large volumes of used oil, recycling the oil would increase the volume of recyclables collected at an airport. Because there are specialized federal and state regulations for managing used oil, airport operators should confirm that vendors collecting used oil for recycling demonstrate knowledge of applicable used oil handling requirements.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

#### *Benefits*






- Beneficial reuse of materials
- Increases opportunity for recycling
- Cost savings from reducing volumes of hazardous waste generation

#### *Additional Resources*

- EPA Used Oil Management Program  
<http://www.epa.gov/osw/conserves/materials/usedoil/index.htm>
- American Petroleum Institute Used Motor Oil Collection and Recycling  
<http://www.recycleoil.org/>
- Ventura County, California Airports  
<http://portal.countyofventura.org/portal/page/portal/airports/Pilot%20Information/Used%20Oil%20Recycling%20at%20Ventura%20County%20Air>

### Haz Waste-6: Utilize Used Oil for Heating Purposes

Instead of having used oil collected by a waste hauler for disposal or recycling, airports can reuse used oil on site for heating purposes in furnaces or space heaters. For airports, used oil heating equipment is typically installed in maintenance areas where the used oil is generated. Once purchased used oil heating equipment is operational, this practice could directly result in reduced energy costs compared to electric or gas heat. Additionally, since oil is reused on site, handling costs may also be reduced. If used oil heaters are planned to be installed at airport facilities, the design, operation, and use of the equipment must not result in unauthorized (i.e., federal or state) air emissions.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Daily</b>	<b>Savings</b> 

*Benefits*

- Beneficial reuse of materials
- Energy cost savings

*Additional Resources*

- EPA Used Oil Management Program  
<http://www.epa.gov/osw/consERVE/materials/usedoil/index.htm>
- American Petroleum Institute Used Motor Oil Collection and Recycling  
<http://www.recycleoil.org/>

## APPENDIX A-17

**Deicer Runoff Management Practices**

Aircraft and pavement deicer application can be widespread at an airport affecting most drainage areas. Deicing chemicals may be discharged into streams, coastal waters, rivers, and lakes when snow melts or rain washes them into the storm water drainage system. Microorganisms in the receiving waters degrade the chemicals in deicers. As the microorganisms work, they use oxygen, leaving the receiving water oxygen deficient, and potentially harming aquatic life. Degrading deicers can also result in significant odors at airport outfalls and in receiving waters that may be the source of community concerns. Reducing the amount of deicer that degrades in airport receiving waters may improve the oxygen content and aquatic life, and may enhance the public's image of the airport.

<b>Applicable Federal Regulatory Programs</b>
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- |   |
|---|
| <ul style="list-style-type: none"> <li>• Clean Water Act (Chapter 8)</li> </ul> |
|---|

Although airports cannot dictate deicer usage to tenants, they can help facilitate reducing the amount of aircraft deicer applied through recommendation of more efficient methods while still meeting FAA safety requirements for removal of snow, ice, and frost from aircraft prior to departure. Reducing the amount of deicer applied also results in cost avoidances. Airports can also control the effect pavement deicing chemical degradation has on the aquatic life in their receiving waters through use of more environmentally friendly deicing chemicals.

The following deicer runoff management practices may improve water quality by facilitating collection of deicer-impacted runoff and reducing the volume and load of deicing chemicals applied.

- Source Reduction
  - ✓ Encourage Tenant Proactive Anti-icing to Reduce Aircraft Deicing Fluid Usage Post Winter Weather Event
  - ✓ Encourage Tenant Use of Alternative, Less Expensive Deicer Application Methods
  - ✓ Monitor Tenant Aircraft Deicer Usage
  - ✓ Utilize Low Toxicity/Low Biochemical Oxygen Demand Deicing Materials
- Deicer Collection
  - ✓ Utilize Glycol Recovery Vehicles to Collect Spent Aircraft Deicing Fluid
  - ✓ Construct a Deicer-laden Snow Management Area to Collect and Contain Contaminated Snowmelt
  - ✓ Construct Innovative Deicing Facilities
- Treatment and Disposal
  - ✓ Process Spent Deicer on Site



## Source Reduction

### Deicer-1: Encourage Tenant Proactive Anti-icing to Reduce Aircraft Deicing Fluid Usage Post Winter Weather Event




Utilizing anti-icer prior to or during a winter event can prevent the buildup of ice and snow on an aircraft, reducing the amount of deicer needed to remove snow and ice prior to departure. Annual winter operations meetings with tenants provide good opportunities to encourage them to utilize anti-icer to reduce deicer usage after a winter event.

#### Benefits

- Reduces use of deicing chemicals
- Improves water quality from reduction in deicing chemical use
- Less significant deicing controls




#### Additional Resources

- *ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems*

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Annually	Savings 

### Deicer-2: Encourage Tenant Use of Alternative, Less Expensive Deicer Application Methods

FAA safety requirements necessitate removal of snow, ice, and frost from aircraft prior to departure. The use of high efficiency deicing trucks is an effective means for reducing the amount of deicer applied while still meeting FAA safety requirements. Although high efficiency deicing trucks represent a large capital investment for tenants, reducing the amount of deicer applied may result in long-term cost savings, and reduce the amount of deicer that requires collection to meet airport NPDES permit requirements. Specialized deicing trucks use forced air technology to assist in removing ice and snow from an aircraft, reducing the amount of fluid required. The efficiency of the specialized trucks is dependant on the snow or ice conditions and the experience of the operator. Airports can encourage tenants to further reduce deicer use by first using forced air and hot water to remove snow built up on aircraft, and then spraying anti-icer to prevent snow and ice buildup prior to takeoff, eliminating the need for Type I deicing fluid.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$\$
Knowledge 	Operational \$\$
Frequency Monthly	Savings 

In addition to forced air technology, airports should consider providing facilities for tenants to allow efficient mixing of Type I aircraft deicers. Typically, Type I deicers are mixed with water at ratios of 50:50 or 45:55. Consider providing mixing tanks for tenants to mix just enough Type I deicer with water to achieve the required concentration based on the outside air temperature. The deicing manufacturers provide charts indicating the appropriate mixture based on outside air temperature to meet FAA requirements for the freezing point of the solution. Efficient mixing can be done in batches in tanks, or

can be mixed on the trucks. Annual winter operations meetings with tenants provide good opportunities to provide information about high efficiency deicing trucks and efficient mixing opportunities.

*Benefits*

- Reduce amount of deicer used




*Additional Resources*

- *ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems*

**Deicer-3: Monitor Tenant Aircraft Deicer Usage**

Asking airlines and fixed-base operators to monitor their aircraft deicing chemical usage not only keeps airports informed about the types of deicers used, areas where they are applied, volumes used, and conditions and dates when they are applied, but also promotes tenant responsibility in tracking their own deicer use.

The easiest way to track aircraft deicer usage is to establish a form that airlines and fixed-base operators can complete. Forms typically include the following information: date, time, aircraft type deiced (e.g. Regional Jet, 737), volume of ADF applied, percent neat deicer in ADF mixture, volume of anti-icing fluid applied, and weather conditions.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Monthly	<b>Savings</b> 

Requiring airlines and fixed-base operators to report deicer use may actually decrease the amount of product they spray as they start to monitor their use and determine how much deicer is actually required to remove frost, snow, and ice from aircraft. It may also discourage the application of aircraft deicer on stairways, GSE, and pavement.

Tracking aircraft deicer use facilitates investigation of the sources of deicing chemicals in an airport’s storm water. With an accurate drainage map of the airport, an airport operator can identify the airlines and fixed-base operators applying deicer in each drainage area. Storm water training and improvements to deicer capture systems can be targeted to airlines and fixed-base operators operating in drainage areas most affected by deicer, using unapproved chemicals (e.g., urea), and utilizing excessive application practices.

*Benefits*

- Increases knowledge of airline and fixed-base operator deicing activities
- Decreases in use of aircraft deicer for non-aircraft deicing activities
- Facilitates investigation of deicing chemicals in storm water
- Targets training and deicing collection improvements
- Facilitates compliance with NPDES permit






*Additional Resources*

- *ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems*

### Deicer-4: Utilize Low Toxicity/Low Biochemical Oxygen Demand Deicing Materials

There are many products available for aircraft and pavement deicing. Some products are more environmentally friendly than others. Airports and airlines must consider the effectiveness of products, cost, and long-term effect of the chemicals on aircraft and airport infrastructure along with its environmental impacts.

New non-glycol-based aircraft deicers are currently being tested by manufacturers and these deicers provide similar freezing point depression properties but have lower biochemical oxygen demand than conventional glycol-based products.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

Many airports are discontinuing the use of urea for pavement deicing because it can lead to toxic levels of ammonia in receiving streams. The proposed ELG for airport deicing includes restrictions on the use of urea. There are several options for non-urea based liquid and solid pavement deicers with lower aquatic toxicity than urea. Airports should consider reaching out to pavement deicer manufacturers to learn about less toxic, lower biochemical oxygen demand pavement deicers in development.

It is recommended that airports evaluate aircraft and pavement deicing chemical options before each deicing season. Industry organizations such as the Society of Automotive Engineers provide information on the safety, cost, and effectiveness of most deicing products.

#### *Benefits*

- Improves receiving water quality by phasing out the use of urea-based pavement deicers
- Improves receiving water quality by implementing more environmentally friendly pavement and aircraft deicers

#### *Additional Resources*






- *ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems*

## Deicer Collection

### Deicer-5: Utilize Glycol Recovery Vehicles to Collect Spent Aircraft Deicing Fluid

Glycol recovery vehicles can be used to collect deicing fluid from the pavement in aircraft deicer application areas. Collection of spent deicing fluid may be required during certain winter conditions at airports to meet certain discharge requirements in airport NPDES permits (i.e., propylene glycol, biological oxygen demand, dissolved oxygen, chemical oxygen demand).

Airports and/or their tenants should consider using glycol recovery vehicles, as they offer several benefits over other more complex collection methods. At many small airports, using a glycol recovery vehicle to remove deicer

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Deicing Season</b>	<b>Savings</b> 

from the pavement could be sufficient to satisfy NPDES permit requirements without investing in complex and expensive infrastructure improvements. Collecting the spent deicer close to the application source minimizes the amount of deicer that reaches storm drains and mixes with storm water from other areas. This results in less volume that needs to be collected to achieve the same amount of deicer capture. Lower volumes result in lower cost for storage and disposal.

Deicing should ideally be conducted in centralized locations, instead of across the ramp, so that less pavement is affected and the glycol recovery vehicle can more efficiently remove the deicer. The deicer application areas should be located away from storm drains, or else drain covers should be used to block storm drains during deicing. This gives the glycol recovery vehicle a chance to collect the deicer before it reaches the storm drain. Emulsifiers may also help a glycol recovery vehicle remove more deicer from the pavement.

*Benefits*

- Reduces the amount of runoff that needs to be collected
- Facilitates collection of deicer runoff for compliance with NPDES permits
- Avoids constructing a complex or more expensive deicer collection system

*Additional Resources*




- *ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems*

**Deicer-6: Construct a Deicer-laden Snow Management Area to Collect and Contain Contaminated Snowmelt**

Providing a dedicated area for deicer-laden snow could reduce the total amount of snow impacted by deicer at an airport. Collection and segregation of deicer-laden snow will reduce contamination of clean snow and may also facilitate compliance with deicing-related requirements in a NPDES permit (e.g. limits on biochemical oxygen demand, chemical oxygen demand, total organic carbon, propylene glycol or ethylene glycol concentration, or load-based limits) if drainage from the deicer-laden snow area is diverted to a sanitary sewer or other treatment facility.

Snow management staff will need to be trained to identify snow containing deicer and know the appropriate area for accumulation of deicer-laden snow. Ideally the area designated for deicer-laden snow should be adjacent to the area where aircraft deicer is applied, and the snow management area should be a well marked area identified on a map for operators' reference.

Drain covers may be used to prevent melting snow from entering the storm drain system, and a glycol recovery vehicle could be used to collect the snowmelt off the pavement. If snow piles regularly accumulate and cause visibility issues, snow melters can be used to reduce the volume of stored snow. Alternatively, if the storm water pipes do not leak, and if it is feasible to isolate drainage from the snow management area, valves could be installed within the storm water drainage system to collect melted snow in the pipes. A vacuum truck could then be used to remove the melted snow from the pipes at a

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital <b>\$\$\$</b>
Knowledge 	Operational <b>\$</b>
Frequency <b>Deicing Season</b>	Savings 

centralized location, or additional piping could be installed to direct collected runoff to a centralized storage location. Collected deicer-laden snow melt could then be trucked to the local municipal sanitary sewer, off-site recycling facility, or treated on site.

*Benefits*




- Reduces the amount of snow contaminated with deicer
- Improves water quality in receiving streams
- Facilitates compliance with a NPDES System permit

*Additional Resources*

- *ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems*

**Deicer-7: Construct Innovative Deicing Facilities**

During winter events aircraft deicer may be applied in many areas around an airport including on ramps, around the terminal, and at the hold pads. Providing centralized deicing locations minimizes the areas impacted by deicing activities, thereby minimizing the storm water impacted by deicing activities. Centralized deicing may also potentially streamline operations, reducing flight delays. Tenants can set up two or four deicing trucks stationed at a location. As an aircraft taxis between the trucks, it is sprayed from both sides at once reducing the time it takes to deice.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$\$</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Utilizing centralized deicing areas also facilitates collection of the deicer. Drains around the deicing facility may be blocked, and a glycol recovery vehicle may be utilized to remove fluid from the area. Dedicated drainage systems may also be constructed to isolate runoff and divert it to storage before treatment or recycling.

*Benefits*

- Reduces the amount of runoff that needs to be collected
- Facilitates collection of deicer runoff for compliance with NPDES permits
- Simplifies deicing operations
- Facilitates collection of deicer runoff for compliance with NPDES permits




*Additional Resources*

- *ACRP Report 14: Deicing Planning Guidelines and Practices for Stormwater Management Systems*

## Treatment and Disposal

### Deicer-8: Process Spent Deicer on Site

Requirements in NPDES permits necessitate collection of storm water runoff contaminated with aircraft deicers at many airports. Typically this collected runoff is discharged to the local municipal sanitary sewer system, and discharge fees are often dependent on the amount of biochemical oxygen demand load in the runoff. As aging municipal sanitary sewer systems require infrastructure improvements, and available treatment capacity diminishes, sanitary sewer rates are rising around the country causing airports to look for alternative methods for disposal of collected runoff. Processing storm water runoff containing aircraft and pavement deicers on site may decrease an airport’s exposure to these rising rates while maintaining compliance with permit limitations.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$\$</b>
<b>Frequency</b> <b>Deicing Season</b>	<b>Savings</b> 

Several options are available for on-site processing, including glycol recycling through reverse osmosis or recompression and distillation; and biological destruction of the glycol through aerobic or anaerobic treatment. Reverse osmosis, recompression and distillation are technologies that work best with higher concentrations of collected deicer, and in areas where there is a market for the processed glycol. Aerobic and anaerobic systems can handle either high or low concentrations of deicer in collected runoff, and vary from small tank reactor facilities that cover less than a quarter acre to several acres of subsurface treatment units depending on the specific situation.

Processing of spent deicers on site required construction of storage tank(s) for collected runoff and a treatment system (or purchase or rental of a modular-type treatment system). Systems can either be operated by specially trained airport staff or can be outsourced to companies specializing in treatment or recycling system operation.

The technology best suited for an individual airport is dependent on the local climate, amount of runoff collected annually, concentration of propylene glycol, local market for recycled glycol, and land available for on-site processing. It is recommended that an airport consult with a specialist in airport deicer treatment systems to identify the most appropriate treatment technology for its facility.

#### *Benefits*

- Reduces reliance on local municipal sanitary sewer
- Facilitates compliance with a NPDES permit
- Decreases exposure to rising utility rates

#### *Additional Resources*

- *ACRP Synthesis 10: Airport Sustainability Practices*  
*ACRP Report 14: Deicing Planning Guidelines and Practices for Storm Water Management Systems*



## APPENDIX A-18

### Water Conservation Practices

By investing in controls to reduce water use and recycle water, airports not only reduce consumption of a limited resource but also save money. The following water conservation practices will assist with reducing water usage and increase the reuse of water at airports:

<p><b>Applicable Federal Regulatory Programs</b></p> <ul style="list-style-type: none"> <li>• Safe Drinking Water Act (Chapter 8)</li> </ul>
--

- Use Reduction
  - ✓ Install Automatic Sensors on Faucets to Conserve Water
  - ✓ Install Waterless Urinals
  - ✓ Install Pressure-assisted Toilets to Conserve Water Usage
  - ✓ Install Low-flow Plumbing Fixtures in Facilities
  - ✓ Reduce Potable Water Used in Irrigation Systems by Limiting Irrigation Frequency and Duration
  - ✓ Use High Pressure Nozzles in Car Washes and for Aircraft Washing
  - ✓ Use Synthetic Grass in Landscaping
- Potable Water Recycling
  - ✓ Implement a Water Reclamation System in Airport Car/Aircraft Wash Area
  - ✓ Recycle Used Non-Potable Water
- Other Conservation Practices
  - ✓ Install Metering Networks to Facilitate Accurate Measurement of Water Use
  - ✓ Protect Drinking Water Supply
  - ✓ Develop a Water Management Plan

### Use Reduction

#### Water Conservation-1: Install Automatic Sensors on Faucets to Conserve Water






Installing automatic sensors on faucets is a relatively easy way to save water. They are rather inexpensive, and once installed, require similar maintenance to a regular faucet. The sensors activate an automatic valve to turn the water on when motion is sensed in the sink and turn the water off after a set period of time. The automatic sensors prevent users from leaving the faucet on and wasting water. A variety of faucet designs and sensor types are available for installation on existing sinks.

*Benefits*

- Reduces usage of potable water
- Reduces volume of wastewater generated

*Additional Resources*

- EPA WaterSense  
<http://www.epa.gov/watersense/>




<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency  Once	Savings 

- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>

**Water Conservation-2: Install Waterless Urinals**

Instead of flushing waste with potable water in a traditional urinal, waterless urinals allow waste to pass through a filter that collects solids and lets liquids pass through to the sanitary sewer. The filter, changed monthly, contains an odor barrier to prevent sewer gas from backing up through the urinal.

Waterless urinals typically require less maintenance than regular urinals. Because no potable water is needed, there is no risk of leaks in the water supply plumbing. Training is required for cleaning staff, as daily cleaning methods are different from traditional urinals.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Benefits*

- Eliminates usage of potable water for urinals
- Reduces volume of wastewater generated




*Additional Resources*

- USACE Technical Evaluation of Waterless Urinals.  
[http://www.cecer.army.mil/techreports/ERDC-CERL\\_TN-06-03/ERDC-CERL\\_TN-06-03.pdf](http://www.cecer.army.mil/techreports/ERDC-CERL_TN-06-03/ERDC-CERL_TN-06-03.pdf)

**Water Conservation-3: Install Pressure-assisted Toilets to Conserve Water Usage**

Pressure-assisted toilets work differently from traditional toilets. Pressure assisted toilets use the water pressure in the line to compress the air in their enclosed tank as they fill. This compressed air pushes the water out and through the bowl when flushed, unlike traditional toilets that use gravity to remove waste. Pressure-assisted toilets look similar to traditional toilets, but use only 1.6 gallons of water per flush, clog less often, and fill faster than traditional low-flush gravity toilets.

Pressure-assisted toilets cannot be retrofitted onto existing toilets, so new toilets would need to be purchased and installed. Cleaning and maintenance needs on a pressure-assisted toilet are similar to that of a traditional toilet.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*

- Reduces usage of potable water
- Reduces volume of wastewater generated






*Additional Resources*

- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>
- EPA WaterSense  
<http://www.epa.gov/watersense/>

**Water Conservation-4: Install Low-flow Plumbing Fixtures in Facilities**

Faucets, toilets, and showerheads can be replaced or retrofitted to facilitate water reductions. Existing faucets can be retrofitted with low flow faucet aerators. The aerators are relatively inexpensive and work by adding air to the water mixture to maintain an effective spray while reducing the flow of water through the faucet.

Low flow showerheads can be installed in staff locker rooms and come in two varieties, aerated and non-aerated. Aerated showerheads work similarly to aerated faucets by mixing air with water to maintain the pressure of the spray while reducing the flow of water. Non-aerated showerheads work by spraying water in smaller droplets at higher velocity to reduce the amount of water used.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

Low-flush toilets come in two varieties. Pressure-assisted toilets described in Water Conservation-3 are more expensive, but less likely to clog or require multiple flushes. Another less expensive option is traditional, gravity-based low flush toilets. Gravity-based low-flush toilets typically have differently shaped bowls and plumbing to more efficiently remove waste through the toilet with less water.

*Benefits*




- Reduces usage of potable water
- Reduces volume of wastewater generated

*Additional Resources*

- Naples Airport Authority  
[www.flynaples.com](http://www.flynaples.com)
- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>
- EPA WaterSense  
<http://www.epa.gov/watersense/>

### Water Conservation-5: Reduce Potable Water Used in Irrigation Systems by Limiting Irrigation Frequency and Duration

Limiting irrigation can save money and water without sacrificing the look of the landscaping, grass or infield areas. Most grasses only require a small amount of water per week. By using a rain gauge or checking the reported precipitation each week, an airport can limit irrigation to only the amount needed to supplement the rainfall for the week. Alternatively, a moisture gauge for the soil, or an automatic irrigation system that operates based on soil moisture only when it is needed are other potentially viable options. By limiting the frequency and amount of irrigation to the minimum necessary, plants and grasses will develop better root systems and be more tolerant to drought conditions.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Benefits*




- Reduces usage of potable water
- Reduces runoff of fertilizers and other lawn care chemicals from facility

*Additional Resources*

- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>

### Water Conservation-6: Use High Pressure Nozzles in Car Washes and for Aircraft Washing

High pressure nozzles use less water to clean vehicles and aircraft than regular nozzles. By forcing water through a smaller nozzle, the additional pressure gives more force to the spray. High pressure nozzles are available for car washes, and can be used for aircraft washing as well. Wash water may contain dirt, grime, oils and detergents, and should be collected and recycled or discharged to the sanitary sewer.




<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*

- Reduces water usage for aircraft and vehicle washing

### Water Conservation-7: Use Synthetic Grass in Landscaping

Varieties of synthetic grasses are available and are designed to look like real grass. Synthetic grasses do not require irrigation, mowing, herbicide or pesticide applications, thus reducing noise, air, and water pollution from these landscaping activities. Synthetic grass looks good year-round, including during dry periods and in the winter, and can last for 15 to 20 years. Synthetic grass requires an annual application of a disinfectant, and does not have the oxygen-producing benefit to the environment that natural landscaping has.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

*Benefits*

- Eliminates air and noise emissions associated with grass mowing
- Increases water quality from reduced lawn care chemicals in runoff
- Reduces water usage for irrigation




*Additional Resources*

- Fresno Yosemite International Airport  
<http://www.fresno.gov/DiscoverFresno/Airports/default.htm>

### Potable Water Recycling

#### Water Conservation-8: Implement a Water Reclamation System in Airport Car/Aircraft Wash Area

Water reclamation systems are widely available for airport car washes and aircraft wash areas. Since wash water does not require the same level of purification as drinking water, using recycled water in car and aircraft washes instead of potable water is acceptable. Water reclamation systems collect water from the car/aircraft wash drain. The water is then filtered to remove dirt and grime, and stored in a tank for reuse.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Some systems utilize filters that may need to be cleaned, inspected or replaced, and other systems utilize mechanical means of removing solids that do not require maintenance.

Car/aircraft wash reclamation systems reduce the amount of potable water used by the system, and the volume of water discharged to the sanitary system.

*Benefits*

- Reduces usage of potable water
- Reduces volume of wastewater generated






*Additional Resources*

- Naples Airport Authority  
[www.flynaples.com](http://www.flynaples.com)

- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>

**Water Conservation-9: Recycle Used Non-Potable Water**

Used potable water, or grey water, can be reused for purposes where non-potable water is acceptable. Gray water refers to water that is not clean enough to be considered potable water, and is not dirty enough to be considered sewage. Gray water collected from sinks, showers and car/aircraft washes can be stored in tanks and reused in car and aircraft washes, as described in Water Conservation-8, or used for landscaping or irrigation outside. Gray water can also be used indoors for custodial purposes, machine washing, urinals, and toilet flushing. State and local plumbing codes should be checked for restrictions on grey water use in indoor plumbing.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

Collected grey water systems typically are connected to the sanitary system and dispose of unused grey water after a specified amount of time to prevent odor or bacteria growth in the water.

*Benefits*

- Reduces usage of potable water
- Reduces volume of wastewater generated

*Additional Resources*






- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>

**Other Conservation Practices**

**Water Conservation-10: Install Metering Networks to Facilitate Accurate Measurement of Water Use**

Water metering networks facilitate accurate measurement of water use for more accurate utility bills. By tracking typical water flow during low-flow hours of the day, a metering network facilitates early identification of leaks in the system. It can also identify continuously running faucets and toilets.

Metering networks can also help an airport identify peak water use times. Airport water uses that are not time-specific can be planned to occur during non-peak hours. Identification of peak water uses can facilitate tenant and airport staff training on water use reduction, and identify

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 



opportunities for water use reduction. Metering networks can also help an airport appropriately allocate the cost of potable water.

*Benefits*

- Detects leaks early before they result in property damage or waste of potable water
- More accurate water bills






*Additional Resources*

- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>

**Water Conservation-11: Protect Drinking Water Supply**

Airports conduct many activities that could affect drinking water sources. Drinking water sources include wells and surface waters. Airports should consider implementing any of the following applicable practices to protect drinking water supplies.

Limiting chemical storage outdoors, near potable water wells, or near storm drain inlets or ditches will prevent spills from easily reaching potable water sources. Reducing the application of herbicides and pesticides reduces the amount of these chemicals that may potentially infiltrate into groundwater or get washed into receiving streams. Switching from restricted use pesticides and herbicides to general use pesticides and herbicides will reduce the toxicity of chemicals used that may affect surface water runoff or infiltrate and affect groundwater. Using low toxicity deicers, hybrid deicing vehicles, and implementing a collection system for aircraft deicer and contaminated snow may also reduce potential contamination of a drinking water supply. Selected drinking water protection practices should be incorporated into annual maintenance staff training, and should be enforced during monthly storm water inspections to ensure they are implemented.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency Monthly	Savings 

*Benefits*

- Facilitates compliance with drinking water regulations






*Additional Resources*

- Naples Airport Authority  
[www.flynaples.com](http://www.flynaples.com)

### Water Conservation-12: Develop a Water Management Plan

A water management plan can be used to track water management goals (e.g., protection of drinking water supply, reducing water use by 15%, or increasing recycled potable water use by 50%), educate staff on initiatives, and provide a framework for implementing initiatives.

Airport upper management, maintenance staff and custodial staff should be involved in developing water management initiatives to meet these goals. Initiatives can include both technical improvements (e.g., installing low flow toilets, building a car wash water recycling system), or procedure changes (e.g., conducting irrigation at night instead of during the day, charging tenants based on the amount of water they use). Initiatives should include a timeline, capital and operating budgets, and expected staff requirements for installation and regular maintenance, operation and inspection. Once a complete list of initiatives is developed, they should be ranked by priority based on staff requirements, cost and environmental benefit. A timeline should then be developed for implementing the initiatives.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Annual airport staff training on water management and regular inspections of initiatives is essential to ensuring proper implementation. The management plan is also a place to track progress on the initiatives that have been implemented and record quarterly water and sanitary usage to document water saved.

*Benefits*

- Understand where potable water is used
- Understand the sources of wastewater
- Tracks the usage of potable water and generation of wastewater
- Establishes and prioritizes water management goals
- Tracks progress on initiatives

*Additional Resources*

- New Mexico’s Water Conservation Guide  
<http://www.dep.state.pa.us/dep/DEPUTATE/POLLPREV/Iso14001/Tools/Facility%20Environmental%20Issues%20Toolbox/WU%20Water%20Use/WU2,%20WU5,%20WU9%20Water%20Conservation%20Guide.pdf>

## APPENDIX A-19

# Construction Storm Water Discharge Practices

Construction projects at airports often disturb large areas, involve the use of equipment that may leak fuels and oils, and, if not properly managed, can result in significant erosion and sediment problems. Additionally, construction is often conducted by contractors and not airport employees, making it all the more difficult to enforce good storm water practices. By implementing the following practices and managing contractors to ensure they do the same, airports can reduce construction-related impacts on receiving waters:

- ✓ Incorporate Temporary and Permanent Soil Stabilization Techniques
- ✓ Strategically Locate Construction Traffic Areas, Construction Lay-down Areas, and Stockpiles
- ✓ Control Erosion and Sedimentation Through the Use of Earth Dikes, Silt Fences, Sediment Traps, and/or Sediment Basins
- ✓ Conduct Construction-related Storm Water Monitoring
- ✓ Develop and Maintain a Soil Erosion and Sedimentation Control Plan
- ✓ Conduct Independent Inspections of Construction-related Storm Water Best Management Practices




**Applicable Federal Regulatory Programs**

- Drinking Water Supply—Safe Drinking Water Act (Chapter 8)
- Storm Water Discharges Associated with Construction Activities—Clean Water Act (Chapter 8)
- Wetlands—Clean Water Act of 1972, Section 404 (Chapter 8)
- Wetlands—Rivers and Harbors Act of 1989, Section 10 (Chapter 8)
- Wetlands—Executive Order 11990, Protection of Wetlands (Chapter 8)
- Wetlands—Department of Transportation Order 5660.1A Preservation of the Nation's Wetlands (Chapter 8)

### Construction SW-1: Incorporate Temporary and Permanent Soil Stabilization Techniques

Airports should instruct contractors to minimize the amount of soil disturbed at construction sites at all times. Planning construction activities such that only small areas are disturbed at one time and completing work in those areas so that they can be stabilized when construction activities move to a different area significantly reduces potential erosion of soil, sedimentation in streams, and dust problems at construction sites.

Soil that has been disturbed, but where construction activities are not actively occurring, or where construction is complete should be stabilized. The EPA NPDES general permit for storm water discharges from construction activities requires stabilization within 14 days after construction has temporarily or permanently ceased. Techniques for soil stabilization include application of compost, hydraulic mulch, hydro seeding, soil binders, straw mulch, wood mulch, and rolled mats.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b>	<b>Capital</b>
	<b>\$\$</b>
<b>Knowledge</b>	<b>Operational</b>
	<b>\$</b>
<b>Frequency</b>	<b>Savings</b>
<b>Weekly</b>	

*Benefits*

- Prevents erosion of topsoil
- Reduces dust from non-stabilized areas
- Reduces sediment in receiving streams

*Additional Resources*

- EPA Storm Water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>
- Naples Airport Authority  
[www.flynaples.com](http://www.flynaples.com)

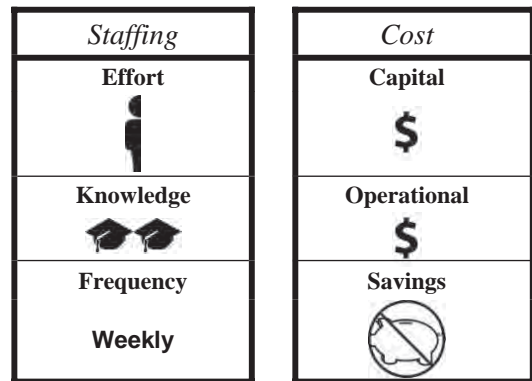
**Construction SW-2: Strategically Locate Construction Traffic Areas, Construction Lay-down Areas, and Stockpiles**

Airports should consider the following general practices to reduce the impact of construction on receiving waters.

Limit construction traffic as well as construction lay-down areas and stockpiles to locations that will be paved as part of the construction. This will minimize the disturbed area that needs to be stabilized at the end of the project. In addition, cover stockpiles whenever feasible to eliminate erosion or dust.

Delineate the site perimeter and seek to minimize temporary pavement that will need to be removed after construction is complete.

Locate construction traffic areas to allow for removal of construction mud from tires on a gravel construction entrance before trucks and equipment leave the site to limit the amount of mud on public roadways.



*Benefits*

- Protects receiving streams by locating construction traffic areas, lay-down areas and stockpiles away from ditches and storm water inlets
- Facilitates erosion and sediment control




*Additional Resources*

- Seattle Tacoma Third Runway Project  
<http://www.portseattle.org/seatac/construction/thirdrunway.shtml#Stormwater>

### Construction SW-3: Control Erosion and Sedimentation Through the Use of Earth Dikes, Silt Fences, Sediment Traps, and/or Sediment Basins

Earth dikes, silt fences, sediment traps, and/or sediment basins can be used on airport construction projects to control soil erosion and sedimentation. Earth dikes are used to direct runoff on a construction site. If they are placed above the site, they direct runoff away from the site thereby reducing soil erosion on the site. When they are used below the site they can direct runoff into sediment control devices to trap sediment.

Silt fences are pieces of fabric stretched between two posts. The fabric is installed flush with the ground and serves to filter sediment from runoff leaving the site. In contrast, a sediment trap or sediment basin is an excavation where runoff is directed. Water is allowed to pool and the sediment settles out before it is directed out through a small spillway, typically constructed of rocks.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Monthly	<b>Savings</b> 

All erosion and sediment control BMPs should be regularly inspected to ensure they have not been damaged by construction activities or during a large rain event. BMPs should be planned according to the size of the area they are expected to serve, and the amount of runoff and sediment they need to remove.

*Benefits*




- Decreases soil erosion and sediment in storm water runoff

*Additional Resources*

- EPA Storm Water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

### Construction SW-4: Conduct Construction-related Storm Water Monitoring

Storm water quantity and quality from an airport construction site should be monitored before, during and after construction. Prior to commencement of construction activities, monitoring can establish a baseline of storm water quality at the site. Storm water monitoring during construction can then be compared to the baseline results to identify increases in sediment in storm water at the site. Additional BMPs can be implemented if sediment in storm water reaches unacceptable levels. If spills are identified in the storm water from construction activities, spill response and notification can happen in a timely manner. Storm water monitoring after construction is complete will confirm if stabilization measures are effective in returning the sediment levels in storm water to pre-construction levels.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$\$
<b>Frequency</b> Monthly	<b>Savings</b> 

Changes to the amount of impervious or pervious surfaces, and changes to the storm water conveyance system on the site may result in changes to the quantity of storm water during a given event




and the overall quality of storm water from the site. If a significant amount of impervious surface will be added as part of a project, or if storm water drainage will be changed that would cause faster movement of storm water from the site, studies may need to be conducted to assure that these changes will not result in flooding downstream, and storm water detention areas may need to be added to prevent downstream flooding.

*Benefits*

- Facilitates detection of failed erosion and sediment controls and BMPs
- Identifies areas where additional erosion and sediment controls are needed

**Construction SW-5: Develop and Maintain a Soil Erosion and Sedimentation Control Plan**

A soil erosion and sedimentation control plan is a guide for airport construction contractors to follow to minimize soil erosion and sedimentation in ditches, storm water inlets and receiving streams. The plan should have an existing conditions site map identifying the topography, drainage patterns, soils, vegetation, coastal resources, wetlands, and sensitive areas on the site and adjacent areas. The plan should also include a map indicating the construction areas, BMPs, construction entrance, staging areas, vehicle and equipment wash down areas, wetlands, ditches, storm drains and other sensitive areas that require protection and are not to be disturbed by construction.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Weekly</b>	<b>Savings</b> 

The plan should minimize the exposed area, provide for temporary or permanent stabilization of soils as soon as practicable, and provide guidelines for implementing appropriate and effective erosion and sediment controls. The plan should also contain an inspection schedule and checklists for inspectors. Completed inspection forms should be kept in the plan. Throughout the project, the plan should be updated on a regular basis to include any changes to the construction plan or BMPs.

*Benefits*

- Provides guidance and standards for construction projects
- Prevents erosion of topsoil
- Reduces sediment in receiving streams
- Provides for regular inspections of sediment and erosion control BMPs

*Additional Resources*






- EPA Storm Water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>
- Columbus Regional Airport Authority Storm Water Management for Construction Activities Guidance Manual  
<http://columbusairports.com/construction/Storm%20Water%20Management%20for%20Construction%20Manual.pdf>



### Construction SW-6: Conduct Independent Inspections of Construction-related Storm Water Best Management Practices

Airports should conduct independent inspections of their contractor’s construction storm water BMPs to ensure the BMPs are functioning as required. Inspections should be conducted during wet weather events to identify repairs or maintenance needs.

Inspectors should check that all BMPs required in the construction storm water permit have been implemented. The controls should be checked to ensure they have not been damaged or destroyed by construction activities, and that they are operating as designed to protect water quality and prevent erosion in all areas impacted by the construction activity. If an airport inspector determines that certain BMPs are not adequate, or are inappropriate for the situation, the airport should request that the contractor implement more appropriate or more effective BMPs. Inspectors should confirm that the contractor is disrupting the minimum surface area required for construction purposes, and that any areas not currently being used for construction are temporarily or permanently stabilized.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Weekly</b>	<b>Savings</b> 

Airport inspector records should be retained, and should include the date and time of the inspection, inspector’s name, weather conditions during the inspection, areas and BMPs inspected, repairs or maintenance necessary, timeline for completing repairs and maintenance, and a check to ensure previously required repairs and maintenance have been completed.

*Benefits*

- Ensures unbiased and regular inspection of storm water BMPs
- Facilitates maintaining appropriate records of inspections
- Detects repairs and maintenance needs early before they result in an exceedance of the construction storm water permit
- Replaces inappropriate or inadequate BMPs with more effective measures

*Additional Resources*

- EPA Storm Water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

## APPENDIX A-20

# Industrial Storm Water Discharge Practices

Airports and their tenants engage in a number of industrial activities that have the potential to adversely affect storm water, including vehicle and aircraft fueling, maintenance, deicing, and washing. Implementing practices and procedures to minimize the risk of leaks and spills from reaching the storm water system will reduce the likelihood of costly spill response and remediation. The following industrial storm water discharge practices will assist with protecting the receiving streams from pollutants associated with common airport industrial activities:

Applicable Federal Regulatory Programs
<ul style="list-style-type: none"> <li>• Drinking Water Supply – Safe Drinking Water Act (Chapter 8)</li> <li>• Industrial Wastewater Pretreatment – Clean Water Act (Chapter 8)</li> <li>• Storm Water Discharges Associated with Industrial Activities – Clean Water Act (Chapter 8)</li> </ul>



- ✓ Confirm that Floor Drains are Connected to the Sanitary System
- ✓ Provide General Aviation Tenants with Sump Fuel Disposal Containers
- ✓ Store Materials and Waste in Areas Sheltered from Rain and Runoff
- ✓ Perform Outdoor Maintenance and Store Equipment in a Designated Paved Area
- ✓ Construct Aircraft and/or Vehicle Wash Pad for Airport and/or Tenant Use that Prevents the Discharge of Wash Water into Storm Drains
- ✓ Develop a Storm Water Management Master Plan
- ✓ Provide Training and Access to Storm Water Pollution Prevention Plan


### Industrial SW-1: Confirm that Floor Drains are Connected to the Sanitary System

Floor drains should be connected to the sanitary system. If connected to the storm system, a non-storm water discharge may occur. If a floor drain connection is unknown, dye or smoke tests can be conducted to determine if the drain is connected to the storm or sanitary system. If connected to the storm water drainage system, the drain should be permanently sealed or disconnected, and new piping installed to connect it to the sanitary system.

#### Benefits




- Facilitates compliance with the CAA
- Prevents leaks and spills from maintenance activities from reaching the storm sewer system
- Prevents non-storm water discharges
- Increases accuracy of drainage maps at the airport

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Monthly</b>

<i>Cost</i>
<b>Capital</b> <b>\$\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

### Industrial SW-2: Provide General Aviation Tenants with Sump Fuel Disposal Containers

Private pilots commonly dispose of sump fuel on the ramp rather than collecting and properly disposing of it. They do not realize that sump fuel can be a significant source of pollution in storm water runoff at an airport. Therefore, airports should supply sump fuel collection containers at general aviation ramps and t-hangars, instruct pilots on the proper handling of sump fuel (e.g., through signs or posters), and provide a means for proper disposal of accumulated sump fuel.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Benefits*




- Prevents sump fuel discharges to storm water
- Educates tenants on pollution prevention

*Additional Resources*

- Naples Airport Authority  
<http://www.flynaples.com/images/docs/general/final%20sustainability%20plan%205-14-09.pdf>
- Scottsdale Airport  
<http://www.scottsdaleaz.gov/Assets/Public+Website/airport/AirportNewsletterApr-Jun2002.pdf>

### Industrial SW-3: Store Materials and Waste in Areas Sheltered from Rain and Runoff

Airports should consider implementing the following practices to reduce the potential for materials stored outside without cover or containment to be washed into storm water inlets during storm events. When possible, materials and storage containers should be moved indoors, away from doors and storm drains.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Solid waste dumpster drains should be plugged and dumpsters should be covered to prevent discharges from entering storm drains. Scrap metal and recyclables storage containers should also be covered to prevent metals and oils from leaching into storm water.

Bulk material storage areas should be located inside, or under cover. Soluble materials like pavement deicers should not be stored outdoors without cover as they easily dissolve in storm water. Bulk materials stored in tanks, such as fuels, should be located within secondary containment. Valves in secondary containment areas should remain closed, and rain collected in the containment area should be inspected for spills or leaks prior to discharging containment water to the storm system.

*Benefits*

- Prevents leaks and spills from reaching the storm system
- Prevents metals from scrap metal bins from being washed into the storm system

*Additional Resources*

- South Bend Regional Airport  
<http://sbnair.com/>

**Industrial SW-4: Perform Outdoor Maintenance and Store Equipment in a Designated Paved Area**

An airport’s maintenance and storage of equipment should be conducted outdoors only when indoor maintenance is infeasible, and it should be conducted in such a way as to minimize the potential impact on storm water.

Maintenance activities should be conducted on impervious pavement, and should not be conducted during storm events whenever possible to prevent leaks and spills from being washed into storm drains. Designating a maintenance area away from storm drain inlets and providing maintenance staff with storm drain covers during maintenance will prevent spills from entering storm drains in the area. Spill response materials should be maintained in outdoor maintenance areas, and drip pans and absorbent materials should be used to catch drips during maintenance activities before they soak into the pavement.

Annual airport storm water pollution prevention training should include a review of policies for minimizing outdoor maintenance, the designated areas for outdoor maintenance, and the methods for protecting storm water during maintenance activities.






*Benefits*






- Prevents maintenance-related leaks and spills from reaching the storm sewer system
- Facilitates spill response by conducting maintenance in an area designed to prevent spills from reaching the storm system

**Industrial SW-5: Construct Aircraft and/or Vehicle Wash Pad for Airport and/or Tenant Use that Prevents the Discharge of Wash Water into Storm Drains**

Wash water from aircraft and vehicles may contain contaminants that affect runoff. Dirt, grime, and salts from roadways, oils, greases, antifreeze, transmission and brake fluids, metals, and soaps and surfactants used to wash aircraft or vehicles may be present in wash water.

Ideally, vehicle and aircraft washing should be conducted indoors in areas not affected by storm water and where drains are connected to the sanitary system. If no indoor locations are feasible, a dedicated wash pad with wash water containment can be constructed. Drain covers may be placed on storm drains or valved drain inserts closed during washing activities to prevent runoff from entering the storm water system. Pooled wash water should be collected from the area with a vacuum truck or other means and discharged to the sanitary system.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Alternatively, a sanitary sewer connection could also be constructed in the wash pad area. A valve would be used to direct wash water to the sanitary sewer during washing activities, but allow storm water runoff to the storm system when no washing activities are occurring. Aircraft and vehicle washing should not be conducted during storm events. Washing activities should be limited to the areas collected by the system, and the boundaries of the wash pad should be well-marked.

*Benefits*

- Improves water quality in receiving streams
- Facilitates compliance with airport NPDES permit requirements
- Prevents spills from reaching receiving streams





*Additional Resources*

- Naples Airport Authority  
www.flynaples.com

**Industrial SW-6: Develop a Storm Water Management Master Plan**

The purpose of a storm water management plan is to determine the long-term implications of future development on storm water quantity and quality at the airport. The plan summarizes the airport’s current and future storm water concerns and outlines a plan for storm water management. The plan should include a vision for long-term storm water management, and airport management, maintenance and environmental staff should be involved in its development.

The plan should include an evaluation of planned airport projects to determine what impacts they may have on storm water drivers. Storm water drivers may include regulatory compliance, flooding, wildlife attractants, maintenance, wetlands, and floodplains. The airport should establish a method for identifying storm water impacts from projects at the airport, considering actions needed to assess storm water impacts, prioritizing projects, and providing guidance to project managers on ways to mitigate adverse storm water impacts. The plan should contain drawings of the current storm water system including drainage basins and outfalls, and identify current and future storm water concerns and projects at the airport.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

*Benefits*






- Identifies potential storm water issues and drivers at the airport
- Proactive approach to handling storm water impacts from airport projects
- Considers storm water impacts during airport planning

**Industrial SW-7: Provide Training and Access to Storm Water Pollution Prevention Plan**

Airports with a SWPPP should keep updated copies of the plan in aircraft hangars, maintenance areas, materials storage areas, fueling areas, and deicing areas so that it is easily accessible for reference when needed. Conducting annual SWPPP training is a requirement of many NPDES permits. Airports should include training about the BMPs, pollution prevention procedures, spill prevention and response, and review issues identified in recent storm water pollution prevention inspections.

*Benefits*

- Facilitates compliance with airport NPDES permit
- Educates tenants and airport staff on storm water pollution prevention
- Increases chances of spills being reported properly
- Increases compliance with BMPs in SWPPP

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 



## APPENDIX A-21

# Storm Water Quantity Management Practices

Airports encompass large areas, resulting in the generation of large quantities of storm water runoff. For safety reasons, runoff must drain quickly from airport surfaces and, as a result, airports can contribute to downstream flooding. By working with the local community to implement storm water management practices on and off airport property, airports can help reduce the risk of flooding in their communities. Proactive storm water management may also facilitate a positive relationship with the local community, reducing community opposition to airport projects. The following practices will help manage storm water at the airport by reducing the volume of storm water discharged, and facilitating recharge of groundwater.

- ✓ Increase Storm Water Drainage Capacity in Areas Prone to Flooding
- ✓ Use Other Properties for Regional Storm Water Infiltration
- ✓ Utilize Pervious Pavement
- ✓ Reduce the Amount of Impervious Surface
- ✓ Develop Storm Water Collection and Rain Harvesting Systems for Treatment Prior to Reuse or Discharge
- ✓ Construct Innovative Technologies to Reduce Storm Water Runoff
- ✓ Prepare a Preliminary Grading and Drainage Plan
- ✓ Repair Wastewater Conveyance Systems






**Applicable Federal Regulatory Programs**

- Drinking Water Supply – Safe Drinking Water Act (Chapter 8)
- Industrial Wastewater Pretreatment – Clean Water Act (Chapter 8)
- Storm Water Discharges Associated with Construction Activities (Chapter 8)
- Storm Water Discharges Associated with Industrial Activities (Chapter 8)
- Wetlands – Clean Water Act of 1972, Section 404 (Chapter 8)
- Wetlands – Rivers and Harbors Act of 1989, Section 10 (Chapter 8)
- Wetlands – Executive Order 11990, Protection of Wetlands (Chapter 8)
- Wetlands – Department of Transportation Order 5660.1A Preservation of the Nation's Wetlands (Chapter 8)

### SW Quantity-1: Increase Storm Water Drainage Capacity in Areas Prone to Flooding

Increasing storm water drainage capacity in areas prone to flooding at an airport may reduce the risk of flooding. This is an important consideration particularly in areas where construction is planned that may increase impervious area or areas that are projected to have increased flooding due to climate change.

Over-sizing pipes to accommodate the 100-year or 500-year flood can provide additional capacity during large storm events. Airports should consider utilizing larger pipes for inline storage, and size the outfall pipe, or downstream pipes based on local requirements. This will allow quick drainage of flood-prone areas to the storm system, but utilize storm water piping for interim storage as smaller outfall pipes meter flow into receiving streams to reduce flooding downstream.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital 
Knowledge 	Operational 
Frequency  Once	Savings 

Another method for reducing flooding on site while reducing flooding downstream is to include storm water retention in ponds upstream of the airport outfalls. Oversized pipes can carry storm water quickly off the airfield, and ponds provide short term detention storage to meter storm water into the receiving streams at a slower rate. Wildlife attractant issues must be considered when siting the ponds by:

- Locating them away from the ends of runways
- Sizing the outlet structures such that the ponds drain within 24 to 48 hours
- Considering enclosed storage by constructing tanks or covered basins

*Benefits*

- Reduces the occurrence of flooding on and downstream of the airport






*Additional Resources*

- EPA storm water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>
- South Bend Regional Airport  
<http://sbnair.com/>

**SW Quantity-2: Use Other Properties for Regional Storm Water Infiltration**

When planning new projects, airports should consider the amount of impervious surface to be created as part of the project. Impervious surfaces prevent runoff from infiltrating into the soil and recharging groundwater. Impervious surfaces also facilitate runoff of storm water to the receiving stream more quickly than pervious areas where storm water runoff is delayed in soil and vegetation.

Adding wetland areas or additional pervious areas for infiltration at the airport may be infeasible, or inadvisable due to wildlife attractant issues, but nearby properties may be able to provide storm water infiltration to reduce storm water runoff in the same watershed as the airport. Airports should coordinate with local governments to identify other properties within the airport watershed that may be available for regional storm water infiltration.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

*Benefits*

- Reduces flooding
- Creates wetlands in area parks




*Additional Resources*

- Center for Watershed Protection  
[www.cwp.org](http://www.cwp.org)
- Storm water Authority  
[www.stormwaterauthority.org](http://www.stormwaterauthority.org)

### SW Quantity-3: Utilize Pervious Pavement

Parking lots and areas not requiring aircraft-rated concrete can be constructed of pervious pavement. Pervious pavement provides a means for runoff to infiltrate through the concrete and seep into the ground, reducing the runoff into the storm water drainage system and recharging the groundwater. Pervious pavement also reduces the amount of storm water infrastructure required for the area. Since storm water is infiltrating into the groundwater, less needs to be conveyed through storm piping. Potential candidates for pervious pavement include:

- Roadways
- Shoulders
- Non-traffic pavements
- Maintenance roads
- Utility yards
- Airside and landside parking facilities

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Annually</b>	<b>Savings</b> 

Airports should consider the activities conducted in the paved area when deciding on pervious pavement. Pervious pavement should be used only in areas where spills are unlikely as it provides a more direct route for spills to reach soil and groundwater. Snow removal equipment can damage pervious pavement, and pavement deicers infiltrate through the pores into the subsurface.

#### *Benefits*




- Decreases impervious surface area at the airport
- Reduces volume of storm water runoff
- Reduces sediment and dissolved and suspended solids in runoff
- Increases infiltration and recharging of groundwater

#### *Additional Resources*

- EPA Storm water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

### SW Quantity-4: Reduce the Amount of Impervious Surface

Removal of pavement reduces impervious surfaces and enhances storm water infiltration. It provides a means for runoff to infiltrate through the soil and recharge the groundwater instead of running off into receiving streams. Pavement should not be removed in materials storage areas or areas where leaks and spills may occur, as pavement serves as a barrier preventing soil and groundwater contamination from leaks and spills. Airports should consider the cost of removing the old pavement, and any environmental remediation that may be needed to clean up historical spills and leaks in those areas before removal.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Project Planning</b>	<b>Savings</b> 

By removing pavement from the airport, runoff will move more slowly across surfaces providing more time for sediment to deposit in pervious areas where natural treatment occurs instead of washing into receiving streams. Since sediments often bind with pollutants including oil and grease, this may reduce the amount of these pollutants in storm water runoff from the airport, as well.

*Benefits*

- Decreases impervious surface area at the airport
- Reduces volume of storm water runoff
- Increases infiltration and recharging of groundwater
- Reduces sediment and dissolved and suspended solids in runoff
- Increases likelihood of responding to spills and leaks before they reach receiving streams
- Reduces flooding

*Additional Resources*

- Green Roofs for Healthy Cities  
[www.greenroofs.org](http://www.greenroofs.org)
- National Ready Mixed Concrete Association  
[www.perviouspavement.org](http://www.perviouspavement.org)
- U.S. Green Building Council  
[www.usgbc.org](http://www.usgbc.org)
- Storm water Authority  
[www.stormwaterauthority.org](http://www.stormwaterauthority.org)

**SW Quantity-5: Develop Storm Water Collection and Rain Harvesting Systems for Treatment Prior to Reuse or Discharge**




Rain harvesting is collecting rain water from roofs, storing it, and then using it in place of potable water. Rain harvesting systems divert runoff from gutters into aboveground or underground storage tanks. Water from the tanks is then pumped out to be used for irrigation, car/aircraft washing, toilet flushing, or janitorial use. For related information, refer to Water Conservation-9, Recycle Used Non-potable Water.

*Benefits*

- Reduces storm water runoff from airport
- Reduces potable water use

*Additional Resources*




- Global Development Research Center  
[www.gdrc.org/uem/water/rainwater](http://www.gdrc.org/uem/water/rainwater)
- International Association of Plumbing and Mechanical Officials  
[www.iapmo.org](http://www.iapmo.org)
- South Bend Regional Airport  
<http://sbnair.com/>

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Annually	Savings 

### SW Quantity-6: Construct Innovative Technologies to Reduce Storm Water Runoff

Reducing the amount or rate of storm water runoff from an airport can reduce the chance of downstream flooding, reduce soil erosion, and, consequently, the dissolved and suspended solids in the runoff. Reducing the velocity at which runoff leaves airport property also provides more opportunity to identify and capture spills before they reach receiving streams.

There are several strategies for reducing storm water runoff. Adding vegetated islands to parking lots and installing flat curbs to route runoff across vegetated areas from roadways and parking lots instead of along curbs into storm water inlets will allow soil and vegetation to naturally remove sediment from runoff and reduce flow rates into the storm system. Parking lots and areas not requiring aircraft-rated concrete can be constructed of pervious pavement, discussed in SW Quantity-3.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 

Runoff from runways, taxiways and ramps can be directed into infield areas where grass and soil naturally remove sediment before it enters the storm system. Infield areas also serve to slow runoff and allow some infiltration into the ground to reduce storm water flow rates.

Green roofs are a means for reducing impervious surfaces on small or expansive airport facility roofs. Green roofs consist of a waterproof roofing material covered with soil, or another light-weight growing substrate, and vegetation. While it is possible to retrofit an existing roof with a green roof, they are typically installed with a new building, or when a roof is replaced. Roots from the vegetation soak up water from rain and snow as it trickles through the green roof growing substrate. Green roofs not only reduce the runoff from an airport, but also decrease the interior building temperature in the summer as green roofs are significantly cooler than traditional roofing materials. Many varieties of vegetation are available, and species that do not attract wildlife should be chosen for airports. When retrofitting with a green roof, the weight of the roof on the existing structure must be considered.

Rain gardens are areas where rainwater is directed from downspouts, parking lots, or other impervious areas. Rain gardens are vegetated, and lower in elevation than surrounding areas to allow rain water to soak into the ground instead of running off. Interesting vegetation and landscaping may also function as ecological features and provide aesthetic benefits. The use of native plants in rain gardens is typically less costly and requires less irrigation and maintenance than non-native vegetation.

Dry wells can also be used to collect storm water and allow it to dissipate into the groundwater. Dry wells often have several storm water pipes connected to them, and contain a large surface area under ground for storm water to infiltrate into ground water. Dry wells should only be used in areas not prone to flooding.

#### *Benefits*

- Reduces storm water runoff from the airport
- Reduces soil erosion
- Increases likelihood of responding to spills and leaks before they reach receiving streams
- Reduces sediment and other pollutants in storm water runoff
- Reduces impervious surface area at the airport

*Additional Resources*

- Chapter 4, Part 2 (Urban Runoff), of the EPA’s Guidance Specifying Management for Sources of Nonpoint Pollution in Coastal Waters, January 1993 (Document No. EPA-840-B-92-002).
- St. Augustine Airport  
<http://www.staugustineairport.com/>

**SW Quantity-7: Prepare a Preliminary Grading and Drainage Plan**

Preparing a preliminary grading and drainage plan prior to construction is important to plan for drainage of disturbed areas during and after construction and to protect areas that should not be disturbed. Soil types and local hydrology that can be found in hydrology and soil reports are used to determine the amount of infiltration that can be expected. From there, airport staff can choose the appropriate slope and drainage needed for the project.

A grading and drainage plan should:





- Provide for preservation and reuse of top-soil in the final grading
- Ensure proper drainage of the site during and after construction
- Include slopes used for grading during and post construction
- Identify areas of soil disturbance
- Identify existing vegetation, wetlands, or other areas that should not be disturbed

*Benefits*

- Better grading and drainage after construction projects
- Reduces the amount of soil disturbed for construction projects

*Additional Resources*

- U.S. Department of Agriculture National Resources Conservation Service  
<http://soils.usda.gov/>
- U.S. Geological Survey  
<http://water.usgs.gov/>

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>Monthly</b>	<b>Savings</b> 






### SW Quantity-8: Repair Wastewater Conveyance Systems

By repairing or replacing old sanitary sewer pipes, an airport can minimize the amount of groundwater that infiltrates into the sewer system. By minimizing groundwater in sanitary or combined sewer lines, an airport can reduce the amount of clean groundwater that is treated by the local POTW. Many airports are charged sanitary sewer fees based on potable water use, but if the sanitary sewer is specifically metered, minimizing groundwater infiltration into lines may reduce sanitary sewer fees.

Historical maps of the airport sewer system and maps from airport projects can be used to determine the age of the sewer pipes. Pressure testing of pipes and TV inspection of pipes can identify sewers with significant infiltration. Dry weather discharges of water from storm sewer outfalls are also indications of groundwater infiltration.

#### *Benefits*

- Minimizes waste water that reaches soils and groundwater
- Minimizes groundwater infiltration into sanitary sewers reducing sewer flow rates

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$\$
<b>Frequency</b>  <b>Annually</b>	<b>Savings</b> 

## APPENDIX A-22

# Storm Water Quality Protection Practices

In addition to the storm water discharge practices applicable to industrial activities described in Appendix A-20, other airport activities, like construction and landscaping, also have the potential to impact storm water quality. Implementing practices for soil disturbed as part of construction, and efficient landscaping techniques protects storm water quality and may save the airport money. The following storm water quality protection practices will help reduce airport-related storm water quality impacts:

- ✓ Reuse Cut Grass Instead of Applying Fertilizer
- ✓ Protect Topsoil
- ✓ Reduce Flow Velocities in Storm Water Conveyance Systems
- ✓ Install Energy-efficient Water Aerators to Maintain Water Quality

<b>Applicable Federal Regulatory Programs</b>
• Drinking Water Supply—Safe Drinking Water Act (Chapter 8)
• Industrial Wastewater Pretreatment—Clean Water Act (Chapter 8)
• Storm Water Discharges Associated with Construction Activities (Chapter 8)
• Storm Water Discharges Associated with Industrial Activities (Chapter 8)
• Wetlands—Clean Water Act of 1972, Section 404 (Chapter 8)
• Wetlands—Rivers and Harbors Act of 1989, Section 10 (Chapter 8)
• Wetlands—Executive Order 11990, Protection of Wetlands (Chapter 8)
• Wetlands—Department of Transportation Order 5660.1A Preservation of the Nation’s Wetlands (Chapter 8)

### SW Quality-1: Reuse Cut Grass Instead of Applying Fertilizer






Airport grounds maintenance staff should evaluate composting and recycling grass clippings, rather than having it removed by waste contractors. After composting for about five months, the material should be assessed before being applied to grassy areas. Reusing cut grass reduces the amount of artificial fertilizer used. When mowing grass, avoid mowing grass clippings into storm drains, ditches, or surface waters.

#### *Benefits*

- Reduces reliance on fertilizers
- Reduces storm water and groundwater affected by chemicals in fertilizers
- Reduces waste generated from cut grass

#### *Additional Resources*



- Stansted Airport, United Kingdom  
<http://www.stanstedairport.com/>


<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b>  <b>Seasonal</b>	<b>Savings</b> 

### SW Quality-2: Protect Topsoil

During site disturbance activities, stockpiling topsoil separately from other excavated materials will protect it from erosion, and allow it to be reused in final grading. Applying about four inches of topsoil after final grading provides a better growing media for new vegetation than less fertile materials excavated from below the topsoil. Use of topsoil promotes soil stabilization, which reduces erosion and sedimentation.

Additionally, vegetation cleared as part of a construction project can be composted and applied with topsoil or used as mulch. Invasive plants or weeds should not be composted.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Monthly</b>

<i>Cost</i>
<b>Capital</b> <b>\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

#### *Benefits*

- Promotes soil stabilization
- Decreases soil erosion and sediment in storm water runoff
- Protects topsoil



#### *Additional Resources*


- Washington Organic Recycling Council  
<http://buildingsoil.org/>
- EPA Storm Water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

### SW Quality-3: Reduce Flow Velocities in Storm Water Conveyance Systems

Several options are available for reducing flow velocities in storm sewers. Consider designing storm sewer conveyance system improvements with reduced diameter pipes. Velocity slows as flow backs up in larger pipes upstream and encourages settling of sediments. A dam, weir or specialized valve can also be used to slow the rate of flow by backing up runoff in pipes.

Sediments that settle out in storm sewers must be removed on a regular basis. Otherwise, the pipes will fill with sediment and their capacity will be reduced resulting in increased flooding risk. Pipe restrictors should be placed in areas easily accessed.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Once</b>

<i>Cost</i>
<b>Capital</b> <b>\$</b>
<b>Operational</b> <b>\$</b>
<b>Savings</b> 

#### *Benefits*

- Reduces flooding downstream in receiving waters
- Reduces sediment in storm water runoff

*Additional Resources*

- EPA Storm Water BMPs  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>

**SW Quality-4: Install Energy-efficient Water Aerators to Maintain Water Quality**






In ponds where water does not circulate, oxygen concentrations decrease and the water stagnates. Water aerators, like pond fountains, help to infuse oxygen into the water. Aerators can also serve to prevent freezing in the winter and enhance aesthetics of storm water detention ponds. Aerators should be equipped with floats to automatically turn the aerator off when the water level drops to avoid burning out the engine.

*Benefits*

- Eliminates odor issues from stagnant water
- Increases dissolved oxygen in water to promote aquatic life

*Additional Resources*

- Naples Airport  
[www.flynaples.com](http://www.flynaples.com)

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

## APPENDIX A-23

## Energy Efficiency and Renewable Energy Practices

Airports can lessen their dependence on energy by considering energy efficient and/or renewable energy practices. These practices encompass a broad array of activities. The practices related to energy efficiency and renewable energy, as summarized below, do not have regulatory requirements, but there is guidance from several federal agencies. Airports should select those practices in areas of most concern to the airport and the community as a whole. The following are proactive practices related to energy efficiency and renewable energy and are grouped by topic:

### Applicable Federal Programs

- EPA Energy Conservation Action Plan (Chapter 9)
- EPA Energy Star Program (Chapter 9)
- Department of Energy—Energy Efficiency and Renewable Energy (Chapter 9)

- Alternative Transportation
  - ✓ Implement Transit-first Policy for Employees, Passengers and Other Airport Users
  - ✓ Provide Transit Use Incentives to Employees
  - ✓ Encourage Bicycle Commuting and Use for On-airport Transportation
- Airport Lighting
  - ✓ Shut Down Airfield Lighting During Nighttime, Off-peak Hours
  - ✓ Monitor or Inspect Interior and Exterior Lighting Systems Regularly to Maintain Proper Illumination and Minimize Off-site Impacts
  - ✓ Maximize Use of Natural Light and Other Daylighting Strategies
  - ✓ Utilize Energy-efficient Lighting
- Energy Efficiency
  - ✓ Develop and Implement an Energy Conservation/Efficiency Plan
  - ✓ Work with Airlines to Group Flights in a Given Part of a Concourse During Non-peak Hours
  - ✓ Implement Flexible Ticket Counters
  - ✓ Develop an Operation and Maintenance Manual
  - ✓ Establish Building Systems Commissioning
  - ✓ Implement an Energy Management Control System
  - ✓ Utilize Prefabricated Equipment
  - ✓ Purchase and Install Energy Star Appliances and Computers
  - ✓ Utilize Thermal Energy Storage to Aid with Air Chilling
  - ✓ Solar Water Heating
  - ✓ Use Tankless Water Heaters
  - ✓ Enhance Energy Efficiency of Escalators
- Performance Tracking
  - ✓ Track Energy Use
  - ✓ Develop and Implement a Program to Track Progress Achieved in Improving Environmental and Sustainability Performance
  - ✓ Track Sustainability Elements in Construction Projects
  - ✓ Utilize Contractors with Sustainability Experience
- Renewable Energy
  - ✓ Install Solar Energy-powered Roadway Signs or Airfield Lighting
  - ✓ Implement Cogeneration

- ✓ Purchase Renewable/Alternative Energy Generated Off-site
- ✓ Conduct a Renewable and Alternative Energy Feasibility Study
- ✓ Install On-site Renewable/Alternative Energy Systems
- ✓ Use Snow as an Energy Source
- ✓ Install Small-capacity Solar Power Systems
- ✓ Use Solar Trombe Walls for Passive Solar Heating

## Alternative Transportation

### Energy-1: Implement Transit-first Policy for Employees, Passengers and Other Airport Users

Airports can adopt a transit-first policy that prioritizes investments, design, and promotion of high-occupancy vehicle lanes and facilities before single-occupancy vehicles. The transit-first policy may encourage smart growth/complete street development. The transit-first policy may also include initiatives to promote bicycling and walking for employees, and public transportation for both airport employees and the traveling public.






A transit-first policy may be adopted at a city, county, or state level, which may promote transportation development beyond an airport’s control. For related information, refer to Planning-7 in Appendix A-11.

#### Benefits

- Reduces environmental impacts

#### Additional Resources

- San Francisco City Charter, Section 8A.115, *Transit-First Policy*  
<http://www.sfmta.com/cms/bcomm/3179.html>
- Airport Transit Plan, San Diego International Airport  
[http://www.san.org/documents/airport\\_authority/transit\\_roadway/08Aug\\_Final\\_Report/SAN\\_Transit\\_Final\\_Aug08\\_report.pdf](http://www.san.org/documents/airport_authority/transit_roadway/08Aug_Final_Report/SAN_Transit_Final_Aug08_report.pdf)






<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

### Energy-2: Provide Transit Use Incentives to Employees

Airports can provide incentives to employees to use public transportation. This may include the airport subsidizing train and/or bus passes. Providing commuter benefits could offer tax incentives, as well. For related information, refer to Planning-8 in Appendix A-11. Increased use of public transportation will also reduce airport congestion and associated air and GHG emissions.

#### Benefits

- Reduces environmental impacts

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 






*Additional Resources*

- American Public Transportation Association’s *It Pays To Ride Public Transportation*  
[http://www.publictransportation.org/pdf/reports/pays\\_to Ride.pdf](http://www.publictransportation.org/pdf/reports/pays_to Ride.pdf)

**Energy-3: Encourage Bicycle Commuting and Use for On-airport Transportation**

Providing safe bicycle lanes and paths, centralized facilities with secure bicycle storage, and convenient changing/shower areas may encourage bicycle commuting by employees. Additionally, “Ride to Work” days for employees might be ideal for establishing bicycle commuting awareness. An airport saves money because fewer employee parking spaces would be needed. Bicycle racks are approximately \$50 to \$200 per bike and lockers are \$1,000 to \$2,500 per bike, but offer more security. Airports should coordinate with regional planners and biking initiatives. Maintenance costs of bike racks are approximately one-third that of parking spaces.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

*Benefits*

- Encourages and improves health and wellness
- Reduces air emissions

*Additional Resources*




- Bike to Work at O’Hare International Airport  
<http://www.flychicago.com/environment/OhareBiketoWork.shtm>
- The Baltimore Metropolitan Council and Baltimore Regional Transportation Board’s *Employer Guide to Bicycle Commuting*  
[http://www.baltometro.org/downloadables/bike/BikeCommuterGuide\\_Employers.pdf](http://www.baltometro.org/downloadables/bike/BikeCommuterGuide_Employers.pdf)

**Airport Lighting**

Lighting upgrades are particularly important because the energy consumed by lighting is costly. There have been many recent technological advances with lighting and lighting systems which reduce air emissions as well as energy consumption and costs.

**Energy-4: Shut Down Airfield Lighting During Nighttime, Off-peak Hours**

Small airports, particularly General Aviation airports, have the opportunity to save monetary resources by installing pilot activated lighting, also called pilot-controlled lighting, which allows pilots arriving at an airport to turn on airfield lighting via radio transmissions. This enables airfield lighting to be turned off at night and off-peak hours of operation. This is especially beneficial when demand at small airports doesn’t warrant nighttime personnel.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

Misawa Air Base, a U.S. military airfield in Japan, turns off airfield lighting after the last aircraft lands at the end of

the day. By no longer lighting the airfield at night, the base expects to reduce its \$85,000 lighting bill by two-thirds. While this is a military base, with aircraft restrictions, it is a good example of how much an airport may be able to save with pilot-activated lighting.

*Benefits*

- Reduces energy consumption and costs
- Reduces light pollution

*Additional Resources*

- Misawa Saves Energy at the Flip of a Switch  
<http://www.misawa.af.mil/news/story.asp?id=123174569>

**Energy-5: Monitor or Inspect Interior and Exterior Lighting System Regularly to Maintain Proper Illumination and Minimize Off-site Impacts**




Regular monitoring of lighting systems can ensure the lighting systems are operating efficiently. Monitoring/inspections can also help identify when lighting system upgrades are needed. Building optimization techniques may also be identified, which could significantly reduce energy use. Proper illumination enhances visibility and positioning can reduce light pollution.

*Benefits*

- Reduces energy consumption and costs
- Reduces light pollution




*Additional Resources*

- ACRP Project 11-02: *Model for Improving Energy Use in U.S. Airport Facilities*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

**Energy-6: Maximize Use of Natural Light and Other Daylighting Strategies**

Airports planning new facilities (especially terminals and administrative buildings) should consider designs that maximize exposure to natural light through controlled use of daylighting systems such as open-air design, skylights, atriums, and windows. Additionally, the designs should optimize the use of sunlight without compromising the heating and cooling needs of the building by incorporating a lighting control system and utilizing indoor fixtures such as shades, blinds, or reflective panels, and/or exterior shading such as vegetation and trees that deflect sunlight and glare while keeping the space bright.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

For administrative offices, open cubicles and offices, increased exposure to natural light can reduce artificial lighting requirements and enhance employee productivity and well-being.

*Benefits*

- Reduces energy consumption and costs
- Potential for short-term ROI
- Improved employee and passenger satisfaction/well-being




*Additional Resources*

- Natural Institute of Building Sciences, *Whole Building Design Guide*  
<http://www.wbdg.org/resources/daylighting.php>

**Energy-7: Utilize Energy-efficient Lighting**

Due to the many lighting requirements at airports, from airfields to terminal and administrative spaces, airport lighting is a large source of energy and indirect source of GHG emissions. However, there exist many energy efficient lighting technologies that result in short (one to two year) ROIs, depending on the airport’s energy.

The most commonly used lighting at airports is typically incandescent and fluorescent lamps. There are two common types of fluorescent lamps, standard full-size or U-bent fluorescent lamps, and compact fluorescent lamps. The standard full size and U-bent fluorescent lamps are most commonly used in commercial lighting. Compact fluorescent lamps are used most often as architectural or decorative features, or as task lighting. Fluorescent lamps are significantly more efficient than traditional lighting sources, producing up to four times as much light as conventional incandescent lamps according to the U.S. Department of Energy (10). When selecting energy efficient fluorescent lighting fixtures, it is important to avoid lighting that contains mercury, a highly toxic element.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$-\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

There are a number of more efficient lighting solutions, however, which could greatly reduce airports’ energy consumption. LED lamps are a semiconductor diode that emits light when an electric current is applied to the device. According to the U.S. Department of Energy, the best LED lamps available today can be up to five times more efficient than conventional incandescent lamps (10).

*Indoor Lighting*

In terminal buildings and other airport building spaces, airports should seek to retrofit lighting with either LED or fluorescent lighting. Energy Star-qualified light bulbs and fixtures use approximately 75 percent less energy than standard incandescent bulbs and last up to 10 times longer. Buying Energy Star-rated fixtures is an effective way to guide the airport’s purchase of energy efficient lighting solutions.

In addition to lighting retrofits, the airport should install occupancy sensors to control lighting in areas that are intermittently occupied. The sensors turn off a set of lights, or all of the lights, when a room or area is vacant. Task lighting in office areas can also decrease overall lighting requirements. Upgrading both the light bulbs and control systems is ideal and is significantly more energy-efficient.

### *Airfield and Roadway Lighting*

For roadways, runways, taxiways, apron areas, and obstructions (as applicable), airports should use energy-efficient lighting and signals (note that only FAA-approved LED or quartz lighting for runways and taxiways are eligible for FAA funding) (11). Transitioning to energy-efficient lighting can result in a significant cost savings. Honolulu International Airport recently replaced all of its 30-watt incandescent taxiway lamps with 1-watt high-intensity LED lamps. Along with the lamps, the airport also replaced its 30/45-watt isolation transformers with lower wattage more efficient transformers. The overall energy reduction for the entire taxiway lighting system (lamp and isolation transformers) was estimated to be 36-watt per fixture. With the retrofit of 1755 taxiway lights and isolation transformers, Honolulu International Airport was able to achieve a reduction in energy consumption of nearly 300,000 kWh per year and savings of more than \$27,000 on their annual electric bill (12).

If lighting upgrades are included as part of a larger project, such as a runway or taxiway rehabilitation, the costs would be eligible for FAA funding and represent only a small incremental cost from the cost of runway rehabilitation. Another potential funding source is to use Energy Savings Performance Contracts, which provide organizations funding for energy saving projects. An energy service company is a partnership between an organization and an energy service company. The energy service company conducts a comprehensive energy audit for the facility and identifies improvements to save energy, such as upgrading to LED lighting. In consultation with the organization, the energy service company designs and constructs a project and arranges the financing. The energy service company guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract.

### *Benefits*

- Potential for short-term ROI
- Reduces energy consumption and costs
- Reduces maintenance costs
- Reduces environmental impacts






### *Additional Resources*

- EPA Tools and Resources for Lighting Retrofit Projects  
<http://www.epa.gov/EEBUILDINGS/lighting/detail/>
- Federal Energy Management Program Energy Savings Performance Contracts  
<http://www1.eere.energy.gov/femp/financing/espcs.html>
- American Council for an Energy Efficiency Economy Online Guide to Energy-Efficient Commercial Equipment - Energy-Efficient Lighting and Lighting Design  
[http://www.aceee.org/ogeece/ch2\\_index.htm](http://www.aceee.org/ogeece/ch2_index.htm)
- Powerlines. Energy Efficiency Takes-Off at the Honolulu International Airport. A Hawaiian Electric Company, Inc. Publication. No. 1 Sprint 2008  
<http://www.adb-airfield.com/docs/Honolulu%20International%20Airport%20Spring%202008.pdf>
- EPA Energy Star Program  
[www.EnergyStar.gov](http://www.EnergyStar.gov)
- U.S. Department of Energy, Solid-State Lighting Information Resources, Technology Fact Sheets Updated June 2009  
<http://www1.eere.energy.gov/buildings/ssl/factsheets.html>

## Energy Efficiency

### Energy-8: Develop and Implement an Energy Conservation/Efficiency Plan

Developing an energy conservation/efficiency plan can address many different stages of airport development. For new construction, the plan could establish design standards for energy conservation, which may include purchasing Energy Star products (for additional information, see Energy-15). Local energy codes and American Society of Heating, Refrigeration and Air Conditioning Engineers Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings* can be used as guides for establishing requirements. In addition, Energy Star Portfolio Manager, required for LEED™ certification, is a powerful online energy management tool that airports can use to track and assess building energy and water consumption. Energy conservation should also include other aspects of the airport, not just the buildings. For example, LED lights could be used for lighting and signals.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b>	<b>Savings</b> 
<b>Ongoing</b>	

The energy conservation/efficiency plan could include an energy audit of buildings and facilities to create a baseline for comparison. This audit can be used to develop a plan to increase efficiency and reduce energy consumption. Audits can be performed periodically to measure the results of the energy conservation/efficiency plan.

#### *Benefits*

- Reduces energy costs
- Decreases environmental impacts
- Establishes a baseline energy consumption which can identify possible conservation measures and used for future comparison






#### *Additional Sources*

- EPA Energy Conservation Action Plan  
[http://www.epa.gov/greenkit/q5\\_energ.htm](http://www.epa.gov/greenkit/q5_energ.htm)
- American Society of Heating, Refrigeration and Air Conditioning Engineers Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*  
<http://www.ashrae.org/education/page/1834>
- EPA Energy Star Program  
[www.Energy Star.gov](http://www.Energy Star.gov)
- Energy Star Portfolio Manager  
[http://www.Energy Star.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://www.Energy Star.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)

### Energy-9: Work with Airlines to Group Flights in a Given Part of a Concourse during Non-peak Hours

Consolidating flights in one part of a concourse allows an airport to reduce use of air conditioning and lighting in the unused portion of the concourse. Since non-peak hours traditionally have less passenger traffic, there is likely more flexibility to consolidate the flights during these times. This small, minimal cost change can result in energy and cost savings. It can also centralize the passengers to a consolidated area to enhance passenger movement through the airport.

The applicability of this strategy for a small airport will depend on the size and number of concourses, and on airlines' flexibility and willingness to participate. It may also be necessary to modify existing gate leases to allow shared gate access at various times of the day.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

*Benefits*

- Reduces energy consumption and costs
- Centralizes nonpeak operations






*Additional Sources*

- ACRP Synthesis 10: *Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)

### Energy-10: Implement Flexible Ticket Counters

Common use, or flexible, ticket counters can reduce the building footprint by requiring fewer ticket counters and minimize energy use through more efficient processes.

Rather than airlines having their own designated ticket counters, which are unused when the airline does not have any flights, common use ticket counters allow the airport to assign airlines to ticket counters in order to have a more efficient use of the ticketing area. Typically, electronic signs are used to display the air carrier using the ticket counter at that time.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

*Benefits*

- Increases efficiency
- Reduces energy consumption and costs




*Additional Resources*

- Los Angeles World Airports Tom Bradley International Airport Common Use Ticket Counter Rules and Regulations  
[http://www.airports.ci.la.ca.us/uploadedfiles/airops/pdf/rules/Section\\_10-Tom\\_Bradley\\_International\\_Terminal\\_Common\\_Use.pdf](http://www.airports.ci.la.ca.us/uploadedfiles/airops/pdf/rules/Section_10-Tom_Bradley_International_Terminal_Common_Use.pdf)



### Energy-11: Develop an Operation and Maintenance Manual

Investments in energy-efficient improvements can be costly. One way for an airport to help reduce energy costs is to develop a comprehensive Operation and Maintenance manual that includes record logs for all systems and operations. This can include many systems, such as all HVAC system equipment, lighting controls and sensors, refrigeration systems, vertical transport, building envelope, emergency power generators and automatic transfer switching, uninterruptible power supply systems, life safety systems (fire protection fire alarm, egress pressurization, lightning protection), domestic and process water pumping and mixing systems, equipment sound control systems, data and communication systems, paging systems, security systems, irrigation systems, plumbing and fixtures, and any other systems or operations at the airport.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

Operations and maintenance record logs can be used as a baseline of energy usage and efficiency and can also be utilized as a performance measure for the airport. These measures can be used as a tool for determining which energy improvements should be installed.

*Benefits*




- Reduces energy consumption and costs
- Reduces maintenance costs
- Reduces environmental impacts

*Additional Resources*

- ACRP Project 11-02: *Model for Improving Energy Use in U.S. Airport Facilities*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)

### Energy-12: Establish Building Systems Commissioning

Commissioning for existing buildings or “retro-commissioning” is a systematic process of investigating, analyzing, and optimizing the performance of building systems by improving their operation and maintenance to ensure optimal performance over time. This process helps make the building systems perform to meet the airport’s current facility requirements and activities.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$\$
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

According to a Lawrence Berkeley National Laboratory study consisting of the world’s largest compilation and meta-analysis of commissioning experience in commercial buildings, the median whole building energy savings for commissioning of existing buildings was 16%, translating to a median payback time of 1.1 years. The median benefit-cost ratio of commissioning for all existing buildings in the study was 4.5.

*Benefits*

- Optimizes the performance of building systems
- Reduces energy consumption and costs
- Reduces GHG emissions
- Reduces maintenance downtime and repair costs

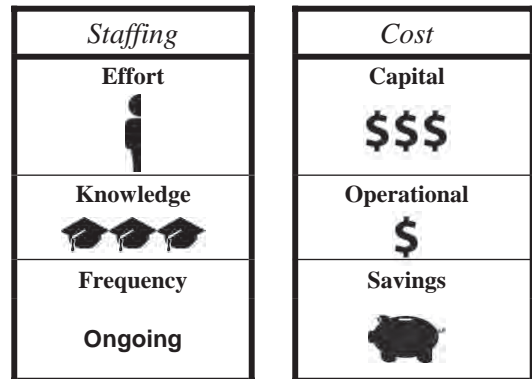
*Additional Resources*

- ACRP Project 11-02, “Model for Improving Energy Use in U.S. Airport Facilities”  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)
- Evan Mills (2009) Lawrence Berkeley National Laboratory. *Building Commissioning: A Golden Opportunity for Reducing Energy Costs and GHGs Emissions*  
<http://cx.lbl.gov/2009-assessment.html>

**Energy-13: Implement an Energy Management Control System**

An Energy Management Control System, or a Building Automation System, is an operations and maintenance best practice. These systems enable the facility HVAC and lighting systems to adjust to the operating environment, meeting load conditions as well as identifying equipment in need of maintenance or refinement.

An airport should seek an independent consultant that specializes in energy management control system/building automation system to perform an analysis of the operating systems. The consultant would perform tasks such as identifying and recommending functions, capabilities, and best practices that would optimize the reliability and controllability of the airport’s energy systems. Based on the findings of ACRP Project 11-02, an energy management control system typically has a six to ten year ROI.



With digitized controls/valves, sensor calibration, and centralized control rooms, an energy management control system increases the energy efficiency of buildings and facilities. The early identification of maintenance needs can avoid costly repairs.

*Benefits*

- Reduces energy consumption and costs
- Reduces maintenance downtime and repair costs






*Additional Resources*

- ACRP Project 11-02, “Model for Improving Energy Use in U.S. Airport Facilities”  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)

### Energy-14: Utilize Prefabricated Equipment

Give preference to off-site, prefabricated assemblies, which avoid the need for on-site fabrication equipment. Purchase precut and prefabricated components when available to reduce waste, noise and air emissions, dust, and other inconveniences resulting from on-site construction.

Depending on the use, prefabricated equipment can be made from more durable materials; therefore it can last longer and may withstand harsh environmental conditions and natural disasters better than traditional on-site material construction. Where possible, airports should seek to locally source this equipment in order to minimize emissions associated with transport of these larger components.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>As Needed</b>	<b>Savings</b> 

*Benefits*

- Reduces waste
- Reduces emissions






*Additional Resources*

- Building Research Establishment. New and Improved Technologies and Techniques: Defining the Sustainability of Prefabrication and Modular Process in Construction  
<http://projects.bre.co.uk/prefabrication/prefabrication.pdf>

### Energy-15: Purchase and Install Energy Star Appliances and Computers

Energy Star is a joint program of the EPA and the U.S. Department of Energy to help consumers save money and protect the environment through energy efficient products and practices. Energy Star offers a proven energy management strategy that helps to measure current energy performance, set goals, and track savings.

Appliances and products that airports can replace with Energy Star qualified products include refrigerators, water coolers, heating and cooling equipment, fans, lighting, computers, televisions, phones and much more. The cost differential for Energy Star products compared to conventional items is minimal.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*

- Reduces energy consumption and costs
- Reduces environmental impacts

*Additional Resources*

- EPA Energy Star Program  
[www.Energy Star.gov](http://www.Energy Star.gov)

### Energy-16: Utilize Thermal Energy Storage to Aid with Air Chilling

Air conditioning systems are often some of the most significant contributors to high energy loads at airports during warm months of the year. Thermal energy storage systems optimize energy use of air conditioning systems by running the system’s chiller during off-peak nighttime hours, when electricity is often cheaper and outdoor temperatures are lower. The resulting stored ice acts to chill the system throughout the day.

A small airport could consider using thermal energy storage if it experiences any of the following conditions:

- High utility demand costs
- Utility time-of-use rates (some utilities charge more for energy use during peak periods of day and less during off-peak periods)
- High daily load variations
- Short duration loads
- Infrequent or cyclical loads
- Capacity of cooling equipment has trouble handling peak loads
- Rebates are available for load shifting to avoid peak demand (13)




Thermal energy storage systems reduce peak energy loads and enhance efficiency of the chilling system, thereby decreasing energy costs. Potential capital assistance may be available from state and federal energy efficiency incentives or local utility companies looking to reduce peak energy demand.

#### Benefits

- Reduces indirect air and GHG emissions
- Reduces energy consumption and costs

#### Additional Resources




- ACRP Project 11-02, “Model for Improving Energy Use in U.S. Airport Facilities” [http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)
- Washington State University Energy Efficiency Fact Sheet. Thermal Energy Storage <http://www.energy.wsu.edu/documents/engineering/Thermal.pdf>

Staffing	Cost
Effort 	Capital \$\$\$
Knowledge 	Operational \$
Frequency Once	Savings 

### Energy-17: Solar Water Heating

A solar hot water system installed on the roof of an airport’s terminal building can help reduce energy consumption by using the sun’s energy to heat large quantities of water for terminal lavatories, administrative spaces, and ancillary hot water demand systems. These systems can result in reduced energy costs and associated air and GHG emissions.

Solar water heating systems are typically composed of solar thermal collectors (liquid heating solar panels), one or multiple storage tanks, and a system to move the liquid from the collector to the tank. Solar hot water systems are highly

Staffing	Cost
Effort 	Capital \$\$\$
Knowledge 	Operational \$
Frequency Once	Savings 

efficient, having the ability to absorb up to 87% of the sun’s energy, depending on the type of system used according to Walker (14). Liquid in the collector, heated by the sun, is pumped to one or more storage tanks, thereby reducing or eliminating the need for conventional water heating fuel, such as natural gas. Solar hot water systems are different from PV cells that generate electricity from light. Instead, these systems use the sun to directly heat the water.

Because airports have heating loads that remain relatively constant throughout the year, they are good candidates for implementing solar water heating. Solar water heating systems are most cost-effective for facilities with the following characteristics.

- Cost of fuel used to heat water is high (more than \$10/Mmbtu or \$40.034/kWh), such as electricity, which represents 46% of the water heating market, or propane which represents 2% of the market in remote locations.
- A sunny climate, although this is not required. In 2003, the three largest markets were Florida, California, and New Jersey as documented by Walker (14).

Federal or state incentives and other funding mechanisms may also exist that airports could use to further incentivize investment in this technology.

*Benefits*

- Reduces energy consumption and costs
- Reduces GHG emissions






*Additional Resources*

- *ACRP Synthesis 10, Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)
- Del Chiaro, Bernadette. "Solar Water Heating (How California Can Reduce Its Dependence on Natural Gas)" Environment California Research and Policy Center  
[http://www.environmentcalifornia.org/uploads/at/56/at563bKwmftrJI6fK19U\\_w/Solar-Water-Heating.pdf](http://www.environmentcalifornia.org/uploads/at/56/at563bKwmftrJI6fK19U_w/Solar-Water-Heating.pdf). Retrieved 2007-09-29
- Whole Building Design Guide, Solar Water Heating  
<http://www.wbdg.org/resources/swheating.php>
- U.S Department of Energy. Energy Efficiency and Renewable Energy Building Technologies Program. *Water Heating*  
[http://www1.eere.energy.gov/buildings/commercial/water\\_heating.html](http://www1.eere.energy.gov/buildings/commercial/water_heating.html)

**Energy-18: Use Tankless Water Heaters**

Tankless water heaters, also called “instantaneous” or “demand” water heaters, provide hot water on an as-needed basis. Rather than using a water storage tank that wastes energy by heating water when it is not needed, a tankless water heater has a heating device that is activated by the flow of water when a hot water valve is opened. Once the heating device (electric or gas) is activated, the heater supplies hot water as long as it is needed.

Tankless water heaters are better suited for smaller airports, where demand for hot water can be accommodated by a centrally installed heater. Tankless water heaters are

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

more energy efficient than conventional heating systems because they are not constantly maintaining a hot water supply. According to manufacturers, these systems can reduce energy costs 20-30% when compared to conventional heating systems.

*Benefits*

- Reduces energy consumption and costs
- Potential for ROI




*Additional Resources*

- U.S Department of Energy. Energy Efficiency and Renewable Energy Building Technologies Program. *Water Heating*  
[http://www1.eere.energy.gov/buildings/commercial/water\\_heating.html](http://www1.eere.energy.gov/buildings/commercial/water_heating.html)

**Energy-19: Enhance Energy Efficiency of Escalators**

Airports can purchase or retrofit escalators with energy efficiency components, such as sleep mode/variable speed features. These escalators slow down when not in use to reduce overall energy consumption. Manufacturers of this technology report savings up to 20-35%. One manufacturer of the motor efficiency controller offers a system that regulates the escalator based on level of demand.

Maintenance and ongoing expenses will likely be less because of reduced frequency of operation resulting in reduced energy consumption and reduced wear.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*

- Reduces energy consumption and costs
- Reduces ongoing maintenance and repair costs
- Potential for short-term ROI

*Additional Resources*

- *ACRP Synthesis 10, Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)
- Hirzel, S. and Dutschke, E. Intelligent Energy- Europe: Energy Efficient Elevators and Escalators. *Guidelines for new lift installations and retrofitting*. (February 24, 2010)  
[http://www.e4project.eu/Documenti/WP5/E4-WP5%20-%20D5\\_2\\_Features%20Final%2020100224.pdf](http://www.e4project.eu/Documenti/WP5/E4-WP5%20-%20D5_2_Features%20Final%2020100224.pdf)






**Performance Tracking**

Tracking and monitoring is important because it increases efficiencies, enables preemptive repairs, and can avoid potential fines. Because performance tracking does come at a cost, small airports could select particular environmental areas to focus on based on their priorities. Energy, for example, is an important area on which to focus tracking efforts due to the potential cost savings resulting from reduced energy consumption.



### Energy-20: Track Energy Use

Airports can track energy use as a performance measure, using an initial assessment as an energy baseline. Understanding energy usage can help an airport identify trends and opportunities to reduce energy consumption and associated costs. Tracking energy is also a way for the airport to ensure it is only being charged for the energy it consumes. Lastly, energy use information can be used to justify implementation of energy efficiency measures or to calculate the viability of investment in renewable energy systems. A maintenance log can be utilized to also track energy use processes and performance, which enables airports to anticipate and mitigate potential problems as well as identify opportunities to enhance the efficiency of the system.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

#### *Benefits*

- Provides a baseline for performance measurements
- Can be utilized to develop more efficient practices and reduce energy consumption and costs






#### *Additional Resources*

- ACRP Project 11-02, “Model for Improving Energy Use in U.S. Airport Facilities”  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)

### Energy-21: Develop and Implement a Program to Track Progress Achieved in Improving Environmental and Sustainability Performance

Tracking progress on environmental sustainability provides a way for an airport to document, measure and promote important environmental achievements. Promoting environmental achievements not only elevates the public perception of the airport in multiple areas, but also improves staff morale and pride in their organization.

To track environmental achievements, the airport should identify baseline metrics in each environmental area of interest, and qualify improvements over time. When planning environmental sustainability initiatives, the airport should set measurable goals and consider how progress can be tracked (i.e., tons recycled, kilowatts saved, cost savings). One way to organize environmental sustainability initiatives (and/or compliance programs) is to use an EMS. EMS is the business system of plan, do, check, act as applied to the environment. Airports implementing an EMS systematically identify and prioritize their environmental impacts, set goals to reduce these impacts, and measure and report progress. After the implementation of an EMS, an airport may choose to obtain ISO 14001 certification which is a third party verification that the EMS is in place and functioning well. For more information, refer to Appendix B-2, Implementing an Environmental Management System to Facilitate Compliance and Reduce Impacts at Small Airports.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

*Benefits*




- Systematic environmental improvements that lead to improved efficiency
- Prioritize environmental initiatives
- Document and report environmental improvements

*Additional Resources*

- Westchester County Airport  
[http://airport.westchestergov.com/index.php?option=com\\_content&task=view&id=2564&Itemid=4424](http://airport.westchestergov.com/index.php?option=com_content&task=view&id=2564&Itemid=4424)
- Peercenter.net

**Energy-22: Track Sustainability Elements in Construction Projects**

Airports should consider developing sustainability standards and establishing metrics for construction projects. Requiring regular sustainability progress reports during construction (quarterly or at 30%, 60%, and 90% design milestones) will allow an airport to use the metrics to monitor performance and predict problems. Some elements to include are air and water quality, light emissions, and/or other sustainability elements.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

*Benefits*




- Establishes accountability
- Reduces environmental impacts through sustainable initiatives

*Additional Resources*

- ACRP Project 08-01, “Sustainable Airport Construction Practices (in development)”  
<http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2582>

**Energy-23: Utilize Contractors with Sustainability Experience**

Airports should utilize contractors that have experience with sustainable initiatives. Building service contractors should provide a monthly log that documents the collection, storage and disposal of recyclable materials. Additionally, the contractors should provide a monthly log of the materials used in low environmental impact cleaning equipment, including Green Label equipment, low noise level and low emissions equipment. The contractor should also maintain documentation of disposal procedures and methods of preventing employee exposure to chemicals.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

*Benefits*

- Establishes accountability
- Reduces environmental impacts
- Protects employee well-being




## Renewable Energy

### Energy-24: Install Solar Energy-powered Roadway Signs or Airfield Lighting

Solar lighting is energy-efficient and a reliable source for powering roadway signs. When combined with LED lighting, there is a significant savings in energy costs, but also maintenance costs. Using solar energy instead of conventional electricity also decreases emissions. FAA is currently evaluating the use of solar energy-powered airfield lighting at general aviation airports.

*Benefits*

- Reduces energy consumption and costs
- Reduces environmental impacts

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 




*Additional Resources*

- Virginia Department of Transportation. LEDs, Curfews and Solar Power Reduce Lighting Costs: Balancing Conservation with Driver Safety  
<http://vtrc.virginia-dot.org/rsb/RSB18.pdf>
- Solar-Powered LED Road Signs  
<http://www.metaefficient.com/leds/solar-powered-led-road-signs.html>
- FAA Airport Technology Research and Development Branch, “Solar powered lights at general aviation airports”  
<http://www.airporttech.tc.faa.gov/Safety/solar-twy.asp>

### Energy-25: Implement Cogeneration

Cogeneration is the simultaneous production of electricity and thermal energy. It can provide significant energy cost reduction in cases where steam and electric loads coincide or where a secondary market for excess steam or electricity exists. Absorption chillers are commonly coupled with cogeneration equipment to balance the load profiles.

Although implementing cogeneration may be considered too costly of an investment for many small airports, the high potential for cost savings makes this practice worth considering. Specifically, there are some cases where small businesses can secure funding or project-specific financing that would enable implementation of energy projects with large capital investments.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*

- Reduces energy consumption and costs
- Reduces environmental impacts




*Additional Resources*

- Cogeneration and Competitive Power Journal volume 13(1) (April 1, 1998), A Major Cogeneration System Goes in at John F. Kennedy International Airport. Low-visibility Privatization in a High-impact Environment
- Cogeneration at Greater Toronto Airport Authority presentation <http://www.docstoc.com/docs/23548534/Cogeneration-at-GTAA>

**Energy-26: Purchase Renewable/Alternative Energy Generated Off-site**

Available renewable/alternative energy includes, but is not limited to solar, wind, geothermal, and hydrogen fuel cells. Airports can purchase renewable/alternative energy from a local electric utility and, if that is not available, then purchase renewable energy certificates.

Many utilities offer green energy purchasing programs. When local renewable energy is not available, an airport could purchase renewable energy certificates from brokers to consider promoting renewable sources in your region to offset energy consumption. Purchasing renewable energy or renewable energy certificates subsidizes the production of energy from renewable sources.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$\$\$</b>
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

Fresno Airport participates in a solar power purchasing program. The solar power will supply 40% of the airport’s energy. This is estimated to save the airport \$13 million over 20 years. Payment for renewable energy funds research, development, production, and use of renewable energy technology can demonstrate an airport's commitment to sustainability.

*Benefits*




- Advocates renewable energy
- Reduces environmental impacts

*Additional Resources*

- American Institute of Architects, 50 to 50 program (50 strategies toward 50 percent fossil fuel reduction in buildings), *Renewable Energy* <http://wiki.aia.org/Wiki%20Pages/Renewable%20Energy.aspx>
- *Fresno Airport Dedicates Solar Installation* <http://www.renewableenergyworld.com/rea/news/article/2008/07/fresno-airport-dedicates-solar-installation-53113>

### Energy-27: Conduct a Renewable and Alternative Energy Feasibility Study

Airports should evaluate existing and emerging regulations to determine if renewable energy systems can be installed as part of the local grid. An energy consultant or utility provider could conduct a feasibility study which would include reviewing the renewable energy sources available to the airport, then would make recommendations based on cost, value, and feasibility. Generally, the feasibility of renewable energy depends on local climate conditions as well as available local or state financial incentives available to the airport.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$</b>
<b>Knowledge</b> 	<b>Operational</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*




- Reduces energy costs
- Reduces environmental impacts

*Additional Resources*

- Example General Guidelines for renewable energy feasibility studies  
<http://www.oregon.gov/ENERGY/RENEW/docs/FeasibilityStudyGeneralGuidelines.pdf>

### Energy-28: Install On-site Renewable/Alternative Energy Systems

A renewable and alternative energy feasibility study may recommend new systems for renewable energy. On-site renewable/alternative energy systems can include wind, geothermal, solar (either stand-alone or roof-integrated), or waste-to-energy. The U.S. Department of Energy details methods for on-site renewable energy including cooling, heating, and power systems; distributed energy systems; fuel cells; green power; PV systems; and wind energy.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>\$</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

Heritage Aviation, an FBO located at Burlington International Airport, has several on-site renewable energy systems. Heritage Aviation has a PV solar system, solar hot water system, and a wind turbine, which save nearly \$15,000 annually and power more than 40 area homes.

There may be federal and state tax credits available to offset a portion of the renewable energy system cost. Additionally, supplemental energy can be sold back to the utility grid for a potential revenue stream and to provide renewable energy to the community.

*Benefits*

- May result in additional revenue
- Reduces energy costs
- Reduces environmental impacts

*Additional Resources*

- U.S. Department of Energy, On-Site Renewable Energy  
[http://www1.eere.energy.gov/buildings/commercial/onsite\\_renew\\_energy.html](http://www1.eere.energy.gov/buildings/commercial/onsite_renew_energy.html)
- Vermont Hosts First On-site Airport Installation of Wind Turbine  
<http://www.ecoseed.org/en/general-green-news/renewable-energy/wind-energy/small-wind/5760-Vermont-hosts-first-on-site-airport-installation-of-wind-turbine>

**Energy-29: Use Snow as an Energy Source**

A developing technology is snow-based cooling systems. The systems use snow collected during the winter to chill the liquid used for the cooling system in the summer.




New Chitose Airport in Japan is using snow for the terminal cooling system. The airport collects snow throughout the winter, covers it with heat-insulating material, and uses it in the summer to provide approximately 30% of its cooling needs. Typically, 45% of the snow collected during the winter will remain until summertime.

*Benefits*

- Reduces energy costs
- Reduces environmental impacts

*Additional Resources*

- New Chitose Airport in Japan to Use Snow for 30 Percent of its Cooling Needs  
[http://www.goodcleantech.com/2008/10/new\\_chitose\\_airport\\_in\\_japan\\_t\\_1.php](http://www.goodcleantech.com/2008/10/new_chitose_airport_in_japan_t_1.php)




<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$\$
<b>Frequency</b> Once	<b>Savings</b> 

**Energy-30: Install Small-capacity Solar Power Systems**

Airports can use a discrete PV power source for outlying equipment, such as storm water sampling equipment, ancillary buildings, and parking and site lighting. A small PV system does not emit pollutants and is a cost-effective initiative to provide electricity to meet specific demands, such as site lighting.

*Benefits*

- Reduces energy costs
- Reduces environmental impacts






<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$\$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> Once	<b>Savings</b> 



### Energy-31: Use Solar Trombe Walls for Passive Solar Heating

A trombe wall is a thick wall that faces the sun and acts as a solar thermal collector. The sun heats the wall which helps reduce thermal losses, then during the night when temperatures drop, heat emits from the wall into the building. The interior vents can be closed during the summertime, when heat is not needed.

Since a trombe wall doesn't require moving parts or electricity, there is little to no maintenance required. When the Gunnison County Airport (now Gunnison-Crested Butte Regional Airport) terminal was constructed in the early 1980s, trombe walls were included to increase thermal performance. The trombe walls and solar energy initiatives resulted in substantial savings for the county.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*

- Reduces energy consumption and costs
- Reduces environmental impacts

*Additional Resources*

- National Technical Information Service Report Department of Energy/CS/30339-T1, *Gunnison County airport terminal (Project Number 339)*  
<http://www.ntis.gov/search/product.aspx?ABBR=DE83004512>
- Gunnison-Crested Butte Regional Airport  
<http://www.gunnisoncounty.org/airport.html>

## APPENDIX A-24

## Administration and Policy Practices

The practices described in the following sections will assist airports with common administration and policy activities. The administration and policy practices summarized below do not have regulatory requirements, but there are additional resources available. Airports should

select those practices in areas of most concern to the airport and the community as a whole. The following proactive practices are related to administration and policy activities and are grouped by topic:

### Applicable Federal Programs

- EPA's Environmentally Preferable Purchasing Program (Chapter 9)




- Administration/Policies
  - ✓ Perform Pre- and Post-tenant Facility Environmental Inspections
  - ✓ Include Environmental Clauses in Lease Agreements
- Environmentally Preferable Purchasing
  - ✓ Establish an Environmentally Preferable Purchasing Program
  - ✓ Encourage Use of Local Vendors/Suppliers
  - ✓ Specify Environmentally Preferable Materials
  - ✓ Purchase Environmentally Preferable Supplies for Administration Activities
  - ✓ Encourage Vendors to Purchase Environmentally Preferable Products
  - ✓ Purchase and Install Recycled Furniture
  - ✓ Purchase and Install Furniture Systems that are Greenguard Certified
  - ✓ Reuse Materials or Use Materials with Recycled Content; Sourced Locally/Regionally; and/or Made of Rapidly Renewable Resources, Certified Wood, or Salvaged Materials
  - ✓ Assess the Sustainability of Building Products for Use in Airport Buildings
- Climate Change
  - ✓ Evaluate and Prepare for Changing Climate Conditions Such as More Intense Storms, More Frequent Flooding, and Temperature Increase
- Sustainability Planning Practices
  - ✓ Create and Follow a Sustainable Vision/Mission Statement
  - ✓ Develop or Adopt Sustainable Design Guidelines
  - ✓ Establish a Sustainability Team/Committee
  - ✓ Integrate All Airport Departments in Sustainability Planning
  - ✓ Develop a Sustainable Office Program
  - ✓ Establish a "Sustainable Meetings" Policy
  - ✓ Encourage Staff to Pursue LEED™ Accreditation
  - ✓ Establish Annual Objectives and Targets that Include Quantification on Non-monetary Benefits

## Administration/Policies

### Admin and Policy-1: Perform Pre- and Post-tenant Facility Environmental Inspections

An airport could arrange to perform pre- and post-tenant facility environmental inspections to identify potential environmental impacts, and to facilitate remediation of impacts upon the tenant’s departure. These inspections could be performed by an independent environmental professional, in coordination with ASTM, the EPA All Appropriate Inquiries rule (40 CFR Part 312), and/or FAA requirements. The pre-tenant inspections may include baseline testing to be used as a comparison in the future.

The airport may want to conduct periodic inspections throughout the tenant’s lease to avoid possible costly remediation measures and significant environmental impacts.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Once (with annual review)	Savings 




#### *Benefits*

- Establishes tenant responsibility for environmental impacts
- Reduces airport costs for environmental remediation measures
- Identifies possible environmental hazards of the tenant

### Admin and Policy-2: Include Environmental Clauses in Lease Agreements

The lease can serve as a guide to encourage airport tenants to use sustainable practices, and to comprehend the importance of sustainability to the airport. Lease agreements for tenants could include environmental performance objectives. Included in the lease language would be requirements for tenants to provide results/reports for environmental analyses, as well as conduct and maintain BMPs for environmental protection and to prevent or lessen environmental impacts.

Results/reports required by the lease agreement could include air quality/emissions, noise abatement, energy consumption and costs, recycling measures, water quality, and/or other applicable reports.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

#### *Benefits*

- Establishes tenant responsibility for sustainability initiatives
- Conservation measures result in cost savings




#### *Additional Resources*

- U.S. General Services Administration, *Green Lease Policies and Procedures*  
[http://www.gsa.gov/Portal/gsa/ep/contentView.do?noc=T&contentType=GSA\\_BASIC&contentId=28303](http://www.gsa.gov/Portal/gsa/ep/contentView.do?noc=T&contentType=GSA_BASIC&contentId=28303)

## Environmentally Preferable Purchasing

### Admin and Policy-3: Establish an Environmentally Preferable Purchasing Program

Airports should consider implementing an EPP Program to find and evaluate sustainable products and services. EPP, as defined by the EPA, helps the federal government “buy green”, resulting in market demand for green products and services. The EPP index compiled by the EPA is aimed primarily at helping federal purchasers, but also serves to help green vendors, businesses, and consumers identify and select green products and services, identify federal green buying requirements, calculate the costs and benefits on purchasing choices, and manage the green purchasing process.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Once</b> <b>(with annual review)</b>	<b>Savings</b> 

Purchasing procedures at an airport could be revised to emphasize the purchasing of products that are ecologically friendly. Products would be specified that reduce energy usage, contain recycled materials, come from the region, and have lower impacts on air and water quality. Specific products and services are identified in the EPA’s EPP index.

#### *Benefits*

- Helps identify green products and services appropriate for the airport
- Increases knowledge about green products and services




#### *Additional Resources*

- EPA’s EPP program  
[www.epa.gov/epp/index.htm](http://www.epa.gov/epp/index.htm)
- *Green Office Guide*  
<http://www.environment.gov.au/settlements/publications/government/purchasing/green-office-guide/pubs/green-office-guide.pdf>

### Admin and Policy-4: Encourage Use of Local Vendors/Suppliers

Use of local vendors and suppliers by airports supports the local economy, and invests in the community. It also reduces energy use and air emissions associated with material transport and delivery costs. Using local vendors/suppliers may also reduce the need for storing materials, as delivery time is significantly reduced and materials could be ordered as needed.

Establishing a goal for the minimum percentage of local materials for each project is one way to support this initiative. An airport’s website could also have a link with information about doing business with the airport, and emphasize the preference to work with local vendors/suppliers.






<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> \$
<b>Knowledge</b> 	<b>Operational</b> \$
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

*Benefits*

- Reduces fuel usage and air emissions
- Increases community relations
- Benefits the local economy

**Admin and Policy-5: Specify Environmentally Preferable Materials**

Airports should specify more durable, longer lasting materials and finishes to extend material life and reduce maintenance requirements. Avoid products, materials, and equipment that require frequent replacement or regular maintenance to reduce future waste. These practices apply to all materials sourced by the airport, from construction equipment to office supplies, to building materials or bathroom fixtures. Environmentally friendly products are available in many different categories, including cleaning products, office equipment, landscaping materials, food services, and more.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

One way for an airport to implement this initiative is to use asphalt containing recycled tires to achieve a longer life cycle and reduce required maintenance. Glenwood Springs Municipal Airport (Colorado) completed a pavement project utilizing recycled tires to create rubber-asphalt. According to the EPA, the combination of rubber with asphalt is expected to extend the life of the pavement for seven to ten years (15). Inside airport buildings and facilities, solid surface flooring rather than carpeting is more durable and longer lasting.

*Benefits*

- Reduces maintenance costs
- Reduces waste
- Reduces environmental impacts
- Protects non-renewable resources

*Additional Resources*

- EPA’s EPP website  
<http://www.epa.gov/epp/index.htm>
- Forest Stewardship Council website  
[www.fsc.org](http://www.fsc.org)
- Greenspec Standards  
[www.BuildingGreen.com](http://www.BuildingGreen.com)
- *Materials for Sustainable Sites: A Complete Guide to the Evaluation, Selection, and Use of Sustainable Construction Materials*, Meg Calkins (2009)

**Admin and Policy-6: Purchase Environmentally Preferable Supplies for Administration Activities**

According to the EPA, environmentally preferred office supplies should be non-toxic, recyclable, made from recycled content, remanufactured, and/or reusable. Fair-trade imports are also preferred.



Fair-trade coffee, soy-based inks, and recycled paper (paper towels, office paper) are examples of environmentally preferred supplies. Many environmentally preferable supplies can be purchased by airports at only a marginal cost markup from conventional items.


*Benefits*

- Reduces environmental impacts

*Additional Resources*

- *ACRP Synthesis 10: Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)
- EPA’s EPP website  
<http://www.epa.gov/epp/index.htm>

<i>Staffing</i>
Effort 
Knowledge 
Frequency Ongoing

<i>Cost</i>
Capital NC
Operational \$
Savings 

**Admin and Policy-7: Encourage Vendors to Purchase Environmentally Preferable Products**

Airports should work with their vendors to develop a list of available environmentally preferable products, including cost differentials. An airport may choose to set up an accounting system to track the annual expenditures on these products and services for marketing purposes. Express the airport’s sustainability goals with vendors and encourage them to participate. When feasible, airports should develop vendor contracts requiring green purchasing.



Environmentally preferred products vendors use may include cleaning products, office equipment, landscaping materials, food services, and more.


*Benefits*

- Reduces environmental impacts

*Additional Resources*

- EPA’s EPP website  
<http://www.epa.gov/epp/index.htm>

<i>Staffing</i>
Effort 
Knowledge 
Frequency Ongoing

<i>Cost</i>
Capital \$
Operational NC
Savings 






### Admin and Policy-8: Purchase and Install Recycled Furniture

Office and other furniture typically have a long lifespan and worn furniture can often be refurbished and reused. Purchasing recycled furniture could save airports as much as 50% when compared to purchasing new furniture, even more if the airport restores existing furniture. Another benefit of recycled furniture is the ability to customize the paint or fabric. Recycling furniture extends the life of the furniture and reduces waste and reduces the demand for resources such as wood and metals.

*Benefits*

- Reduces costs
- Reduces waste
- Reduces environmental demands

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$-\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

### Admin and Policy-9: Purchase and Install Furniture Systems that are Greenguard Certified

Greenguard focuses on reducing exposure to chemicals and improving indoor air quality. Greenguard provides an air quality certification to low-emitting products and is also developing certification standards for a Premier certification that includes chemical emission standards in addition to air quality.




Thousands of furniture pieces are Greenguard certified. This includes seating that could be used in terminals and waiting areas, tables, desks, chairs, cubicles, and many other pieces and products.

*Benefits*

- Reduces human exposure to emissions and chemicals
- Reduces environmental impacts

*Additional Resources*

- The Greenguard website  
<http://www.greenguard.org/index.aspx?tabid=109>

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> <b>\$-\$\$</b>
<b>Knowledge</b> 	<b>Operational</b> <b>NC</b>
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

**Admin and Policy-10: Reuse Materials or Use Materials with Recycled Content; Sourced Locally/Regionally; and/or Made of Rapidly Renewable Resources, Certified Wood, or Salvaged Materials**

Establishing project goals for construction sustainability initiatives, such as recycled content goals, will promote sustainable airport activities. Recycled materials, locally produced materials, and renewable resources are sustainable initiatives airports should consider when designing construction projects. For related information, see Planning-2 in Appendix A-11.

Construction and demolition waste is a major contributor to U.S. landfills. By reusing materials, waste is significantly reduced and emissions associated with waste transport are avoided. Asphalt and concrete are two materials that can be easily reused during construction projects.




Renewable materials may include insulation, flooring, furnishings, and other building materials. Local/regional materials and renewable resources not only reduce freight costs and air emissions from transportation, but also stimulate the local economy.

*Benefits*

- Reduces costs
- Reduces waste
- Reduces environmental impacts

*Additional Resources*




- Missouri Buys Recycled; *Rolla Airport to Benefit from Glasphalt Project*  
<http://www.dnr.mo.gov/ENV/swmp/rrr/buys1.htm>

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$-\$\$
Knowledge 	Operational NC
Frequency Once	Savings 

**Admin and Policy-11: Assess the Sustainability of Building Products for Use in Airport Buildings**

As green building practices continue to be promoted by government in the U.S., implementation of features, such as building product selection, can potentially contribute to an airport’s overall sustainability efforts. Before new construction or building retrofits, airports may consider identifying alternative or “green” building products that can be used in place of traditional building materials. Examples of alternative building products include wood flooring made from renewable resources, recycled glass tile, and low-flow toilets.

Identifying sustainable building features can be accomplished by collecting site-specific data. The ASTM Standard Practice of Data Collection for Sustainability Assessment of Building Products provides instructions for collecting data to be used in

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency As Needed	Savings 

assessing the sustainability of various building products. Once the data is obtained, airport planning, development, and consultant teams can review the information to help identify the most cost-effective and efficient practices or materials to meet their needs.

*Benefits*

- Potential for implementing energy efficient building practices
- Potential for reduced energy costs
- Potential LEED credit

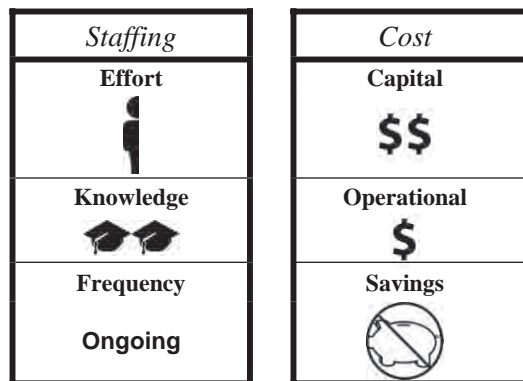
*Additional Resources*

- ASTM E2129-05, Standard Practice of Data Collection for Sustainability Assessment of Building Products
- EPA Green Purchasing Guidelines
- SAGA, Sustainability Database
- Chicago O’Hare International Airport, Modernization Program and Sustainable Airport Manual

## Climate Change

### Admin and Policy-12: Evaluate and Prepare for Changing Climate Conditions Such as More Intense Storms, More Frequent Flooding, and Temperature Increase

To prepare for the potential impacts of climate change, airports can first seek to understand the effects of climate change in their region. The U.S. Global Change Research Program presents the global climate change impacts on the U.S. both by region and by sector, with a chapter specifically dedicated to the effects climate change will have on the transportation sector. Regional predictions are important because warming and impacts vary by location. The recently established NOAA Climate Service provides extensive climate change data and information for the public, businesses, and agencies to understand and incorporate climate change into their planning efforts.



With an understanding of the changing climate patterns in its region, an airport can inventory its infrastructure and operations in order to better understand its vulnerabilities. Once those vulnerabilities have been identified, airports can incorporate climate change impacts into their decision-making to protect its capital investments and ensure long-term sustainability of the airport. Climate change adaptation measures include changing construction specifications to accommodate use of heat-resistant materials, to designing for the 500-year storm instead of the 100-year storm, to enhancing the airport’s emergency and evacuation procedures. Any adaptation measure should be chosen based on an assessment of efficacy, risks, and costs.

*Benefits*

- Limits costs, physical damage, and disturbance from weather-related impacts

*Additional Resources*






- U.S. Global Change Research Program: Global Climate Change Impacts in the U.S.  
<http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts>
- U.S. Global Change Research Program: Adaptation Options  
<http://www.globalchange.gov/component/content/article/67-themes/153-our-changing-planet>
- NOAA Climate Service  
[www.climate.gov](http://www.climate.gov)
- Pew Center on Climate Change. Climate Change 101 – Adaptation  
[http://www.pewclimate.org/docUploads/Adaptation\\_0.pdf](http://www.pewclimate.org/docUploads/Adaptation_0.pdf)

## Sustainability Planning Practices

Planning for sustainability involves considering the economic, environmental, and social implications of airport actions. An organizational approach to integrating sustainability into an airport’s activities is an effective way to implement change and foster innovation. An organizational approach to sustainability involves engaging airport staff from departments across the airport, as well as identifying a “champion(s)” to promote and implement sustainability within the organization. Finally, approaching sustainability at the highest level encourages important changes in culture and environmental mindset that will foster further sustainability improvements.

### Admin and Policy-13: Create and Follow a Sustainable Vision/Mission Statement

The airport operator should work with airport stakeholders (airport authority or governing entity, airport decision-makers, staff, tenants, and surrounding community) to develop a sustainability vision and/or mission statement. The sustainability vision can include principles to guide airport decision making and serve as the foundation for future sustainability initiatives. Adopting a vision statement also indicates the airport’s commitment to sustainability. This commitment can also be channeled through the creation of a sustainability team to further support the airport’s efforts. The sustainability team can help to develop a sustainability policy statement as well as actionable goals and objectives to further guide the airport. The airport can also choose to establish sustainability principles in support of the vision statement and/or to develop a sustainability plan.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b>	<b>Savings</b> 

*Benefits*






- Establishes a foundation, and outlines a strategy, for airport sustainability initiatives
- Provides a sustainability vision that can be shared with airport tenants

*Additional Resources*

- The SAGA Sustainable Aviation Resource Guide  
<http://www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf>
- *A Sustainable Vision for the Aviation Industry*  
[http://www.climateactionprogramme.org/special\\_features/a\\_sustainable\\_vision\\_for\\_the\\_aviation\\_industry/](http://www.climateactionprogramme.org/special_features/a_sustainable_vision_for_the_aviation_industry/)

### Admin and Policy-14: Develop or Adopt Sustainable Design Guidelines

Many airports have recently established sustainable design guidelines to incorporate sustainability considerations into airport design activities. Small airports can utilize these available guidelines, adapting them to fit the airport’s sustainability goals by scaling initiatives to suit the smaller airport. The guidelines previously established can also be adapted/scaled for typical construction practices and routine operation and maintenance activities. Design guidelines can be used for routine operations and maintenance as well as construction, and may address components such as design principles, materials used, and construction and maintenance techniques.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Once</b> <b>(with possible updates)</b>	<b>Savings</b> 

Some of the practices listed in Appendix A of this Guidebook present potential elements for an airport to include in its design guidelines.

#### *Benefits*






- Establishes guidelines for planning, design, and construction
- Sets minimum requirements for design projects

#### *Additional Resources*

- City of Chicago, O’Hare Modernization Program *Sustainable Design Manual*  
[http://www.acec.org/advocacy/committees/pdf/eec0808\\_omp\\_manual.pdf](http://www.acec.org/advocacy/committees/pdf/eec0808_omp_manual.pdf)
- Los Angeles World Airports *Sustainable Airport Planning, Design and Construction Guidelines*  
<http://www.airports.ci.la.ca.us/uploadedFiles/LAWA/pdf/Sustainable%20Airport%20PDC%20Guidelines%20Jan08.pdf>

### Admin and Policy-15: Establish a Sustainability Team/Committee

Airports implementing a sustainability plan should establish a sustainability oversight committee to identify, guide and direct sustainability efforts. Form a Sustainability Team and designate a leader. The Sustainability Team will be responsible for managing the integration of selected sustainability goals into the airport’s practices. The Sustainability Team could include airport stakeholders, such as the airport’s construction and maintenance staff, tenants, airlines, and local regulators.

<i>Staffing</i>	<i>Cost</i>
<b>Effort</b> 	<b>Capital</b> 
<b>Knowledge</b> 	<b>Operational</b> 
<b>Frequency</b> <b>Ongoing</b>	<b>Savings</b> 

The airport may want to divide the team into multiple groups to more efficiently support a sustainability program. Teams may include the Champion(s), Advisory Council, Steering Committee and Implementation teams. The champion(s) would determine the roles and responsibilities of each team. A Sustainability Team with participants at all levels, and the stakeholders, will create a diverse team that can support and enable implementation of sustainability practices.

#### *Benefits*




- Provides guidance for sustainability initiatives

*Additional Resources*

- The SAGA *Sustainable Aviation Resource Guide*  
<http://www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf>

**Admin and Policy-16: Integrate All Airport Departments in Sustainability Planning**

Integrate sustainability planning into airport departments, including procurement, operations, facilities, ground transportation, real estate/community relations, legal, and other departments the airport may have. The departments may have similar sustainability initiatives, and it is important to make sure all of the departments coordinate their efforts, which may be a role for one of the sustainability teams. This integrated approach is necessary to efficiently craft and implement sustainability measures. An integrated approach also provides a forum for discussing sustainability initiatives in other departments.




<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

*Benefits*

- Ensures efficient implementation of sustainability initiatives

**Admin and Policy-17: Develop a Sustainable Office Program**

To reduce paper demand, airports should adopt electronic library and documentation procedures and protocols for posted materials, which can include: web directories and links; web-based document sharing; web-based procurement process; requests for qualifications/requests for proposals, notices/advertisements; and electronic/digital document process.

<i>Staffing</i>	<i>Cost</i>
Effort 	Capital \$\$
Knowledge 	Operational \$
Frequency Ongoing	Savings 

Additionally, the airport could utilize project planning and tracking tools to facilitate documentation and communication and establish central depositories for viewing secure project information.

When reproduction is necessary, there are many sustainable actions an airport can implement. Strategically locate recycling receptacles and place signs directly adjacent that clearly identifies what can and cannot be recycled. Use recycled paper noting in the footers of all documents, “Printed on recycled paper, please recycle.” Email correspondence should include a statement discouraging printing, such as, “Please consider the environment before printing this email.” Only purchase copiers or printers that offer double-sided printing options. Install double-sided or duplex printing trays for commercial or office printers and copiers. Set all print drivers to default to double-sided printing. Use environmentally friendly and renewable inks and printer cartridges.

*Benefits*

- Reduces paper needs and costs
- Reduces environmental impacts





*Additional Resources*




- N.C. Division of Pollution Prevention and Environmental Assistance, *A Checklist for Office Sustainability*  
<http://www.p2pays.org/ref/05/04040.pdf>

**Admin and Policy-18: Establish a “Sustainable Meetings” Policy**

Although this practice could be considered part of a Sustainable Office Program, airports may decide to implement this practice independent from a more comprehensive office-wide program.

A 'green meetings' policy seeks to minimize the use of printed materials and to reduce emissions that result from printing, transportation of the materials, and transportation of meeting attendees. An airport should consider utilizing conference calls or web-based conferences instead of in-person meetings. Additionally, airports could further reduce waste and emissions by preparing electronic visual aids rather than using printed materials.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Ongoing</b>

<i>Cost</i>
<b>Capital</b> 
<b>Operational</b> 
<b>Savings</b> 

*Benefits*



- Reduces paper needs and costs
- Reduces environmental impacts




*Additional Resources*

- The National Recycling Coalition’s *Green Meetings Policy*  
<http://www.fs.fed.us/sustainableoperations/greenteam-toolkit/documents/NationalRecyclingCollolitionGreenMeetingsReference.pdf>
- EPA, *Green Meetings*  
<http://www.epa.gov/oppt/greenmeetings/>

**Admin and Policy-19: Encourage Staff to Pursue Leadership in Energy and Environmental Design™ Accreditation**

Airports should consider assigning one or more airport personnel to take the LEED™ Professional Accreditation Exam, if not already accredited. Involve (require) LEED™ Accredited Professionals at all levels of the airport organization. Assign them to review information regarding sustainable concepts and practices with airport staff, and to review the application of the airport's sustainable rating system for sustainable initiatives. They can guide, help define, implement, and measure the success of sustainability initiatives.

<i>Staffing</i>
<b>Effort</b> 
<b>Knowledge</b> 
<b>Frequency</b> <b>Once</b>

<i>Cost</i>
<b>Capital</b> 
<b>Operational</b> 
<b>Savings</b> 

*Benefits*

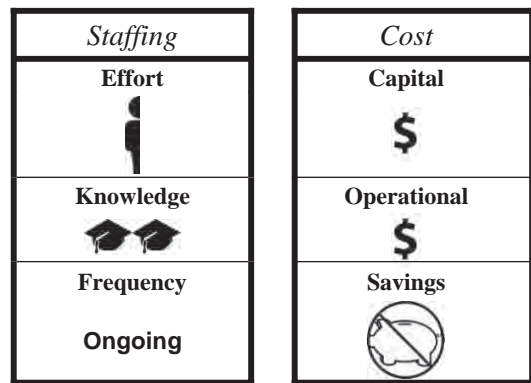
- Increases staff knowledge and comprehension of sustainability initiatives

*Additional Resources*

- U.S. Green Building Council – LEED Accreditation  
<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>
- The SAGA *Sustainable Aviation Resource Guide*  
<http://www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf>

**Admin and Policy-20: Establish Annual Objectives and Targets that Include Quantification on Non-monetary Benefits**

An airport sustainability plan could include goals for non-monetary benefits and methods for quantifying the results. One example of quantifying the results is determining how many tons of carbon dioxide emissions were avoided from implementing energy efficiency measures. Another example is determining how much paper is saved by implementing a sustainable office plan. Goals and targets can be calibrated to activity levels.



*Benefits*

- Quantifies sustainability impacts
- Presents positive information that can be provided to the public

*Additional Resources*

- *ACRP Synthesis 10: Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)



## APPENDIX B

# Case Studies

## APPENDIX B-1

# Garnering Support within a Small Airport Organization to Initiate Proactive Environmental Stewardship Activities

## Problem Statement

Airports must spend time and resources complying with applicable environmental regulations. Because regulatory compliance is the primary environmental goal at most small airports, it may be difficult to garner the support, both top-down and within the organization, necessary to implement proactive environmental stewardship practices. Receiving support, however, is essential to implementing any proactive environmental stewardship practice. Garnering support for initiatives can be hampered by misconceptions about the initial and long-term costs of initiatives, limited knowledge about implementation requirements, and lack of understanding the benefits. Airports can overcome these obstacles in two ways: (1) changing the institutional culture of the airport through education and working to foster an environmental mindset and (2) using a specific stewardship project to garner support and educate naysayers. This case study examines how a small airport obtained support for environmental stewardship projects and how the airport management cultivated an environmental mindset.

## Summary of Key Issues

Establishing an environmental mindset, although often overlooked, is possibly one of the most important factors for enhancing an airport's environmental stewardship and garnering support for environmental improvements. Ultimately, support and enthusiasm for improving environmental performance at an airport leads to development of innovative solutions, effective implementation of environmental initiatives, and ongoing airport stewardship.

## Case Narrative – Northeast Florida Regional Airport at St. Augustine

Northeast Florida Regional Airport at St. Augustine (NFRA) is owned and operated by the St. Augustine - St. Johns County Airport Authority and is located four miles north of the central business district of St. Augustine, in St. Johns County, Florida. NFRA is classified as a general aviation reliever airport, according to the 2009 FAA National Plan of Integrated Airport Systems. NFRA is located on 668 acres and has two seaplane lanes and three runways, the longest measuring 7,996 feet. For the 12-month period prior to May 30, 2009, NFRA accommodated approximately 102,000 operations.

## Environmental Stewardship Initiatives at Northeast Florida Regional Airport at St. Augustine

NFRA has demonstrated a commitment to environmental stewardship through implementation of a number of proactive initiatives. These initiatives include:

- Enhanced Storm Water Pollution Prevention Plan (SWPPP)/Spill Prevention Control and Countermeasure (SPCC) training
- Low impact hangar development, which minimized environmental impacts by designing airport facilities around trees, resulting in an unconventional hangar layout
- Use of pervious pavement in the terminal parking area
- Construction of an eco-park on airport property
- Development of a Sustainability Management Plan

Implementation of these projects has required staff to obtain approval from the Airport Director and the Airport Authority Board (Board) (see Figure 3).

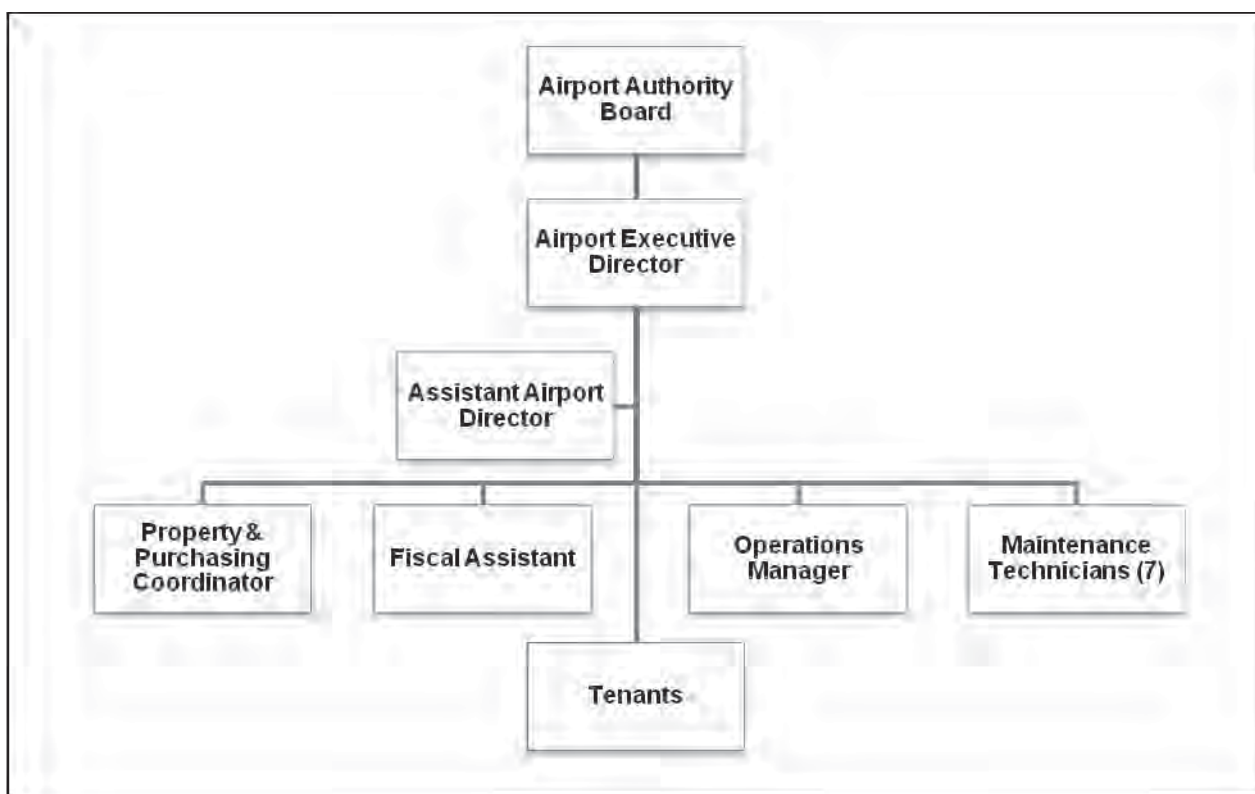


Figure 3. Northeast Florida Regional Airport at St. Augustine organizational chart.

### Obtaining Airport Authority Board Support

NFRA management (including the Airport Executive Director and Assistant Airport Director) targeted the Board for establishing a supportive culture for environmental stewardship, because the Board controls airport development. The following efforts were conducted to garner Board support.

## Communicating Environmental Benefits

For many projects NFRA must obtain environmental permits from the Florida Department of Environmental Protection, St. Johns River Water Management District, the U.S. Army Corps of Engineers (USACE), and/or the U.S. Fish and Wildlife Service (USFWS). NFRA used its proactive environmental program to enhance this permitting process. NFRA management then leveraged the success of the permitting process to receive continued support for environmental improvements from the Board. Awareness of the permitting benefits of environmental stewardship resulted in the Board members becoming more enthusiastic and increasingly supportive of initiatives that go beyond regulatory requirements, despite increased costs. This is evident through the Board's support for the low impact hangar development project and the use of pervious pavement.

## Communicating Life Cycle Costs

NFRA found that even during the economic downturn, the Board continued to authorize environmental improvements despite the increased upfront cost. To obtain Board approval of environmental stewardship projects, the project champion promoted the concepts of lifecycle costs and environmental and social benefits of the projects. NFRA management has not always had to use hard numbers to obtain approval for projects. Instead, it approached the Board with a general explanation of the potential environmental, social, and financial benefits over the life of the project. For example, when pursuing approval for use of pervious pavement in the terminal parking area, NFRA management justified increased capital costs with a financial analysis that considered lifecycle costs. NFRA management also qualitatively described the benefits and savings that would occur over the life of the project. The savings were realized from the increased durable life of the permeable pavement as well as avoidance of construction of a retention pond (required for traditional impervious pavement). Building a retention pond would have been both costly and difficult to approve due to potential wildlife attracting attributes of the pond. NFRA staff theorizes that this strategy of qualitatively describing the factors driving different costs and savings over the life of the project has been successful due to the positive and trusting relationship NFRA management developed with the Board.

## The Importance of Emphasizing Environmental Benefits

There is a dynamic interplay between promoting the financial and environmental benefits of a project. A project's approval process typically focuses on either costs or regulatory compliance, depending on the stakeholder(s) reviewing the project. Less tangible environmental and social benefits, however, are also important and often overlooked because they are difficult to quantify. NFRA found that promoting a project by emphasizing and continually reiterating its environmental benefits facilitated NFRA's efforts. In NFRA's experience, too much emphasis on the financial aspect of the project often diverts the stakeholder's focus away from the potential environmental improvements. Some intangible benefits to highlight include expedited environmental permitting; community acceptance of the project; improved rentability and/or tenant acceptance; reduced environmental, health, and safety risks; improved work environment for employees leading to higher productivity; and enhanced relationships with the surrounding community.

Case Study Project #2, *Low Impact Hangar Development*, described below, provides an example of implementing this strategy.

## Promoting Environmental Stewardship with Community Stakeholders

In the recent past, environmental stewardship has gained increasing public attention in Florida and across the nation. Accordingly, environmental issues are increasingly important to elected officials. As with many airports, NFRA's neighboring community is often concerned about its environmental impacts.



NFRA strives to continually promote its proactive environmental stewardship practices to assist in situations where the public voices concern or opposition to a project. Showing the public that NFRA is a leader on environmental issues also fosters continued Board support and helps gain approval on future projects. Because the Board members are publicly elected, they are held accountable by their constituents. As a result, the Board's decisions are often tied to the needs and interests of the public.

### Case Study Project #1: Construction of a Seaplane Dock at the Airport

Construction of a floating dock alongside the airfield was required for NFRA to maintain its seaplane business. (see Figure 4) The project was estimated to cost \$150,000, of which approximately \$25,000 - \$30,000 was required to exceed compliance requirements and enhance the environmental attributes of the area surrounding the structure. These improvements resulted in proactive mitigation for potential fuel spills by providing facilities that contain the necessary equipment and materials for containing fuel spills. The improvements also proactively avoid oyster beds by constructing a floating dock to extend into the water and separate all aircraft activity from the sensitive shoreline oyster habitat. Although these benefits could not be quantified, emphasizing the importance of the initiative was necessary to obtain approval for the project. This project ultimately addressed existing environmental issues and lowered environmental risk.



**Figure 4. A portion of the constructed seaplane dock at Northeast Florida Regional Airport at St. Augustine (16).**

### Case Study Project #2: Low Impact Hangar Development

When planning a hangar development project in a previously forested area on airport property, NFRA implemented a policy to design the hangars around the existing trees and vegetation in order to conserve old growth trees and maintain local biodiversity. (see Figure 5) Wherever this was not possible, NFRA opted to relocate trees. Although this approach resulted in a substantial increase in capital costs and in fewer hangars being built, NFRA was able to save approximately 200 trees and avoid associated costs of clearing the site. In addition, to help justify upfront costs, NFRA is charging more for use of the new hangars. Justified in part because of the enhanced aesthetic and newer hydraulically operated doors, NFRA's pricing structure enabled it to match the return of investment for traditional hangar development projects.



**Figure 5. A patch of preserved trees that resulted from low impact hangar development project at Northeast Florida Regional Airport at St. Augustine (16).**

When first proposed, the hangar development was controversial and poorly received due to its intrusion and impact on the neighboring community. In addition, many of the public's comments were related to the development's impact on vegetation and old-

growth trees. In response to the public's concerns, NFRA opted to alter the design and approach of the project to enhance the conservation of environmental resources.

A concerted effort and strategic approach was required in order to receive Board approval for the project. One Board member was a vocal champion for the project, which enhanced internal support for the project; and the project design team actively sought to mitigate costs while retaining the project's focus on conservation. In addition, NFRA initiated extensive public outreach to gain community support, including conducting one-on-one interaction with stakeholders, educating local community groups on the benefits of the project, and encouraging local press coverage.



**Figure 6. New low impact hangars at the Northeast Florida Regional Airport at St. Augustine (17).**

Ultimately, the driver for the project was public good. However, a number of other intangible benefits resulted from the project: NFRA has been recognized at the local and state level for its achievement, winning an environmental award from Florida Airports Council; the project created an aesthetically pleasing and shaded locale for the hangars, for which NFRA received positive feedback from its tenants; and finally, preserving this vegetated area allowed NFRA to continue to benefit from the ecosystem services the area provides, such as water filtration and carbon sequestration. With the first phase of the hangar development now completed, its benefits have become increasingly apparent to NFRA and its Board, which in turn motivated further environmental stewardship at NFRA. The six new hangars are illustrated in the bottom right quadrant of Figure 6.

### **Fostering an Environmental Mindset at Northeast Florida Regional Airport at St. Augustine**

NFRA employed a number of strategies to foster a change in the environmental mindset within the airport. Some examples of strategies NFRA used to influence the environmental culture within the airport and community include:

- To promote environmental stewardship with tenants, NFRA used training sessions, required to comply with its SWPPP, to obtain authorization to use the aircraft washrack to promote environmental stewardship. NFRA incorporates discussion of environmental best practices into training sessions. NFRA found after raising a general awareness of environmental issues, tenants more proactively alter their behaviors.
- NFRA regularly invites members of the community and local organizations to use its meeting rooms. NFRA's environmental champion will often use these opportunities to promote NFRA's environmental stewardship activities. This in turn fosters a positive mindset within the community, and provides recognition and encouragement to NFRA.
- NFRA also engages the community through ongoing internships and outreach programs with local high schools and universities.

Through NFRA's experience, shaping the environmental mindset of decision makers and airport staff takes time. As described throughout this case study, NFRA uses communication as its primary tool for enhancing the decision makers and staff environmental mindsets. NFRA continually seeks to create opportunities to share environmental stewardship practices with airport stakeholders.

NFRA found that incorporating environmental considerations into its long-term planning enabled it to foster an environmental mindset that has come to shape the organization's core. Presently, NFRA is focusing on environmental considerations by developing a long-term sustainability plan.

## Findings and Key Considerations: Applying Lessons Learned at NFRA to Other Small Airports

The following sections describe some elements for other small airports to consider, based on NFRA's experience, when seeking to garner support for environmental stewardship within its organization.

### Obtaining Support for an Environmental Stewardship Project

Institutional change of any form cannot occur without the presence of a change agent. At NFRA, the Assistant Airport Manager is the primary advocate for environmental stewardship, but the advocate role may be other personnel depending on the resources available at the airport. There are a number of stakeholders whose support is needed to advance projects, these may include:

- Airport Director
- Airport Board
- Airport staff
- Public/local government
- Tenants
- Other stakeholders

To receive support for specific projects, it is important to understand the motives of the stakeholders involved in the decision-making process. Although costs are often one of the most essential elements to receive support for a project, personal and political motivations can also drive decision-making within organizations. To receive support from a stakeholder, the change agent must craft the discussion to cater to the stakeholders motivations. For example, an Airport Director will often require a financial analysis of the project, the environmental officer will focus on compliance with applicable requirements / regulations, and members of an elected Board will have interests that match their constituents' concerns.

### Cultivating an Environmental Mindset

When seeking to implement proactive environmental stewardship practices, airports should consider developing a strategy for fostering a culture of change within the organization. Some elements to foster organizational change may include:

- Designating a program champion or change agent. The change agent would be responsible for promoting environmental improvements within the organization as well as raising general awareness of environmental opportunities and performance.
- Collecting and disseminating information internally. Awareness of the airport's baseline performance enables an understanding and appreciation of opportunities and the need to reduce airport impacts. Some examples of data to collect include:
  - Current environmental impacts, quantified in both economic and environmental terms (e.g., energy costs, greenhouse gas emissions; water consumption, etc.).
  - Benefits of initiatives (e.g., economic, environmental, community relations, permitting, etc.).
- Educating staff, formally through training opportunities; and informally through verbal communication and participation in initiatives.

- Rewarding staff for taking initiative and identifying opportunities to improve environmental stewardship. Rewards can be public recognition, monetary, or other compensation.
- Incorporating environmental metrics and goals into performance reviews.
- Enhancing community interest in the airport’s environmental performance by:
  - Communicating the airport’s environmental performance.
  - Promoting environmental stewardship activities the airport is implementing.
  - Involving the community in airport activities (e.g., internships).
- Providing a forum for staff and the community to share ideas.

“Ultimately, environmental stewardship is a way of thinking. It is achieved by constantly finding opportunities to point out the benefits of going beyond minimum compliance.” Bryan Cooper, Assistant Airport Director at St. Augustine – St. Johns County Airport.

## References/Additional Resources

**St. Augustine/St. Johns County Airport:** [www.staugustineairport.com/](http://www.staugustineairport.com/)

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- *The Sustainable Enterprise Fieldbook.* Ed Jeana Wirtenberg, William G. Russell, and David Lipsky. Greenleaf Publishing, New York: 2009
- *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage.* Daniel Esty and Andrew Winston. Yale University Press, New Haven: 2006
- *The Sustainability Champion's Guidebook: How to Transform Your Company.* Bob Willard
- *Step-by-Step Guide to Sustainability Planning: How to Create and Implement Sustainability Plans in Any Business or Organization.* Darcy Hitchcock and Marsha Willard.

## APPENDIX B-2

# Implementing an Environmental Management System to Facilitate Compliance and Reduce Environmental Impacts at Small Airports

## Problem Statement

As operating budgets shrink, airports are still required, as a minimum, to meet regulatory requirements. In addition, local governments and elected officials sometimes expect airports to go beyond compliance and address initiatives like climate change and greenhouse gas emissions, more stringent water quality requirements, energy consumption, and reduced impervious areas. The management of these initiatives is well suited to the principals and use of an Environmental Management System (EMS). An EMS can be designed to fit a small airport and prioritize initiatives according to the management goals and environmental impacts of the airport.

## Summary of Key Issues

An EMS is simply a set of processes and practices that will enable an airport to reduce its environmental impacts and increase its operating efficiency. An EMS provides a highly effective means for airports to manage and prioritize environmental issues. The EMS process identifies an airport's environmental risks and systematically works to reduce them. Entities with a well-established EMS commonly report increased operational efficiencies, cost savings, reduced environmental liabilities, and increased employee morale.

An EMS is a plan, do, check, act program designed to reduce an airport's environmental impacts. Through an EMS, an organization determines its environmental impacts, forms a plan for reducing those impacts, implements the plan, tracks progress, and then reevaluates their plan.

The needs for an EMS differ by airport. However, an EMS commonly provides the following:

- A forum to organize and track environmental compliance and environmental initiatives across an entity with decentralized environmental responsibilities
- Improvement of environmental compliance and a decrease of environmental risks
- Reduction of direct and indirect environmental-related costs and increased operational efficiency
- Organization of environmental initiatives that go beyond compliance
- Improved regulatory relationships and opportunities for grants
- Improvement of public environmental perception.

The International Organization for Standardization (ISO) has developed a standard for the implementation of EMSs, and only a handful of U.S. airports have developed EMS that are certified under the ISO 14001:2004 standard. There are a number of terms that have special meaning when used in context with EMS. Table 3 provides definitions for these terms as used by EPA, ISO 14001:2004, and in this case study for reference:



**Table 3. Environmental Management System terms and definitions.**

<b>Term</b>	<b>EMS Definition</b>
Activity, Product, or Service	Broadly covers all the possibilities for an organization to have an influence on the environment, both positive and negative, and may be referred to simply as activities or processes.
ISO 14001	International standard for “Environmental Management Systems – Requirements with Guidance for Use” which provides the overall requirements for developing and sustaining an EMS that may be objectively audited for certification/registration purposes or for self declaration.
ANSI/ISO 14001:2004	American National Standards Institute standard for EMS developed in 1996 and modified in 2004 in collaboration with the international version titled ISO 14001.
Environment	Surroundings in which an organization operates including air, water, land, natural resources, flora, fauna, humans, and their interrelation.
Environmental Aspect	Element of an organization’s activities, products, or services that can interact with the environment.
Environmental Impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization’s environmental aspects.
Environmental Management System	The part of an organization’s management system used to develop and implement its environmental policy and manage its environmental aspects. It is a set of interrelated elements (organizational structure, planning activities, responsibilities, practices, procedures, and resources) used to establish and achieve environmental performance objectives.
Environmental Objective	An overall environmental goal, consistent with the environmental policy, that an organization sets itself to achieve.
Environmental Performance	Measurable results of an organization’s management of its environmental aspects. Results can be measured against the organization’s environmental policy, environmental objectives, environmental targets, and/or other environmental performance requirements.
Environmental Policy	The overall intentions and direction of an organization related to its environmental performance as formally expressed by senior management. It provides a framework for action and for the setting of environmental objectives and targets.
Environmental Target	Detailed performance requirements, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
Internal Audit	A systematic, independent, and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the environmental management system audit criteria set by the organization are fulfilled. <i>Note: May also be referred to as EMS Audit.</i>
Procedure	A specified way to carry out an activity or process.
Significant Environmental Aspect	An environmental aspect that an organization determines has, or has the potential to have, a significant impact on the environment.

## Case Narrative—Westchester County Airport

The Westchester County Airport (HPN) was the third U.S. airport to receive ISO 14001:2004 certification for its EMS in 2004, and received the Environmental Achievement Award from Airport Council International-North America for its program in 2005. HPN is owned and operated by Westchester County (County), in White Plains, New York, and is considered a small hub airport by the 2009 FAA



National Plan for Integrated Airport Systems. HPN is predominantly a general aviation airport, as described in Table 4.

**Table 4. Westchester County Airport National Plan of Integrated Airport Systems data.**

HPN		Annual Operations	Percent of Total Operations
<b>Itinerant</b>	<b>Air Carrier</b>	13,478	8%
	<b>Air Taxi</b>	46,612	27%
	<b>General Aviation</b>	94,892	55%
	<b>Military</b>	161	0%
<b>Local</b>	<b>Civil</b>	16,337	10%
	<b>Military</b>	30	0%
<b>Total Operations</b>		171,510	

SOURCE: FAA National Plan of Integrated Airport Systems, 2009-2013 (18).

Initially, when considering an EMS, the Airport upper management and County officials had several concerns, including:

- What is an EMS?
- Why do we need an EMS for the airport?
- Is an EMS simply a way to achieve compliance with applicable laws and regulations?
- How much will it cost?
- Why do we need a consultant to do this?
- Do other airports or government organizations have an EMS?
- What is a certified/registered EMS?
- Do we need our EMS to be registered/certified?
- Will the EMS require us to make information public about the Airport we may not wish to publicize?
- Will an EMS help our relationships with regulators and the public?

It is likely that these concerns are similar to the concerns raised by many airports when considering an EMS. This case narrative describes the benefits and challenges experienced and overcome by HPN during the implementation of their EMS, and the answers to these questions based on their experience.

### Initiative Driver

Runoff from portions of HPN discharges into small tributaries to the Kensico Reservoir, which provides about 90% of New York City's and much of Westchester County's drinking water. In 1999, community groups were concerned over claimed HPN discharges to the Kensico Reservoir, particularly that groundwater was affecting the Kensico Reservoir. The County hired Environmental Project Director, Robert Funicello to conduct an environmental audit of HPN and its tenants to determine if the Airport was in fact polluting the groundwater aquifer that serves the Kensico Reservoir, and to generally assess the status of the Airport's environmental compliance. After considering the airport's situation, Mr. Funicello recommended the Airport implement an EMS as a better way to address concerns about HPN's environmental impacts, for the following reasons:

- An environmental audit would have provided a snapshot of HPN's environmental compliance status, while an EMS provides an ongoing measure of HPN's performance and a means for continually addressing concerns from the community.
- An EMS provides a means for HPN to implement initiatives for environmental performance beyond compliance with their New York State Pollutant Discharge Elimination System (SPDES) permit.

- An ISO 14001:2004 EMS is certified by a third party auditor, providing additional credibility to environmental results.

Mr. Funicello contacted a consultant with experience implementing EMS, and invited representatives from a local industry that had recently implemented an EMS to speak with Airport upper management and County officials about an airport EMS. Based on information from the consultant and the local industry's experience with an EMS, the County officials decided to proceed with procurement of the consultant services needed and other actions to design and implement an airport EMS.

### **Implementation Strategy**

The County procured an environmental consultant to assist them in the initial implementation of the airport EMS. The decision to hire a consultant was primarily because the requirements of the ISO 14001 standard are complicated, and County staff did not have experience implementing EMS. With the assistance of their consultant, the County assembled four groups of people to oversee the airport EMS:

- Technical Committee
- Working Group
- Advisory Committee
- Steering Committee

The Technical Committee currently consists of 18 members, including:

- Representatives for County Departments involved in Airport Operations
- Department Managers from the contractor that operates HPN
- Tenants' and Permittees' Environmental Representatives

The Technical Committee is responsible for identification of activities, products, and services conducted at HPN, including tenant and contractor operations. The Working Group is a subset of the Technical committee and consists of the:

- Department of Transportation Environmental Project Director
- Airport Environmental Manager
- Airport Manager
- Airport Assistant Manager

The Working Group is responsible for preliminary identification of environmental aspects and impacts associated with the activities, products, and services identified by the Technical Committee. The Working Group also develops the criteria used for determining which aspects could potentially have significant environmental impacts. At least once every three years, the Technical Committee evaluates HPN's environmental impacts based on the criteria developed by the Working Group to determine which aspects and impacts are considered significant.

The Advisory Committee currently consists of 10 members including commissioners from eight County departments involved with operations at HPN. The Environmental Manager and Environmental Project Director communicate HPN's significant impacts to the Airport Advisory Committee, and the Committee is responsible for communicating the significant impacts within their Department.

The Steering Committee is responsible for review of the policy statement, criteria for determining the significance of HPN environmental impacts, and objectives and targets developed to reduce HPN's significant negative environmental impacts. The Steering Committee consists of:

- County Executive
- Commissioner of the Department of Transportation
- Commissioner of the Department of Health

The initial development of the airport EMS started with the authoring of the Environmental Policy Statement by the Working Group with the assistance of the consultant. HPN's Environmental Policy Statement, which was reviewed by all Committees associated with the airport EMS, and ultimately signed by the County Executive in 2002, states:

The Westchester County Airport is committed to achieving excellence in environmental protection by integrating environmental values into airport activities. This will be accomplished through the continual improvement of airport-wide environmental management practices and the environmental education of employees.

The principles that guide the effort to achieve excellence in environmental protection include commitments to:

**Conservation of Natural Resources, Sustainable Operations and Prevention of Pollution** Study, identify and implement programs to preserve the natural environment, conduct sustainable operations, including conservation of energy and nonrenewable resources, and prevent pollution;

**Mitigation of Environmental Harm** Carry out Airport operations in a safe and efficient manner that minimizes adverse environmental impacts;

**Compliance** Fully comply with and, if feasible, exceed the requirements of all environmental laws, regulations, and all other requirements to which the Airport subscribes; and

**Inform the Public** Make available to all interested stakeholders airport environmental performance reports.

To ensure our success, the Westchester County Airport will maintain an environmental management system in conformance with the requirements of the ISO 14001 Standard. This system will include implementing programs and procedures, setting measurable objectives and targets, and monitoring and auditing our progress. The protection of the environment is essential and Westchester County is committed to achieving environmental excellence (19).

The Environmental Policy Statement provides the principles by which the Airport conducts its airport EMS. The fact that the Environmental Policy Statement is signed by the County Executive and published on the HPN website illustrates the commitment of the upper management to seeing the airport EMS applied successfully. Airport staff, tenants, contractors, regulators, neighbors and community groups can see the importance the County places on its environmental performance, and the airport EMS.

## Initiative Outcome and Current Status

The County has implemented many initiatives through the airport EMS to reduce the Airport's environmental impacts, including the following:

- Installation of storm drain markers and storm drain filters to reduce illicit discharges
- Enhancement of environmental training for staff, tenants, and contractors
- Identification, remediation, and closure of historic spill sites
- Incorporation of material storage locations in the Airport GIS
- Investigation of groundwater concerns of the community and implementation of ongoing groundwater monitoring – 52 wells sampled semi-annually
- Additional monitoring of noise
- Replacement of diesel and gasoline engine vehicles with electric vehicles
- Conducting an air emission inventory
- Source reduction and capture of aircraft deicer

The primary objective for the first year of implementation of the airport EMS centered on understanding the quality of the groundwater at HPN. HPN coordinated with the New York Department of Environmental Conservation, the New York Attorney General, and other stakeholders to set up voluntary groundwater monitoring at over 50 wells at HPN. Although the groundwater monitoring results showed that the groundwater at HPN is not impacting the Kensico Reservoir, the results revealed areas of historical spills where the groundwater is affected by other pollutants. As part of subsequent objectives and targets established through the airport EMS, HPN has worked with New York Department of Environmental Conservation and the parties responsible for the contamination to remediate many of these sites. HPN continues to monitor the groundwater wells semi-annually and publishes the report on their website.

Additionally, the Airport banned the use of ethylene glycol-based aircraft deicers and switched to the less toxic propylene glycol-based aircraft deicers to mitigate the risk of ethylene glycol reaching the groundwater or surface water at HPN. The Airport contracts with a company to apply deicer at a centralized deicing pad at HPN. The contractor uses deicing trucks that use a combination of pressurized air and fluid to remove snow and ice, and has recently started efficient mixing of Type I deicer to minimize the amount of propylene glycol in the mix sprayed on the aircraft to the amount required by FAA to provide the proper freezing point depression depending on the outside air temperature. The Airport then collects runoff contaminated with aircraft deicers and discharges it to the sanitary sewer, or hauls it away for treatment. The Airport also implemented the use of catch basin inserts to prevent fuel and oil spills from reaching the storm water system. As a result of HPN's detailed groundwater monitoring program that was established, maintained, and reported through the airport EMS, and the way HPN addressed the findings of the groundwater monitoring through subsequent airport EMS objectives, the many citizens' concerns have been addressed, and most citizen groups now feel more confident that HPN will actively identify and address future groundwater and other environmental concerns.

The Airport also enhanced its noise program as part of the airport EMS in an attempt to reduce the number of noise complaints filed by neighbors. Additional noise monitors were added and HPN tenants participate in a voluntary curfew to reduce aircraft noise at night. Every year the Airport gives Spirit of Noise Abatement awards to tenants that follow the voluntary restraint from flying hours (12:00 to 6:30 am) and do not trigger a high-range noise event. HPN has a noise complaint hotline and publishes a monthly noise newsletter with results from the month's noise monitoring to keep citizens informed of the efforts the Airport and its tenants are making to reduce noise.

In 2007, HPN prepared an air emissions inventory to understand HPN's relationship to the issue of air pollution and climate change. As part of the airport EMS HPN has developed an air emissions inventory management plan to maintain compliance with regulatory requirements, anticipate and prepare for future regulatory requirements, develop strategies for managing greenhouse gasses, and report HPN's environmental performance. The County replaced the Airport GSE fleet of diesel and gasoline vehicles with electric-powered vehicles in 2009 through the Voluntary Airport Low Emissions program and the airport EMS. This initiative sparked an article in the *New York Times*, and HPN received a letter from the local Sierra Club congratulating it for the reduction in air emissions.

An important element of the airport EMS is the environmental work orders. Any staff member, tenant, or contractor may file an environmental work order, and these work orders must be addressed by the environmental staff and be summarized annually for management review. Typical examples of work order include the following:

- Need more properly labeled recycling bins
- Waste container needs a lid
- Procedure for operation of deicing pad needs revisions

#### *ISO 14001:2004 Certification*

The County decided to apply for ISO 14001 certification for its airport EMS for several reasons:

- Being certified gave the program permanency. Once HPN was certified the first year, there was public pressure to maintain that certification. If HPN failed to be certified in the future, it would have to explain to the public why it was unable to maintain the certification.
- In order to be ISO 14001 certified the EMS must be audited by a third party certified ISO auditor annually. The third party verification gives credibility to HPN's environmental results, especially skeptical community groups.
- The ISO 14001 certification provided additional assurance to the public that HPN is environmentally responsible.

The County hired an environmental consultant with experience implementing EMS to assist with the initial implementation. The consultant assisted the Airport with understanding the ISO 14001:2004 process, developing the environmental policy statement, identifying HPN's aspects and impacts, assessing the significance of the impacts, and preparing for the ISO 14001:2004 audit. Once Airport staff was comfortable with the process, they were able to conduct subsequent assessments of HPN's impacts on their own. The County continued to use the consultant for several years to conduct compliance audits in preparation for their annual ISO 14001:2004 audits.

### **Perceived Benefits**

The airport EMS provides a framework for the Airport to:

- Systematically identify the environmental impacts associated with HPN activities, products and services,
- Coordinate staff responsibilities for implementing initiatives to reduce negative impacts, and
- Track progress on environmental objectives.

The working group meetings involve personnel from many Departments in the County that otherwise would not communicate regularly on environmental issues. The airport EMS has facilitated this communication, allowing other important non-airport EMS information to be easily disseminated across

the departments. The environmental work orders allow employees to feel empowered. Any employee can file one, and it must be addressed by the environmental staff. Because of the additional emphasis placed on environmental work, the way environmental performance is tracked, and the fact that staff get to meet with upper management through the airport EMS, morale has increased for staff with environmental responsibilities as they feel their work is important to the organization.

The airport EMS allows the Airport to continually improve its environmental performance and monitor the status of its compliance with environmental regulations. Through the EMS the Airport is proactive regarding environmental impacts at HPN rather than reactive. The EMS allows the Airport to identify and manage risks, and anticipate and handle environmental concerns before they become an environmentally regulatory or public issue. The EPA conducted an intensive multi-media audit of HPN after implementation of the airport EMS. The audit revealed no violations. Since HPN is more aware of its environmental performance and compliance status it is better able to meet all regulatory requirements. Through the EMS, the Airport's relationship with state and federal regulators has improved significantly.

The reporting system set up as part of the EMS allows the Airport to be transparent in reporting its environmental performance. The Airport's aspects, impacts, objectives, and targets are published on its website, and the County publishes a monthly newsletter detailing the noise data from the past month. Environmental impacts from operations and development at HPN are often hot button issues for the local County election. This past election was the first in many years where HPN was not a significant issue in the election.

The electric vehicles save HPN approximately 100,000-gallons of fuel annually, and significant dollars after the cost of electricity. The newer vehicles also require less cost for maintenance than the diesel and gasoline vehicles did. Switching to electric vehicles eliminated the second-largest source of criteria air pollutants at HPN.

### **Obstacles Encountered**

Although most HPN staff support the airport EMS, there have in the past been a few that opposed it. Dealing with problem employees has been a challenge for HPN, but routine training and active involvement by environmental staff and management have kept such staff problems to a minimum.

Numerous tenants and contractors operate on HPN property and are included in the airport EMS. Ensuring tenants and contractors operate in compliance with environmental laws and encouraging them to participate in airport EMS initiatives is difficult since they are not under direct control of the County. The County occasionally has difficulty with contractors because they are more transient than tenants and their operations often have the potential to significantly impact the environment. HPN staff has discontinued the use of one area for construction mobilization because it is near an environmentally sensitive area to mitigate the risk of spills and leaks from contractor's equipment from affecting that area. Again, regular inspection of contractor's sites and training keeps HPN informed of tenant and contractor operations and identifies potential compliance issues before they become a problem.

In an effort to promote the airport EMS to tenants and contractors, HPN requires all contractors to undergo environmental training before they are permitted on HPN property. The airport EMS training typically takes about an hour, and is incorporated into the required FAA safety and TSA security training program for contractors. The training requirement, as well as the airport EMS best management practices and initiatives applicable to contractors are specified in the County bid solicitations for work at the Airport. Contractors are aware of the requirements and can take them into account when they submit for a



project. All staff, tenants, and contractors are also given a card that contains information about the airport EMS, including the answers to these airport EMS frequently asked questions:

- What is the Environmental Policy?
- Who do I call in case of a spill?
- What is my role in the airport EMS?
- What is an environmental work order?
- Is there anything special about ISO?
- Will an ISO auditor talk to me?
- What do I need to know about the airport EMS?
- Who can I ask if I have questions about the airport EMS?

Communication from upper management to key personnel of the importance the airport is placing on the success of the EMS and its initiatives is critical to achieving active staff participation.

### Critical Success Factors

Several actions by the County contribute to the success of the airport EMS, including:

- Getting buy-in from upper management before rolling out the program establishes the importance the County placed on successful implementation of the airport EMS
- Involving staff from a broad range of Departments in the Technical Committee facilitates horizontal communication through the organization
- Transparency in reporting environmental performance to the public enhances the public opinion of HPN
- Strategic selection of initiatives to target hot button items fosters public support
- Obtaining ISO 14001:2004 certification provides permanency to the program
- Utilizing environmental work orders empowers staff to participate in the airport EMS

After the initial implementation of the program, HPN strives to keep their staff, tenants, contractor that operates HPN, and other contractors actively involved in the airport EMS. In an effort to maintain excitement about the program the County has implemented several programs, including:

- Annual Spirit of Noise Abatement Awards for tenants that do not fly during the voluntary curfew hours of 12:00 a.m. – 6:30 a.m. and do not cause a high range noise event
- Speakers that present the benefits of airport EMS to staff. Food is typically provided at these events to encourage attendance

### Estimated Level of Effort

Overall, there are currently 30 people in the committees involved in the planning, development, and implementation of the airport EMS including County representatives, Tenant representatives, and representatives from the Contractor that operates the airport. The Technical Committee meets quarterly and the other committees conduct annual reviews of the activities, aspects, impacts, significant criteria, objectives, and targets. The Environmental Director devotes approximately two and a half days per week to the airport EMS. The Airport Environmental Manager supervises the airport EMS full time and directs environmental staff at HPN with airport EMS responsibilities. HPN environmental staff in addition to the Environmental Director:

- Environmental Manager
- Noise Officer
- Environmental Officer
- Environmental Data Specialist

- Three Environmental Technicians
- Two Environmental Mechanics

Table 5 summarizes the tasks involved with maintaining the airport EMS and the frequency that the tasks are performed.

**Table 5. Airport Environmental Management System tasks.**

<b>Task</b>	<b>Frequency</b>
Develop Environmental Policy Statement	Once
Review aspects and impacts	Triennially
Review and modify criteria for determining significance	Triennially
Determine significant aspects and impacts	Triennially
Review HPN activities, services, and products	Annually
Develop new Objectives and Targets	Annually
Conduct internal audit in preparation for ISO 14001:2004 audit	Annually
Participate in third party audit for ISO 14001:2004 certification	Annually
Measure performance against Targets	Monthly/Quarterly/Annually
Meet with Working Group to discuss airport EMS	Quarterly
Address Environmental Work Orders	Ongoing
Implement Environmental Objectives	Ongoing

### Estimated Costs

The County Airport has not received outside funding for the development or implementation of the airport EMS. The airport EMS is funded through Airport revenues.

The initial contract with the environmental consultant from March 2001, through March 2003, for development and operation of an EMS to meet the ISO 14001 standard was for \$485,000. The initial contract was extended at no additional cost to December 2004, and the airport first received ISO 14001 certification in August 2004. The consultant's contract was extended twice through December 2007, for a total of \$350,000 for compliance audit and other work.

The County estimates that it spends between \$50,000 and \$100,000 on the airport EMS annually, including salaries and an \$8,000-\$10,000 external audit for ISO certification. This is in addition to any capital costs associated with specific initiatives, such as construction of a deicing pad, groundwater well installation, noise monitoring equipment, and recycling costs.

In retrospect, the County feels that these costs and the cost of the consultant were well justified considering the benefits they see from the airport EMS.

### Findings and Key Considerations

The County has enhanced the reputation of HPN and facilitated improved environmental performance through its airport EMS. The County has received positive feedback from the community, local officials, regulators, and staff for the airport EMS. Because of the airport EMS, the Airport's relationship with state and federal regulators and the public has improved significantly and the Airport considers its improved environmental performance, avoidance of regulatory problems, and these improved relationships well worth the cost of implementing the airport EMS. Many initiatives have reduced the environmental impacts at HPN and the Airport plans to continue to implement additional initiatives in the future. The Airport has maintained its ISO 14001:2004 certification every year since it was first certified in 2004.

## Planning

The ISO 14001:2004 standard is somewhat complex, and there are many requirements involved in implementing an airport EMS that meets the ISO 14001:2004 standard. The County decided to hire a consultant to assist with the initial implementation of the airport EMS because County staff were not familiar with airport EMS. Airports implementing an EMS may want to consider involving an environmental consultant experienced in EMS if airport staff is unfamiliar with the ISO 14001:2004 standard, particularly if the airport is considering ISO 14001:2004 certification.

Gaining buy-in from upper management and publishing an Environmental Policy Statement signed by the County Executive illustrated to employees and the public that the County was serious about the environment and the success of the airport EMS. Obtaining upper management support is key to achieving success. Support from upper management effectively sends the message to all staff that the airport EMS is an important initiative and the airport is serious about the success of the program.

Establishing airport EMS committees with staff from various County Departments and including upper management established lines of communication. Effective communication is key in implementing an airport EMS, as it facilitates flow of information vertically along the chain of command and horizontally across departments, encouraging active participation in the program at all levels, and empowering staff to become involved.

## Implementation

Successful implementation means meeting the County's goals for the airport EMS, including:

- Ongoing knowledge of HPN's environmental compliance status —The airport EMS program requires regular measurement of HPN's performance with regard to environmental compliance and the airport EMS objectives and targets.
- Continuous identification of and mitigation of risks for non-compliance—Through coordinated annual reviews of HPNs activities, services and products, the County identifies areas of environmental risk, and can take steps to mitigate those risks.
- Improving HPN's public image with the respect to the environment—HPN publishes its objectives, targets, aspects, impacts, monthly noise reports, and semi-annual groundwater monitoring reports on its website, improving the public confidence in HPN environmental program. Because of this enhanced confidence the public is less critical of other HPN projects.
- Reducing HPN's negative environmental impacts—HPN eliminated the second largest source of criteria air pollutants with its electric vehicles. HPN prohibited the use of ethylene glycol-based aircraft deicers and reduced the amount of deicer that reaches surface water. HPN remediated and closed historical spill sites.
- Improved communication and coordination within the County Departments and with the tenants and contractors—Staff from eight County Departments, tenants and contractors serve on the environmental committees established under the airport EMS.
- ISO 14001:2004 certification—HPN has maintained its ISO 14001:2004 certification since 2004 when it was first certified.

## Ongoing Maintenance

After the initial implementation of the program, HPN strives to keep their staff, tenants, contractor that operates HPN, and other contractors actively involved in the airport EMS. HPN's continued success

with their airport EMS is a result of several key actions taken by HPN staff during the planning, implementation, and maintenance of the program:

- The initial roll out of the EMS came as a directive from the County Executive through the Environmental Policy Statement. This illustrated to airport staff, tenants, and contractors the importance the airport placed on the success of the EMS and its initiatives.
- Continued ISO 14001:2004 certification establishes permanency for the program to the public.
- In addition to maintaining regulatory compliance, HPN targets its objectives towards issues identified by staff and community groups concerned about the environment. This maintains the positive relationship with staff and the community.
- The County maintains a policy of transparency with regard to its environmental performance and its EMS program. This enhances public opinion of the airport and serves to garner support from the community for airport projects.
- The airport uses environmental work orders, lunch time speakers, and awards to maintain staff motivated about implementing EMS initiatives.

## Additional Resources

- ISO 14000 standard  
[www.iso.org/iso/iso\\_catalogue/management\\_standards/iso\\_9000\\_iso\\_14000/iso\\_14000\\_essentials.htm](http://www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000/iso_14000_essentials.htm)
- Westchester County Airport  
<http://airport.westchestergov.com/>
- EPA  
[www.epa.gov/ems/](http://www.epa.gov/ems/)
- ACI-NA Environmental  
[www.aci-na.org/committees/enviro\\_main](http://www.aci-na.org/committees/enviro_main) and [www.aci-na.org/index/issues\\_enviro\\_main](http://www.aci-na.org/index/issues_enviro_main)
- Federal Government Guidance  
[www.fedcenter.gov/programs/ems/](http://www.fedcenter.gov/programs/ems/)
- FAA Regional EMS Implementation Guide  
[www.faa.gov/airports/environmental/policy\\_guidance/media/regional\\_ems\\_implementation\\_guide.pdf](http://www.faa.gov/airports/environmental/policy_guidance/media/regional_ems_implementation_guide.pdf)
- All-Electric Vehicles Bought for Airport. *New York Times*, January 23, 2009.  
[http://www.nytimes.com/2009/01/25/nyregion/westchester/25airportwe.html?\\_r=1&fta=y](http://www.nytimes.com/2009/01/25/nyregion/westchester/25airportwe.html?_r=1&fta=y)

## APPENDIX B-3

# Establishing a Small Airport Sustainability Program Case Study

## Problem Statement

Airports can enhance environmental performance and meet future demands for clean water and energy by developing, through comprehensive planning, an approach to sustainability which considers environmental, social, and economic elements.

Airport sustainability is defined by Airports Council International—North America as “a holistic approach to managing an airport so as to ensure the integrity of the economic viability, operational efficiency, natural resource conservation and social responsibility (EONS) of the airport” (2).

A more detailed introduction to sustainability is included in Chapter 9.

Sustainability represents an “approach” to planning, rather than an end goal. With the understanding that the health of our environment and communities is valuable, integrating environmental and community considerations into decision making can result in substantial cost savings. These cost savings are often achieved through enhanced efficiency and/or through reduced resource demand. Opportunities for enhanced efficiency and innovative planning arise when decision making seeks to minimize use of financial and environmental resources, and enhance social well-being. Because a sustainability approach is integrated with airport planning, it can be applied to airports of any size, reflecting the fundamental needs and capacities of the individual airport.

Airports seek to incorporate sustainability into their planning processes for a number of different reasons. As documented in the Sustainable Aviation Resource Guide (1), these drivers include the following:

- Rising and fluctuating energy and water costs
- More abundant enabling technologies
- Aging infrastructure
- Growing stewardship philosophy
- Airline industry financial pressures
- Green and environmental mandates
- Political desires

Airports planning for sustainability can take many forms, including the following:

- Sustainability master plans
- Stand-alone sustainability management plans
- Sustainability management systems
- Facility design and construction guidelines incorporating sustainability
- Integration of sustainability into capital improvement plans

The following case study provides an in-depth look at the development, successes, and challenges of the sustainability management system that the City of Albuquerque Airport Department developed and implemented.

## Summary of Key Issues

Developing a sustainability plan is an effective way to incorporate environmental stewardship into all aspects of airport operations, capital improvements programming, and the cultural fabric of airport management and operations. As noted by the Sustainable Aviation Guidance Alliance (1), some benefits to incorporating a sustainability approach to airport planning include:

- Reduced life cycle costs of capital assets
- Reduced operating costs
- Reduced environmental footprint
- Optimization of new and better technologies
- Reduced costs of asset development
- Enhanced bond ratings
- Reduced environmental, health, and safety risks
- Improved work environment for employees leading to higher productivity
- Better customer service and satisfaction
- Enhanced relationships with the surrounding community

Until recently, large airports have primarily undertaken sustainability planning projects. However, an increasing number of small airports have initiated sustainability programs due to the potential benefits, outlined above, that can be achieved without substantial capital costs. One of the primary obstacles for implementing projects that respond to the sustainability needs of a small airport is the limited potential for economies of scale. As a result, small airports must carefully identify relevant projects and weigh the triple bottom line benefits – social, environmental, and economic – of potential initiatives.

## Case Narrative—Double Eagle II Airport

The City of Albuquerque’s Aviation Department operates two airports: Albuquerque International Sunport (ABQ), which is primarily a commercial service airport and Double Eagle II Airport (AEG or the Airport), which is a general aviation reliever airport, as defined by the Federal Aviation Administration’s National Plan of Integrated Airport Systems (2009-2013). The City of Albuquerque’s Aviation Department sustainability program addresses the activities of ABQ and AEG. Because the Albuquerque Aviation Department operates both airports, it has planning resources that other small airports may not have. However, the sustainability framework set forth in the plan is designed to be applied within smaller business units of the Aviation Department, such as AEG. This case study focuses on the general aviation airport and identifies lessons learned by the City of Albuquerque Aviation Department that are applicable to small airports.

AEG is located on 4,361 acres situated 8 miles northwest of the Albuquerque central business district and 13 miles northwest of ABQ. AEG has two runways, Runway 04/22, which is 7,400’ long and 100’ wide and Runway 17/35 which is 6,000’ long and 100’ wide. In 2009, AEG had 128 based aircraft and 80,000 annual aircraft operations.



## Initiative Driver(s)

The City of Albuquerque Aviation Department undertook the development of a department-wide plan for addressing sustainability as a result of two motivating factors:

- The City of Albuquerque was currently in the process of developing a city-wide mandate addressing sustainability. The Aviation Department wanted to demonstrate leadership by proactively initiating a sustainability program prior to any City-wide mandate.
- The Aviation Department felt that incorporating sustainability into its planning and development was the right thing to do.

Developing its own sustainability plan enabled the Aviation Department to organize itself and identify opportunities to enhance its sustainability activities independently of the city's larger initiative. Had the Aviation Department waited for the city's sustainability mandate to go into effect, AEG perceived it would have had less control over the direction and focus of its sustainability efforts.

## Implementation Strategy

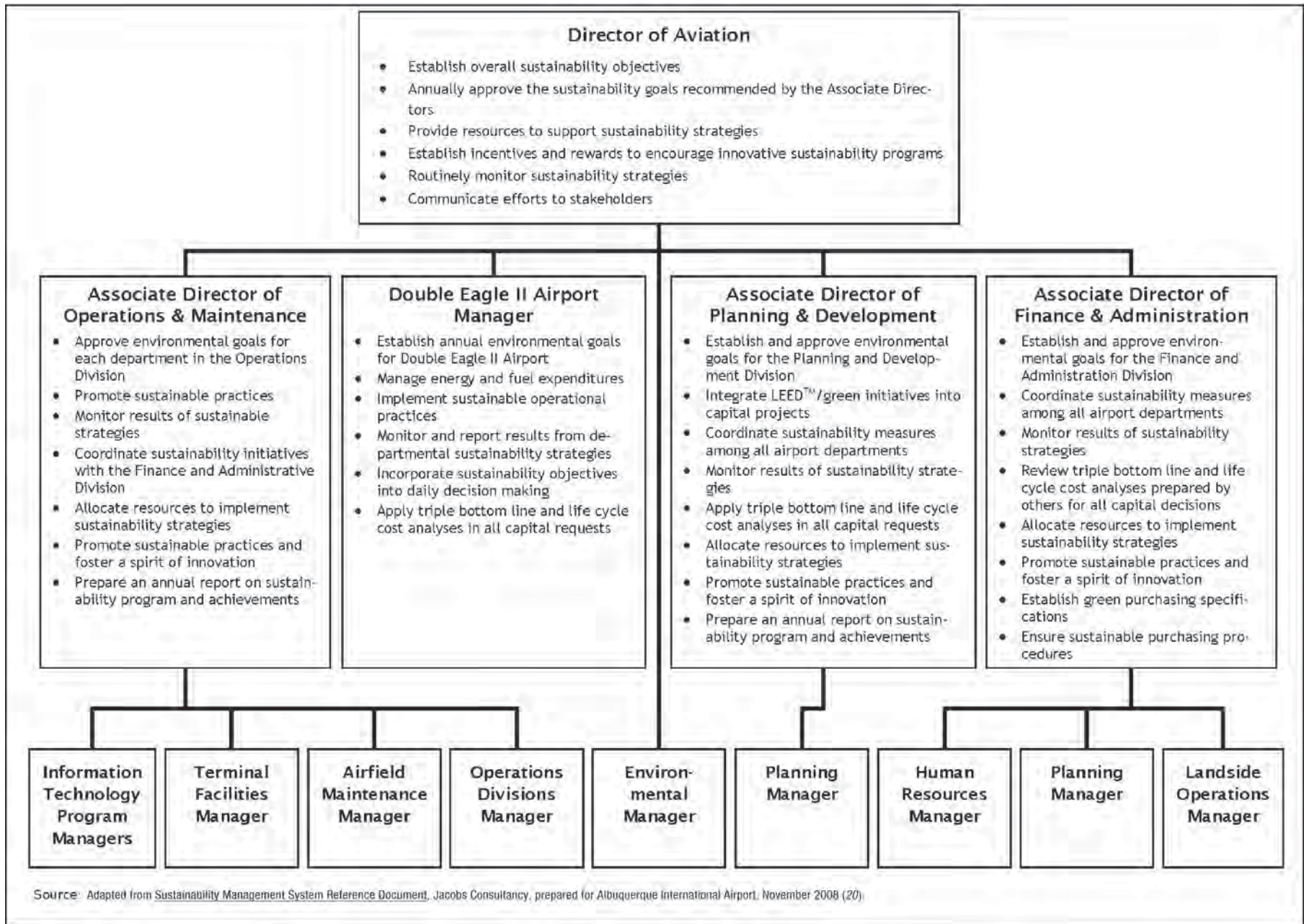
### *Elements of the City of Albuquerque Airport Department Sustainability Management System*

The City of Albuquerque Aviation Department's sustainability management system outlines a number of elements designed to incorporate sustainability into the decisions of each of the Aviation Department's business units. These business units include: Operations and Maintenance, AEG, Planning and Development, and Finance and Administration (see Figure 7).

The elements of the City of Albuquerque Aviation Department sustainability management system are the following:

- Develop a sustainability policy
- Document existing sustainability practices
- Set goals and objectives
- Perform a gap analysis
- Achieve management commitment to sustainability
- Develop tools for financial analysis
- Delineate staff roles and responsibilities
- Establish performance metrics
- Develop a communications program
- Train staff on incorporating sustainability into daily activities
- Continually evaluate and improve the sustainability program

The City of Albuquerque Aviation Department's sustainability program enables decentralized implementation of sustainability principles by establishing a management structure that clarifies responsibilities, objectives and goals, and distributes accountability throughout the organization (see Figure 7). Although the program establishes an overall goal and vision for the entire aviation system, focused goals and objectives are set by Asset Managers of the Aviation Department's various business units. As a result, environmental stewardship activities can be catered to match departmental needs and capabilities. This approach makes sustainability planning relevant and accessible for AEG.



**Figure 7. Proposed project organization for Double Eagle II Airport.**

### *Sustainability Planning at Double Eagle II Airport*

The sustainability management system identifies an approach for AEG to incorporate sustainability into its operations, planning, development, and construction. Ultimately, the AEG Manager who oversees all operational activities at AEG is responsible for implementing the sustainability program. Specifically, the plan identifies the following responsibilities for the AEG Manager, which are intended to guide decision-making at AEG:

- Establish annual environmental goals for AEG
- Manage energy and fuel expenditures at AEG
- Implement sustainable operational practices
- Monitor and report on the results from sustainability strategies
- Incorporate sustainability objectives into daily decision-making
- Apply triple-bottom-line and life-cycle cost analyses in all capital requests

To support the development of initiatives that meet the airport's sustainability goals, AEG also conducts pilot projects. These projects enable the airport to gauge the feasibility and magnitude of improvements the initiative would have.

### **Initiative Outcome and Current Status**

#### *Environmental Goals for AEG*

As part of implementing the Sustainability Management System, AEG identified sensitive environmental areas as well as aspects of the airport's operations and development that have environmental impacts:

- Energy use
- Waste management and recycling
- Potential lead issues (that could result from pending EPA regulation)
- Stormwater

With an understanding of the critical current and future environmental issues associated with AEG's operations, the Department of Aviation developed sustainability practices to minimize AEG's impact in those environmental areas.

#### *AEG Sustainability Initiatives Resulting from the Sustainability Management System*

Although AEG's sustainability activities are part of a larger effort that includes all of the Aviation Department's business units, AEG typically does not implement the same initiatives as ABQ because of differing environmental and community contexts, as well as differing airport functions. For example, ABQ focused on expanding multimodal transportation opportunities for passengers and airport employees. However, due to its isolation a similar program is not as applicable for AEG. Instead, initiatives are focused on areas of greatest concern for AEG specifically, which includes energy use, waste management, and stormwater.

The improvements that AEG has initiated to-date include:

1. **Conversion of fuel used for AEG's vehicle fleet to biodiesel fuel (B20 and E85).** This fuel conversion was initiated to minimize AEG's dependence on fossil fuels and to reduce air emissions.

However, because of increased maintenance costs, AEG is looking to revert back to using regular unleaded fuel for the fleet vehicles.

2. **Conversion of Runway Lights to Low Emitting Diode Lights (LED).** A Life Cycle Cost Analysis (LCCA) for this initiative demonstrated the conversion of runway lights to LED would save AEG close to \$73 per fixture each year, resulting in a 2.2-year return on investment. In addition, environmental benefits resulting from this project included savings of 15.9 metric tons of carbon dioxide per year, equivalent to the yearly emissions of 2.9 passenger vehicles or the emissions from the yearly electricity use of 1.5 homes.
3. **Leadership in Energy Efficiency and Design™ (LEED) Certification of Airport Maintenance Facility.** The City is seeking to achieve the Gold certification level. Examples of strategies AEG used to meet LEED standards are listed on AEG's website. The final upfront costs for seeking LEED certification were 10 to 20 percent higher than a conventional project approach. A critical component of this project addressed stormwater retention. The project incorporated the design of a stormwater capture system that will reduce water pollution by minimizing the contaminants leaving the site and removing pollutants from stormwater runoff. All stormwater leaving the AEG site will flow through four major retention ponds that allow the water to be naturally treated and stored to avoid unhealthy runoff to streams in large storm events.
4. **Energy Meter Mapping.** One significant effort conducted at AEG was to identify and map all of the electrical meters at AEG using a geographic information system. As a result of the energy meters inventory, the Airport discovered it was being charged for more electricity than it was actually using. Correcting electricity charges resulted in significant cost savings for AEG.
5. **Establishing a recycling program.** AEG is currently in the process of establishing a recycling program despite a low volume of waste resulting from airport operations.

AEG is also evaluating the feasibility of sourcing its energy from renewable sources. AEG is considering leasing land to an outside company to construct a 10 mega watt solar array. The owner of the system would supply 100 percent of AEG's electricity and would sell the remaining back to the grid. This arrangement is enhanced by the Airport's small size: supplying electricity for the Airport would represent only a small fraction of the total electricity the system could produce, thereby allowing the company managing the system to profit from the remaining electricity produced. This initiative is pending an agreement with the local utility provider that would allow the system's owner to resell excess electricity produced to the local grid, thus making the installation financially viable.

### Perceived Benefits

The sustainability initiatives that AEG has undertaken as a result of its sustainability management plan resulted in substantial reductions in energy consumption and financial savings associated with reduced resource consumption. In addition, AEG anticipates that its new LEED certified maintenance facility will result in a number of environmental and social benefits, such as reduced use of electricity, potable water, and raw materials, reduced waste generation, and enhanced employee health and productivity.

Finally, initiating sustainability planning in advance of any potential city mandates demonstrated AEG's leadership and commitment to sustainability, and offered AEG increased flexibility in the direction and focus of its sustainability efforts.

### Obstacles Encountered: Challenges of Implementing the Sustainability Management System at AEG

Although still in the early phases of implementation, AEG has identified a number of challenges encountered in applying the sustainability program, including the following:



- Due to AEG's location and the nature of its operations, it has fewer opportunities to implement sustainability initiatives, especially when compared to its larger counterpart, the Albuquerque International Sunport. AEG's small number of operations and isolation from local population centers limit the environmental and social issues associated with airport operations. However, AEG benefits from being part of a larger airport system and the associated economies of scale to justify airport improvements.
- AEG's small size also impedes the ability of sustainability measures to result in the necessary financial returns to justify the investment. For example, because AEG has limited passenger traffic and few administrative staff, increasing its recycling rates would only result in a small reduction of landfill waste. As a result, the effort and financial costs associated with increasing recycling rates do not result in the financial returns that larger recycling programs at other airports and organizations may provide. However, AEG opted to implement a recycling program despite the limited financial return because the program has social and environmental benefits, and offers a visible example of its efforts to plan for sustainability.
- The cost to maintain an environmental initiative can prohibit the continued implementation of the sustainability measure. The environmental benefits resulting from use of biofuel, for example, were not great enough to offset the increased cost. Although sustainability initiatives often result in social and environmental benefits without monetary value, the financial constraints of small airports will often dictate the choice of the project to be implemented. As a result, AEG often approaches sustainability projects by conducting a pilot phase to obtain information on the financial viability and other intangible benefits of the project.
- Establishing a culture of sustainability is a critical component to implementing sustainability. A sustainability management system establishes a framework to approach sustainability, but does not address the organizational mindset changes necessary to incorporate sustainability into decision making. The Aviation Department sought to encourage culture shifts through friendly competition amongst airport staff, highlighting of public interest in sustainability issues, and stressing that implementing sustainability initiatives is the right thing to do.

## Critical Success Factors

### *Analytical Tools for Applying Sustainability*

Two primary analytical components of the sustainability program for which each asset manager, including the AEG Airport Manager, is responsible include:

- **Triple Bottom Line Analysis**—One of the most important aspects of a sustainability program is a shift in the decision-making process—to consider environmental and social factors in addition to economic concerns. It is important to understand that one factor need not come at the expense of another. In some cases, evaluating a project based on environmental and social concerns will spur innovation that ultimately reduces overall costs over the life of the project. The goal of a triple bottom line approach to decision-making is to optimize economic, environmental, and social capital. AEG conducted a triple bottom line analysis to decide whether to replace cleaning agents with ionized water. Ionized water is environmentally beneficial because it eliminates chemical waste that is found in traditional cleaning products. Additionally, ionized water is socially beneficial because the janitorial staff is no longer exposed to chemicals, which enhances working conditions. Lastly, the triple bottom line analysis determined that although transitioning to a new cleaning mechanism would result in increased costs, in the long run, the change would result in financial savings due to the reduced amount of cleaning supplies needed at AEG.
- **LCCA** – LCCA is the calculation of the total cost of ownership of an asset as the sum of all costs incurred in the initial planning and development stage, the operational stage, and the end-of-life stage. LCCAs are used to determine the total cost of implementing an environmental initiative, thereby

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enabling a cost comparison of different alternatives. An LCCA conducted for the conversion of taxiway lighting to LEDs demonstrated the financial viability of the project (a 2.2 year return on investment).

AEG used these tools to provide quantitative measures of sustainability, and applied them to projects of all types and sizes.

*Changes in Environmental Mindset*

Shifts in environmental mindset at AEG and at ABQ have been essential to the successful implementation of sustainability initiatives. Although the sustainability plan provided a framework for action, changes in the organizational culture of the Aviation Department lead to the innovation and enthusiasm necessary for incorporating sustainability into airport planning.

*Funding Mechanisms*

AEG utilized a number of different funding sources to implement the initiatives resulting from the sustainability program recommendations. These funding sources included:

- Reduced purchase costs by utilizing economies of scale resulting from joint purchases with ABQ
- American Recovery and Reinvestment Act of 2009 to convert runway lighting to LEDs
- Airport capital funds

In addition, leasing of land is a potential funding source for AEG, and it plans to use this for the installation of a solar energy system.

**Estimated Level of Effort**

The sustainability management plan was completed by an external consultant and intended for the entire aviation department of the City of Albuquerque. The plan identified specific roles and responsibilities that AEG could undertake with its limited staff resources. Nonetheless, AEG received support from the entire Aviation Department team, as identified on Figure 7.

**Estimated Costs**

The cost of the planning effort was not shared with the research team. In addition, the costs of the project may not be relevant to other small airports because it covered the operations and activities of the entire Aviation Department of the City of Albuquerque. Some costs associated with the individual sustainability initiatives that resulted from the Sustainability Management Plan are discussed above.

**Findings and Key Considerations**

Through development of a sustainability management plan, AEG identified airport-specific sustainability goals, received tools to incorporate sustainability into its decision making, and identified a number of projects to enhance environmental, social, and economic aspects of airport operations and development.

**Planning**

The planning component of the project consisted of the development of the sustainability management plan. Although the plan itself was intended to capture the operations of the entire Aviation



Department, the decentralized approach to managing sustainability enabled AEG to pursue a program that suited its operations, environmental, and social conditions, as well as AEG's financial considerations. Those elements of the plan that were most instrumental to the initiation of sustainability initiatives at AEG include the following:

- Developing a sustainability policy
- Setting goals and objectives
- Achieving management commitment to sustainability
- Developing tools for financial analysis
- Continually evaluating and improving the sustainability program

An important aspect of developing the sustainability plan at AEG was to concurrently build an environmental mindset within the airport. Shifts in mindset were achieved through competitions within the Aviation Department and through regular interactions among those leading the sustainability efforts of each business line of the Aviation Department (see Figure 7).

### Implementation

An integral component to successfully implementing the sustainability management plan at AEG was identification of the critical current and future environmental issues associated with AEG's operations and development of goals in each of these areas. AEG then sought to meet those goals and minimize its impact in those environmental areas.

Because AEG sought to develop an understanding of its baseline conditions, it was able to cater the sustainability strategies to the specific environmental and community context of the Airport, as well as to its differing airport functions. Specifically, one of the primary challenges AEG faces is its smaller environmental footprint and a difficulty to achieve sufficient economies of scale to justify investments. To overcome these obstacles, AEG prioritized projects that fit within the financial constraints of the airport and that offer environmental, social, and economic benefits of value.

### Ongoing Maintenance

AEG strives to keep its staff, tenants, and contractors actively engaged in sustainability planning. The sustainability management plan provides a framework for continued incorporation of sustainability into AEG's decision making. Analyses such as the LCCA and the triple bottom line provide tools for AEG to continue to effectively incorporate a long-term sustainable view into airport planning and development.

### Additional Resources

- Double Eagle II Airport  
[www.cabq.gov/airport/double-eagle-ii-airport](http://www.cabq.gov/airport/double-eagle-ii-airport)
- Sustainability at Albuquerque International Airport  
[www.cabq.gov/airport/sustainability-at-sunport](http://www.cabq.gov/airport/sustainability-at-sunport)
- Double Eagle II Airport - LEED  
[www.cabq.gov/airport/double-eagle-ii-airport-leadership-in-energy-and-environmental-design-lead](http://www.cabq.gov/airport/double-eagle-ii-airport-leadership-in-energy-and-environmental-design-lead)
- TRB—ACRP Transportation Research Circular E-C138: Critical Issues in Aviation and the Environment, September 2009  
[www.aci-na.org/static/entransit/trb\\_aviation\\_environment\\_sept09.pdf](http://www.aci-na.org/static/entransit/trb_aviation_environment_sept09.pdf)
- *ACRP Synthesis 10: Airport Sustainability Practices*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_syn\\_010.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_010.pdf)

- *ACRP Research Results Digest 2: Model for Improving Energy Use in U.S. Airport Facilities*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rrd\\_002.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rrd_002.pdf)
- ACRP Project 02-13: Development of a Guidebook of Practices for Improving Environmental Performance at Small Airports (in development)  
<http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2576>
- *ACRP Project 20: Strategic Planning in the Airport Industry*  
[http://onlinepubs.trb.org/onlinepubs/acrp/acrp\\_rpt\\_020.pdf](http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_020.pdf)
- Sustainable Aviation Guidance Alliance (SAGA)  
[www.airportsustainability.org/](http://www.airportsustainability.org/)
- Sustainable Aviation Resource Guide: Planning, Maintaining and Implementing a Sustainability Program at Airports  
[www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf](http://www.airportsustainability.org/sites/default/files/SAGA%20Final2.pdf)
- Database of Sustainable Initiatives  
[www.airportsustainability.org/database](http://www.airportsustainability.org/database)
- Airports Council International-North America Joint Environmental and Technical Committee, Airport Sustainability Working Group  
[www.sustainableaviation.org/](http://www.sustainableaviation.org/)
- DRAFT Sustainable Initiatives Index, ACI Sustainability Working Group, March 14, 2006  
[www.sustainableaviation.org/pdfs/ACI%20Index%20031506.pdf](http://www.sustainableaviation.org/pdfs/ACI%20Index%20031506.pdf)
- Airport Sustainability – A Holistic Approach to Effective Airport Management  
[www.sustainableaviation.org/pdfs/ACC%20-%20Sustainability%20White%20Paper.pdf](http://www.sustainableaviation.org/pdfs/ACC%20-%20Sustainability%20White%20Paper.pdf)
- Sustainable Initiatives – Index of Weblinks  
[www.sustainableaviation.org/Links.htm](http://www.sustainableaviation.org/Links.htm)
- [www.sustainableaviation.org/pdfs/ACI%20Weblinks%20031406.pdf](http://www.sustainableaviation.org/pdfs/ACI%20Weblinks%20031406.pdf)
- Going Greener: Minimizing Airport Environmental Impacts. Airports Council International-North America, Washington, D.C., 2009  
[www.aci-na.org/static/entransit/enviro\\_brochure.pdf](http://www.aci-na.org/static/entransit/enviro_brochure.pdf)

## AIRPORT PROGRAMS

### *Example Airports in the U.S.*

- Fort Lauderdale/Hollywood International Airport – Environmental Initiatives, Green Airport Initiative, and Environmental References  
[www.broward.org/airport/community\\_environment.htm](http://www.broward.org/airport/community_environment.htm)
- Naples Municipal Airport — Sustainability, Conservation and Social Responsibility Plan  
[www.flynapples.com/images/docs/general/final%20sustainability%20plan%205-14-09.pdf](http://www.flynapples.com/images/docs/general/final%20sustainability%20plan%205-14-09.pdf)
- St. Augustine-St. Johns County Airport - Sustainability Management Plan  
[www.staugustineairport.com/index.aspx](http://www.staugustineairport.com/index.aspx)
- MASSPORT - Sustainability Plan  
[www.mass.gov/envir/Sustainable/initiatives/PDF/mpa\\_finalplan\\_10\\_29\\_04.pdf](http://www.mass.gov/envir/Sustainable/initiatives/PDF/mpa_finalplan_10_29_04.pdf)
- MASSPORT – Logan International Airport LEED Registered Project: Terminal B Addition  
[www.usgbc.org/LEED/Project/project\\_detail\\_step\\_1.asp?PROJECT\\_ID=83](http://www.usgbc.org/LEED/Project/project_detail_step_1.asp?PROJECT_ID=83)
- City of Chicago - O'Hare Modernization Program Sustainable Design Manual  
[http://egov.cityofchicago.org/webportal/COCWebPortal/COC\\_EDITORIAL/December2003SustainableDesignManual.pdf](http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/December2003SustainableDesignManual.pdf)
- Port of Oakland Sustainability Program, 2003  
[www.portofoakland.com/pdf/sustaina.pdf](http://www.portofoakland.com/pdf/sustaina.pdf)
- Port of Oakland—Oakland International Airport: Green Airport Initiatives  
[www.oaklandairport.com/green\\_airport.shtml](http://www.oaklandairport.com/green_airport.shtml)

- Oregon Department of Transportation, *Sustainability Plan, Volume 1: Setting the Context*, September 2008  
[www.aci-na.org/static/entransit/oregon\\_Sustain\\_Plan\\_Volume1.pdf](http://www.aci-na.org/static/entransit/oregon_Sustain_Plan_Volume1.pdf)
- Portland International Airport- Recycling program  
[http://www.sustain.pdx.edu/hm\\_feature\\_pdx\\_compost.php](http://www.sustain.pdx.edu/hm_feature_pdx_compost.php)
- Sacramento County Airport System – Green Airport Initiative  
<http://www.epa.gov/ttn/airinnovations/2005conference/Wed4/5-GregRowe.pdf>
- Seattle Tacoma International Airport – Sustainability Initiatives  
[www.portseattle.org/](http://www.portseattle.org/)
- Seattle Terminal Radar Approach Control facility at Seattle-Tacoma International Airport - Gold LEED certification  
[www.djc.com/news/en/11159540.html](http://www.djc.com/news/en/11159540.html)
- Seattle Tacoma International Airport – Recycling Program  
[www.ecy.wa.gov/pubs/0107030.pdf](http://www.ecy.wa.gov/pubs/0107030.pdf)
- Fresno-Yosemite International Airport – Solar Installation  
[www.fresno.gov/DiscoverFresno/Airports/default.htm](http://www.fresno.gov/DiscoverFresno/Airports/default.htm)
- South Bend Regional Airport – List of current and planned sustainability initiatives  
[www.sbnair.com/](http://www.sbnair.com/)
- San Francisco International Airport – “Green SFO” Environmental webpage & Reports:  
[www.flysfo.com/web/page/about/green/index.html](http://www.flysfo.com/web/page/about/green/index.html)
- San Diego International Airport Environmental Initiatives & Sustainability Policy:  
[www.san.org/sdcraa/airport\\_initiatives/environmental/](http://www.san.org/sdcraa/airport_initiatives/environmental/)
- San Diego International Airport - Recycling Program:  
[www.san.org/sdcraa/airport\\_initiatives/environmental/recycling.aspx](http://www.san.org/sdcraa/airport_initiatives/environmental/recycling.aspx)

#### *Example International Airports*

- Athens International Airport, Greece  
[www.hochtief-airport.com/airport\\_en/23.jhtml](http://www.hochtief-airport.com/airport_en/23.jhtml)
- Amsterdam International Airport, Netherlands  
[www.greenroofs.com/chic\\_sustainability.htm](http://www.greenroofs.com/chic_sustainability.htm)
- Auckland International Airport, New Zealand  
[www.auckland-airport.co.nz/Annual2005/downloads/enviro\\_sustainability\\_ar05.pdf](http://www.auckland-airport.co.nz/Annual2005/downloads/enviro_sustainability_ar05.pdf)
- Bristol International Airport, United Kingdom (UK)  
[www.bristolairport.co.uk/upload/sustainability\\_appraisal.pdf](http://www.bristolairport.co.uk/upload/sustainability_appraisal.pdf)
- Dusseldorf International Airport, Germany  
[www.hochtief-airport.com/airport\\_en/24.jhtml](http://www.hochtief-airport.com/airport_en/24.jhtml)
- East Midlands Airport, UK Environmental Initiatives:  
[www.eastmidlandsairport.com/emaweb.nsf/Content/Environment](http://www.eastmidlandsairport.com/emaweb.nsf/Content/Environment)
- East Midlands Airport, UK Community Initiatives:  
[www.eastmidlandsairport.com/emaweb.nsf/Content/Community](http://www.eastmidlandsairport.com/emaweb.nsf/Content/Community)
- Hamburg Airport, Germany  
[www.hochtief-airport.com/airport\\_en/25.jhtml](http://www.hochtief-airport.com/airport_en/25.jhtml)
- Manchester Airport, UK  
[www.manairport.co.uk/web.nsf/Content/SustainabilityEnvironment](http://www.manairport.co.uk/web.nsf/Content/SustainabilityEnvironment)
- Munich Airport, Germany  
[www.munich-airport.de/media/download/general/publikationen/en/nachhalt-2008\\_en.pdf](http://www.munich-airport.de/media/download/general/publikationen/en/nachhalt-2008_en.pdf)
- Narita International Airport, Japan  
[www.naa.jp/en/environment/index.html](http://www.naa.jp/en/environment/index.html)

## 316 Guidebook of Practices for Improving Environmental Performance at Small Airports

- Sydney Airport, Australia  
[www.hochtief-airport.com/airport\\_en/26.jhtml](http://www.hochtief-airport.com/airport_en/26.jhtml)
- Tirana International Airport, Albania  
[www.hochtief-airport.com/airport\\_en/27.jhtml](http://www.hochtief-airport.com/airport_en/27.jhtml)
- Vancouver International Airport  
[www.yvr.ca/authority/airmail/archive\\_details.asp?id=161](http://www.yvr.ca/authority/airmail/archive_details.asp?id=161)

*Other Aviation and Non-Aviation Sustainability Resources*

- Waste Management:  
NRDC Report: *Trash Landings: How Airlines and Airports can clean up their Recycling Programs*  
[www.nrdc.org/cities/recycling/airline/contents.asp](http://www.nrdc.org/cities/recycling/airline/contents.asp)
- Climate Change / Greenhouse gases:  
*ACI Greenhouse Gas Emissions Guide:*  
[www.aci.aero/aci/aci/file/ACI\\_Priorities/Environment/2009/ACI%20Guidance%20Manual%20-%20Airport%20Greenhouse%20Gas%20Emissions%20Management.pdf](http://www.aci.aero/aci/aci/file/ACI_Priorities/Environment/2009/ACI%20Guidance%20Manual%20-%20Airport%20Greenhouse%20Gas%20Emissions%20Management.pdf)
- Pew Center on Global Climate Change – *Adaptation Planning: What U.S. States and Localities are doing*  
[www.pewclimate.org/docUploads/State-Adapation-Planning-02-11-08\\_0.pdf](http://www.pewclimate.org/docUploads/State-Adapation-Planning-02-11-08_0.pdf)
- Building Commissioning:  
Berkley University research on cost-benefits of building commissions (not airport specific): Evan Mills. 2009. "Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse-gas Emissions"  
<http://cx.lbl.gov/2009-assessment.html>
- U.S. Green Building Council Leadership in Energy Efficiency and Design  
[www.usgbc.org/DisplayPage.aspx?CategoryID=19](http://www.usgbc.org/DisplayPage.aspx?CategoryID=19)

## APPENDIX B-4

# Developing an Airport-wide Storm Water Pollution Prevention Program

## Problem Statement

While small airports have less air traffic than large airports, the structural and facility requirements of aviation result in vast impervious areas needed for runways, taxiways, and ramps. Not only does this result in large volumes of storm water runoff, but these small airports and their tenants also conduct industrial activities (e.g., maintenance, fueling, deicing, and construction of new facilities) that can adversely affect storm water quality.

## Summary of Key Issues

Discharges of sediments or other pollutants in storm water as a result of airport construction or industrial activities can lead to odor, foam, oily sheens, and other impairments to surface water quality, and airport infrastructure improvements that add impervious area may result in increased risk for flooding downstream if not mitigated. Water quality regulations are often developed on a state level and many state regulations mirror federal mandates contained within the Multi-sector General Permit for Industrial Activities and the General Permit for Construction Activities. Additionally, the EPA recently issued a Construction and Development Effluent Limitation Guideline (ELG) and a Proposed Airport Deicing ELG. Airports of all sizes have to deal with these regulatory programs (either federal or state equivalents) and many have taken steps to mitigate their potential impacts on storm water runoff quality.

In addition to the water quality compliance concerns related to airport activities, increases in the risk of downstream flooding and discharge of sediment and pollutants can lead to community complaints and media reports on environmental problems at the airport. These public relations issues can make it difficult to get local approval for airport development projects, increase regulatory involvement at the airport, and lead to political pressure to incorporate environmental stewardship practices. Alternatively, an airport-wide storm water pollution prevention program that includes a comprehensive training program; pollution prevention considerations in planning, maintenance, operations, development and construction; proactive consideration of environmental regulations; coordination with regulators; and airport involvement in community and watershed groups can foster relationships with the community and regulators, facilitate approval of airport projects, and generate positive media for the airport.

This case study will examine storm water best management practices (BMPs) implemented by small airports to eliminate, control, or reduce pollutants in storm water runoff. It will examine the methods used to overcome difficulties commonly faced by small airports including implementing initiatives with limited budget, facilitating tenant buy-in and conformance with BMPs, and maintaining BMPs with limited staff.

## Case Narrative—Naples International Airport

Located on the Bay of Naples in Florida, the Naples Municipal Airport (APF) is operated by the City of Naples Airport Authority (NAA) and is considered a non-hub airport by the 2009 FAA National Plan of Integrated Airport Systems with operations and characteristics listed in Table 6.

**Table 6. Naples Municipal Airport National Plan of Integrated Airport Systems Data.**

	APF	Annual Operations	Percent of Total Operations
<b>Itinerant</b>	<b>Air Carrier</b>	0	0%
	<b>Air Taxi</b>	6,793	6%
	<b>General Aviation</b>	72,134	65%
	<b>Military</b>	102	0%
<b>Local</b>	<b>Civil</b>	31,513	28%
	<b>Military</b>	52	0%
<b>Total Operations</b>		110,594	

SOURCE: FAA National Plan of Integrated Airport Systems, 2009-2013 (18).

### Initiative Driver

The Florida Department of Environmental Protection is developing Total Maximum Daily Loads (TMDLs) for impaired water bodies in Florida. The South Florida Water Management District is assisting the Florida Department of Environmental Protection with development of TMDLs in Southern Florida. South Florida Water Management District developed a Surface Water Improvement and Management Plan for the Naples Bay watershed in 2007 to address specific water quality and water quantity concerns in the watershed in advance of the TMDLs (18). The Storm Water Improvement and Management Plan includes strategies and action steps to protect the ecological, aesthetic, recreational, and economic value of Naples Bay through the implementation of four initiatives.

**Initiative 1—Water Quality** Development in the Naples Bay Watershed led to degradation of the water quality in the Bay. The South Florida Water Management District plans evaluate the use of a database to track water quality data, incorporate existing and future storm water quality data into GIS, and implement a water quality model. The water quality model will be used to quantify the effect of water quality on specific sensitive receptors. The results will be used to identify high water quality areas for conservation purposes, and recommend actions to solve problems and meet watershed goals.

**Initiative 2—Storm water Quantity** The large network of canals and development of the Naples Bay area led to excess freshwater flows that are affecting the salinity of the bay. South Florida Water Management District identified several action steps to help restore the natural timing and quantity of freshwater flow into Naples Bay. Action steps include developing a salinity model, and considering the use of aquifer storage and recovery wells, canal rerouting and storm water recycling to reduce discharge, increase recharge, and improve discharge flow timing. South Florida Water Management District is also considering a requirement for onsite retention of storm water.

**Initiative 3—Watershed Master Planning and Implementation** South Florida Water Management District plans to assist local governments with updating storm water master plans so that they include appropriate storm water retrofits, and recycling and recharge of storm water initiatives; and facilitate pursuit of federal funding for water quality improvement projects.

**Initiative 4—Habitat Assessment, Protection and Restoration** There have been losses to historic aquatic life and reduction in the beneficial use of the Naples Bay Watershed. South Florida Water Management District plans to develop a map of available habitat areas within the watershed; develop habitat protection strategies; facilitate habitat restoration, stabilization, and enhancement; and control exotic vegetation to protect and enhance existing habitat.



Runoff from APF discharges into the Naples Bay watershed. It is important for the airport improvements and operations to follow the strategies and action steps identified in the Naples Bay Storm Water Improvement and Management Plan where possible. Tenants at APF were planning to add additional infrastructure at the airport on their leaseholds. NAA realized that to participate in Storm Water Improvement and Management Plan Initiative 2, each tenant that was adding infrastructure would need to implement measures to add storm water retention to handle storm water from the additional impervious surfaces created as a result of the new facilities.

### **Implementation Strategy**

Instead of each tenant creating separate storm water retention facilities, APF decided to consolidate the storm water management efforts and implement airport-wide storm water retention facilities to accommodate the final build-out of the airport. Consolidating storm water management efforts provided the Airport with several benefits:

- Decisions about what measures would be used to manage storm water
- Implementation of a cohesive program instead of piecemeal measures on each leasehold
- Integration of new storm water management needs into the existing system
- Control over which sites were used for storm water retention

### **Initiative Outcome and Current Status**

In 2001 and 2002 APF conducted several projects to increase and improve the storm water discharges:

- Construction of four water retention lakes and interconnecting culvert systems
- Redesign of five existing lake outfalls
- Redesign of three drainage ditch outfalls

The lakes provided storm water retention and sedimentation, and the interconnecting culvert systems and drainage ditch outfall redesigns improved storm water detention and filtration. These projects improved the storm water flow from the airport. The airport hired an environmental consultant to survey potential development areas for wetlands, historic resources, exotic/invasive species, and threatened and endangered species prior to the design of the new facilities to identify any mitigation that would be needed to prepare the sites for development. The consultant also conducts annual reviews to identify exotic/invasive species for removal and to ensure that wetlands and uplands areas are maintained. Because of concerns about attracting birds to the new retention lakes, special design elements like steep banks were included in the lakes to prevent specific wading birds from entering the lakes. The water retention areas are also designed in a cascade system to facilitate removal of sediment.

Since 2001, the Airport has installed more new infrastructure to improve drainage on the airfield:

- Drainage culvert under Runway 23 to improve storm water drainage on the airfield
- Additional retention ponds adjacent to Runway 23 approach to control runoff and sediment
- System of drainage ditches and culverts to improve drainage and water detention along Taxilane E

After coordinating on airport-wide storm water management efforts, the Airport decided to coordinate management of other storm water quality initiatives. The airport constructed a consolidated rental car wash and fueling station. Prior to the consolidated facility, two of the rental car tenants had car washes, and waste water from the car washes was discharged to a leach field. The consolidated facility recycles used wash water in the car wash.

During the reconstruction of the ramp in front of the general aviation terminal, the airport added three oil water separators to the ramp to facilitate capture of oil and fuel spills on the ramp.

Fountains were installed in airport ponds to improve oxygen levels in the ponds reducing odors, and increasing the aesthetic value of the ponds. The airport uses water from the airport ponds for irrigation, saving potable water, and reducing runoff from the airport. The airport operations staff actually received calls from the community interested in installing similar fountains. By coordinating storm water quality initiatives, the airport and tenants:

- Encourage tenant involvement/participation
- Facilitate compliance with current and expected future environmental regulations
- Participate in the Naples Bay Storm Water Improvement and Management Plan by recycling storm water, improving infiltration, filtering runoff and retaining storm water
- Save money from consolidated operations
- Reduce storm water runoff to Naples Bay
- Control sediment and other pollutants in airport storm water runoff

In addition to infrastructure improvements, APF implemented several procedural and policy measures to decrease the risk of storm water pollution from spills and leaks, reduce erosion and sedimentation, and improve the quality of storm water leaving the airport. NAA has proprietary fueling rights, and the Airport does not have a fixed based operator. NAA allows tenants to conduct self-fueling, but helps to ensure that they provide the airport with satisfactory storm water pollution prevention plans (SWPPPs) and spill prevention control and countermeasure (SPCC) plans for their operations. The tenant lease agreements contain a clause that addresses storm water management, and the airport conducts annual training with the tenants. The airport conducts regular clearing of vegetation from airport ditches to facilitate flow of runoff, remove exotic/invasive species, and reduce wildlife attractants.

### **Perceived Benefits**

Airport staff attends weekly meetings to review regulatory news and attends the Florida Airports Council conferences to learn about upcoming regulations. When the Airport staff learned about proposed requirements to include secondary containment for fuel trucks, they included containment measures in the construction of their loading/unloading area. When constructing the ramp containment fuel loading/unloading area, they oversized the load/unload secondary containment area so that they could park their fuel trucks at that location when it was not in use. The area serves as secondary containment for airport fuel trucks. This proactive approach to incorporating compliance with anticipated future regulations in current infrastructure improvements saved the airport what may have been an expensive retrofit, or construction of a separate secondary containment parking facility for its fuel trucks. The airport also coated the secondary containment structures in the fuel farm with poly-urea to prevent leakage through cracks in the concrete should a spill occur in the secondary containment area. Area businesses heard about the coated secondary containment and visited the airport to find out more about this pollution prevention measure.

By implementing a cohesive storm water program the Airport experienced numerous benefits:

- Collective airport negotiation on storm water retention projects with FAA, EPA, Florida Department of Environmental Protection, and the Fish and Wildlife Service regarding conflicting requirements for wildlife and wildlife habitat at the airport, instead of separate negotiation by each tenant for storm water retention associated with each new development project.
- Upgrade of existing storm water retention areas to reduce wildlife attractants

- Cost savings from coordinated storm water retention efforts, which allowed the airport to make additional capital improvements to sidewalks and roadways
- Pond excavation material used to construct a berm that blocked view of and sound from the airfield from the road from that improves community relations
- Completion of a full revision of the Airport Environmental Resource Permit per Florida airport development requirements
- Achievement of full compliance with FAA required safety areas
- Increase in storm water capacity and improved flow from the airport reducing flooding potential
- Improved public relations from supporting the Naples Bay Storm Water Improvement and Management program
- Received 2003 Airports Council International – North America Environmental Achievement Award
- Avoidance of costly retrofits or construction of separate facilities by proactive consideration of potential future regulatory requirements

The airport director recognizes sustainability as an important initiative, and in 2009, NAA published a Sustainability, Conservation and Social Responsibility Plan. The plan identifies the many ways that APF is an environmental steward. The plan summarizes environmental projects, and provides an opportunity to brainstorm on new environmental projects. It also seeks input from staff and the community on new ideas. Unlike many other airports, APF is not regularly the subject of community complaints about storm water pollution, and is not a highlighted target for improvement in the Naples Bay Storm Water Improvement and Management Plan or a key issue in the development of the TMDLs. This absence of concern over storm water discharges from APF is a tribute to the success of the Airport's storm water pollution prevention program.

### **Obstacles Encountered**

Although the airport coordinated storm water retention efforts and consolidated tenant fueling and washing activities, they made a conscious decision to not consolidate National Pollutant Discharge Elimination System (NPDES) permit coverage. Initially the tenants were all included in the airport's permit coverage, and the airport was responsible for ensuring tenants complied with the airport NPDES permit requirements. The airport determined that their permit should not include tenant industrial activities that the airport does not control. The airport's NPDES permit now covers airport industrial activities, including the airport run fueling station and wash stations, and their general aviation ramp. Each tenant with industrial activities is required to apply for separate coverage under the Florida NPDES permit. Forcing tenants to obtain permits for their own activities ensures tenants are held accountable for their own storm water pollution prevention, without requiring the airport to incorporate additional training or inspections for tenants in its pollution prevention program.

NAA also experienced some difficulties in the redesign of some of its storm water retention ditches that were heavily vegetated. The vegetation was obstructing flow, and may have been attracting wildlife. The airport was concerned that some of the areas had become wetlands, or potential habitat for wildlife, including endangered or threatened species. The airport hired a consultant to conduct a wetland inventory and determine if the areas would be considered protected wildlife habitat for any threatened or endangered species. Once the airport had assessed the status of the ditches, they then had to handle conflicting federal regulations: FAA regarding wildlife attractants at airport, and EPA regarding the protection of wetlands and threatened and endangered species habitat. Initially the airport was unable to reach an agreement with one agency that would be acceptable to the other agency. To resolve conflicts between these agencies, the airport director held a meeting with all stakeholder agencies to reach a resolution on how to handle the ditches. In the end the airport and agencies agreed on a plan to clear the ditches in areas near runways and create wildlife habitat and wetlands in areas away from the airport runways.

### **Critical Success Factors**

Coordinating negotiation with FAA, EPA, Florida Department of Environmental Protection, and the Fish and Wildlife Service to resolve conflicting regulations regarding vegetation in the airport ditches allowed the airport to construct water retention and filtration lakes and ditches to improve drainage and storm water quality, remove exotic species to reduce wildlife attractants in ditches, and become compliant with FAA safety regulations.

By constructing the airport rental car wash and fueling facility, the airport generates revenue from car wash fees and fuel sales. The tenants are relieved of the burden of operating and maintaining car wash and fueling facilities. Water is conserved through recycling of the wash water, and waste water is no longer discharged to airport leach fields.

Monitoring of anticipated future regulations allows the airport to be proactive in incorporating future requirements into their designs to avoid costly retrofits, or construction of additional facilities.

### **Estimated Level of Effort**

The airport does not have dedicated environmental staff. Airport environmental projects, including development of the Sustainability, Conservation and Social Responsibility Plan are coordinated by the Airport Director, Director of Development, and Director of Operations as part of their responsibilities. Environmental assessments, including wetlands inventories, threatened and endangered species surveys, and exotic/invasive species surveys are conducted by environmental consultants.

### **Estimated Costs**

APF funds smaller storm water projects from airport operating revenue. Larger projects have been funded through FAA grants and other outside funding sources. The airport spent an estimated \$80,000 of airport operating revenue on the ditch clearing initiative. The new storm water retention ponds cost between 8 million dollars and 10 million dollars and were funded by FAA, Florida Department of Transportation, City of Naples and Collier County. Other initiatives generate revenue or save the airport money. The airport generates revenue from the sale of fuel and the car wash use fees. The pond water is used for irrigation, which allows the airport to avoid spending money on potable water for irrigation. By incorporating the secondary containment requirements for mobile refuelers into the design of the load/unload rack, the airport avoided the cost of constructing separate secondary containment measures.

## **Case Narrative—Columbus Regional Airport Authority**

The Columbus Regional Airport Authority (CRAA) operates three airports in central Ohio, Port Columbus International Airport (CMH), Bolton Field Airport (TZR) and Rickenbacker International Airport (LCK). CMH is a medium size hub by the 2009 FAA NPIAS, LCK has primarily military and cargo operations, and TZR is primarily general aviation. LCK and TZR benefit from the resources available through the airport authority including a dedicated energy and environment manager. LCK and TZR present different storm water pollution prevention challenges from CMH due to the general aviation operations at TZR, the sensitive watersheds where the airports are located, environmental contamination from historical military use at LCK, and the cargo and intermodal operations at LCK. This case study focuses on LCK and TZR.

## Initiative Driver

Originally developed in 1942 as the Lockbourne Air Base, LCK was used as a testing and training facility for the US military during World War II, the Korean War, and the Vietnam War. Since the closure of the Base in 1980, ownership of the airport and associated Base property has been transferred to CRAA, and the airport is used jointly for civil and military operations. Recently, CRAA partnered with a developer to determine an approach for redeveloping portions of the former Base property as a logistics center. CRAA realized that there were environmental liabilities in some areas on the former Base as a result of military operations. The Federal Government investigated and cleaned 327 sites at LCK, including investigation of sediments in the ditch system at the Airport; and CRAA knew that the developer would want to conduct all appropriate inquiry into the cleanup and current status of these sites prior to purchasing former Base land for Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) protection. As land owner, CRAA needed to facilitate cleanup of any remaining contaminated sites, and provide documentation on prior cleanup activities to the developer prior to property reuse. Because the land had been operated by several branches of the military and used for several purposes, identifying the potential environmental risks, status of all military cleanup activities, and determining an appropriate method for remediating sites without affecting the area's sensitive natural environmental resources, including wetlands and a watershed with a total maximum daily load (TMDL) program required significant coordination.

## Implementation Strategy

CRAA divided the property into campuses, and identified the environmental features on each campus. Environmental features included anything that might affect the site's development, including natural features like wetlands and threatened and endangered species; and manmade environmental liabilities like unexploded ordnance, and contamination from former military fueling operations. CRAA developed a database and map of environmental sites at LCK. The database included a description of each site, the party responsible for the cleanup, if necessary, and the current status of the site. This information was very helpful when the developer's consultant came to CRAA with questions from their all appropriate inquiry process about the status of sites.

Air Force investigation of the ditch system at LCK determined that although contaminated sediments were present in the ditches, concentrations were low enough that remedial action was not required to clean up the ditches. Special procedures were implemented to avoid re-entrainment of ditch sediment during construction. CRAA also developed guidance for contractors on identifying environmental contamination during construction, and the necessary steps for handling contaminated soils, sediment, storm water, and groundwater should construction activities uncover previously unidentified environmental issues. The guidance was designed to prevent personnel exposure to unknown contamination, and to prevent spread of polluted soils or groundwater to un-contaminated soils, groundwater or surface waters.

CRAA also conducted a natural resources inventory to identify any protected natural resources that needed to be considered during development of the land. Wetlands were present in some of the areas identified for development, and CRAA identified a site near LCK that contained wetlands that the State of Ohio was interested in restoring. CRAA worked with the State of Ohio to develop the Mackey Ford wetland mitigation site, which includes 20 acres of wetlands. The site, which includes wetlands plants transplanted from LCK, was constructed and will be maintained by CRAA for the first five years and is ultimately owned and managed by the State of Ohio. This project was a win for the airport in that it allowed development of land at LCK and removed wetlands from within FAA safety area; and a win for the State of Ohio as CRAA conducted the restoration of the Mackey Ford wetland. Because the wetland is nearby the airport, it provides flood protection, water quality improvements and water quantity management for the same watershed that the original airport wetlands served.

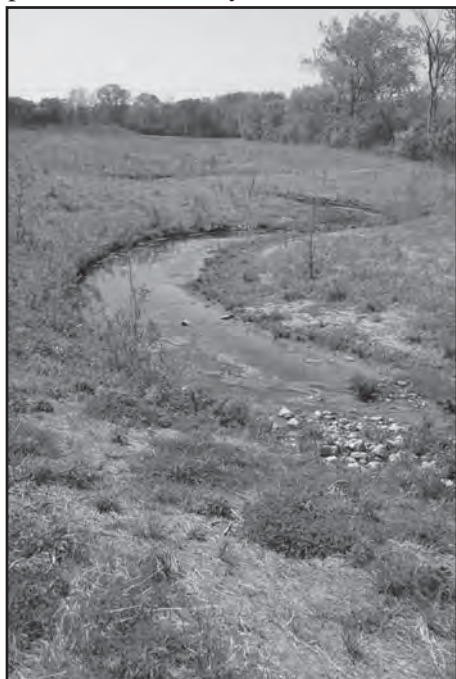


### Initiative Outcome and Current Status

In addition to coordinating management of environmental features during the development of the Base property, with approval from the Ohio Department of Transportation, the airport was able to include several water quality features in the design of Rickenbacker Parkway. The roadway includes pervious curbs upstream of inlets that allow sediment in runoff to be filtered through pervious areas before it reaches the storm water inlets. Vortex-type sedimentation units were installed in inlets to remove additional sediment from runoff. Construction of Rickenbacker Parkway involved relocation of a portion of a jurisdictional stream. The portion of the stream that was relocated was



**Figure 8. Rickenbacker Parkway ditch system. (23).**



**Figure 9. Oversized ditches near Rickenbacker Airport. (23)**

part of the ditch system identified as having contaminated sediments. CRAA coordinated removal and disposal of the sediments prior to stream relocation. The relocated stream is designed with a natural flow pattern, and CRAA conducts annual monitoring to ensure the new segment meets EPA required wetland and stream mitigation standards for vegetation. Figure 8 illustrates a portion of the ditch system. The U.S. Army Corps of Engineers (USACE) will also be removing an interceptor in the stream and reshaping it to a more natural meandering channel as the project continues.

Farmland on the airport was developed for warehouses, and because of water quality concerns in the Walnut Creek Watershed, Ohio Environmental Protection Agency was concerned about the addition of new impervious areas. One of the warehouses was built with oversized ditches and detention ponds to accommodate additional storm water infiltration and treatment, illustrated in Figure 9. In addition to the storm water quality and flow rate reduction benefits, the oversized ditches and detention ponds were actually the least expensive design choice. Dry detention basins were also incorporated in the new airport parking lot, for required detention for the parking lot.

In addition to new infrastructure projects, CRAA implemented several policy and procedural initiatives as part of their storm water programs at LCK and TZR. CRAA has a comprehensive construction storm water guidance document which is provided to contractors as part of the construction documents made available for each project. This document provides guidance on best management practices for reducing storm water quality impacts from construction activities. CRAA maintains copies of tenant SPCC plans for tenants that have fuel storage that require an SPCC plan.

Training is coordinated with annual operations staff meetings, and staff members from all shifts are included in the same meeting. This facilitates communication between staff on environmental and other airport operations issues. Because of the low staff turnover at LCK and TZR, environmental training is



typically about an hour, and includes review of spills from the previous year, and any new issues. Annual pollution prevention team training and deicing winter time training is conducted at the tenant snow removal meeting. Training includes a review of the airport features and runoff, and the procedures for reporting spills. CRAA provides a compact disk of the PowerPoint presentation from the pollution prevention training to the tenants when they send annual site compliance inspection letters. The tenants often use the compact disk as part of their own training programs.

CRAA is working on an integrated training agenda to organize airport and airport authority-wide training. Under this new program, the Manager of Energy and Environment is responsible for identifying storm water training opportunities and staff that should receive training and attend seminars, EPA classes, environmental events, and expos. The new training program also includes an on-line calendar to coordinate scheduling.

### **Perceived Benefits**

Creating an inventory of natural environmental features and environmental liabilities protected these environmental features during development and helped ensure safety of employees and the environment during work around environmental liabilities. The database also facilitated transfer of this property to the developer, saving CRAA money in negotiations about environmental issues. Coordinating training events with operations meetings and involving staff members that do not normally communicate facilitates cross communication of issues and efficient use of training budget.

In addition to benefits from a coordinated program on development projects and coordinated training, the airport also benefits from coordination with the City of Columbus on storm water utility fees for TZR. The City of Columbus offers an off-set to the fee if the airport maintains its own ditches and storm water infrastructure. CRAA maintains the ditches at all three of its airports, and the ditch maintenance program, which includes regular mowing and vegetation management, provides several benefits:

- Control over access to airport ditches located within secure areas
- Control over the appearance of the ditches
- Regular removal of beaver dams to reduce ponding and standing water that impedes flow, promotes erosion, and attracts wildlife
- Reduced fees for TZR and CMH
- Additional credit for oversized detention facility at TZR

Public use areas are exempt from the City of Columbus storm water utility fee, and CRAA worked with the City of Columbus to exclude TZR's runways and taxiways from the fee. The City of Columbus bills CRAA based on the City of Columbus geographic information system maps, so CRAA meets with the City of Columbus GIS staff when updates are made to the base maps to ensure they have the most up to date airport maps.

### **Obstacles Encountered**

CRAA conducts annual storm water pollution prevention inspections of the tenant operations as part of the requirements of their NPDES permit. Unlike at APF, where the airport and tenants maintain separate permit coverage, CRAA's individual NPDES permit at LCK, and the general NPDES permit coverage at TZR include tenant operations. This occurs because the Ohio Environmental Protection Agency would not accept individual tenant coverage. Because tenants are covered under the airport's permit, the airport is responsible for ensuring the tenants comply with the requirements in the permit, including complying with best management practices identified in the airport storm water pollution prevention plans. The Manager of Energy and Environment conducts annual site compliance inspections at tenant

facilities as part of the requirements of the airports NPDES permits. CRAA then sends compliance inspection letters to the tenants. These letters include a checklist from the inspection and identify any issues noted and measures required to address issues. The airport finds that it is a challenge to enforce corrective action on a large number of tenants with varying levels of environmental awareness.

CRAA has taken several steps to protect the airport authority from tenant environmental liabilities. CRAA made an effort to include environmental language in tenant leases, and newer leases include clauses for restoration of the property, including potentially conducting sampling and remediating any environmental contamination caused by the tenant. Lease language is often specific to the tenant's operations, including fueling, maintenance, deicing, or other operations where there is an environmental risk. Although some airport leases are much older, and do not contain the same environmental language, all tenants are subject to the CRAA rules and regulations. There is a section on deicing, environmental, health, and pollution in the rules and regulations which includes several pollution prevention measures:

- Requirements for proper disposal of trash and construction debris to avoid spills and leaks
- Restrictions on using fill and discarding waste on airport property
- Prohibition of fuels, grease, oil, dopes, paints, solvents, acid, flammable liquids or other contaminants or pollutants in the airport sanitary system, storm system, open water, or soil
- Procedures for reporting a spill to CRAA and to the Ohio Environmental Protection Agency
- Designation of spill cleanup responsibility and expenses to the responsible party
- Requirements to conduct deicing in CRAA-approved areas
- Response and reporting procedures for deicing material spills
- Enforcement and penalties for violations

When airport tenants violate environmental rules and regulations, or when issues are repeatedly identified in annual site inspections, tenants are issued a letter including their lease and the airport rules and regulations reminding them that compliance is required. The rules and regulations also provide for monetary penalties and for termination of the lease agreement should the airport find significant issues.

### **Critical Success Factors**

CRAA benefits from coordination with watershed groups for Walnut Creek. Watershed groups have the ability to influence the community's or the regulator's perspective of the airport. CRAA finds it beneficial to coordinate with watershed groups to understand the watershed action plan, and keeps the group informed about the airport development plans. Although local watershed groups are typically less sensitive to the cost of environmental mitigation measures, by working with watershed groups, low cost solutions may be developed that meet the airport's needs and satisfy the watershed group's concerns. Positive team work efforts with watershed groups can have a positive impact on how the community and regulators view the airport's environmental initiatives.

### **Estimated Level of Effort**

CRAA used to regularly hire consultants to conduct storm water training, construction site inspections, and storm water pollution prevention inspections. Under the direction of their new Vice President for Planning and Construction Administration, the airport authority is working to get internal staff more involved in airport engineering and environmental projects. By developing a more rounded internal staff, CRAA project managers will conduct construction site inspections, and CRAA environmental staff will conduct storm water pollution prevention inspections and training. Use of internal staff members instead of consultants to conduct inspections forces airport staff members to engage tenants in identification of storm water pollution risks more often. Conducting environmental

work in-house saves CRAA money, as inspections can be conducted as part of routine site visits, and annual storm water pollution prevention training requires only a few hours from the environmental staff.

### **Estimated Costs**

The largest annual cost for CRAA is the cost of sampling for compliance with their NPDES permits. The airport spends \$15,000 annually for a consultant to conduct sampling at LCK and TZR. The airport spends a few thousand dollars every five years to update their SPCC plans. Other ongoing storm water pollution prevention programs are conducted in house by CRAA's Environmental, Safety and Health supervisor.

The wetlands project was a significant capital cost to CRAA at LCK. CRAA agreed to pay the State of Ohio \$112,000 to develop 22.33 acres of wetlands in the Mackey Ford wetland mitigation site just west of the airport. CRAA constructed and will manage the wetlands for the first five years, and the State will take ownership and management of the wetlands after the initial five-year period. CRAA paid a contractor and consultant around \$111,000 to build the wetlands, and is spending \$75,000 to \$100,000 to manage the wetlands during the initial five-year period.

## **Findings and Key Considerations**

### **Planning**

Both CRAA and NAA realized significant benefits from careful and coordinated planning of environmental programs. By incorporating environmental requirements into leases and airport rules, tenants are required to participate in storm water pollution prevention. Coordinating with local watershed groups informs the airport about the watershed plans, and informs the watershed group and the community about the airport's development plans and environmental mitigation measures. Keeping abreast of anticipated future regulations allows airports to consider incorporating requirements of those regulations during current construction projects to avoid costly retrofits or construction of separate facilities.

### **Implementation**

By coordinating with tenants on projects, airports can facilitate negotiations with regulators regarding conflicting regulations as one entity for consolidated storm water mitigation measures. Coordinating airport-wide solutions also saves the airport and tenants money, and allows the airport to exercise more control over how tenants manage storm water discharges. Coordination with local communities to implement storm water projects community wide help develop solutions that benefit both the airport and the community, and provide for a means for implementing wetlands and ponds outside FAA's safety areas. Investment in storm water quality infrastructure in new facilities has a positive impact on the community's and regulator's perception of the airport.

### **Ongoing Maintenance**

Development of airport staff to identify environmental concerns reduces the airport's reliance on outside environmental consultants, and facilitates early identification of concerns before spills or leaks can reach receiving waters. An integrated training program that involves employees that do not normally communicate facilitates knowledge sharing, and is a more efficient use of training budget. Maintaining a database and map of environmental features, including natural features and known liabilities facilitates transfer or lease of property, protects natural features during development, and manages environmental liabilities.

## Additional Resources

- Naples Municipal Airport  
[www.flynaples.com](http://www.flynaples.com)
- Naples Municipal Airport Sustainability, Conservation, and Social Responsibility Plan  
[www.flynaples.com/images/docs/general/final%20sustainability%20plan%205-14-09.pdf](http://www.flynaples.com/images/docs/general/final%20sustainability%20plan%205-14-09.pdf)
- International Storm Water BMP Database  
[www.bmpdatabase.org](http://www.bmpdatabase.org)
- Columbus Regional Airport Authority  
<http://columbusairports.com/>
- Columbus Regional Airport Authority Rules and Regulations for doing business with the airport, including environmental rules  
<http://columbusairports.com/business/CRAA-Rules.pdf>
- Columbus Regional Airport Authority Storm Water Management for Construction Activities Guidance Manual  
<http://columbusairports.com/construction/Storm%20Water%20Management%20for%20Construction%20Manual.pdf>
- Columbus Regional Airport Authority Capital Program Sustainable Design Guidance Manual  
[www.columbusairports.com/construction/CRAA-Capital-Program-Guidance-Manual.pdf](http://www.columbusairports.com/construction/CRAA-Capital-Program-Guidance-Manual.pdf)

## APPENDIX B-5

# Implementing Renewable Energy Systems at Small Airports

In recent years, many airports of all sizes have experienced a decrease in commercial aviation demand. With rising fuel costs, even general aviation facilities and other smaller airports have scaled back operations and incurred additional costs to operate. The EPA has recently and aggressively re-evaluated and strengthened existing air quality regulations for many pollutants commonly emitted at airports. Further, aviation has been implicated as a significant contributor to the global levels of greenhouse gases (GHG), and many airport sources of GHG could potentially face regulation in the future. Taken together, all of these factors present an immediate pressure on airport owners and operators to reduce operations and maintenance costs associated with the purchase and use of fuel and energy, whether via mobile sources such as aircraft and ground support equipment (GSE), or via stationary sources such as power generators and heating-ventilation-air conditioning (HVAC) equipment operating in public use areas.

Many agencies, including FAA, strongly advocate the installation of renewable energy systems at airports as a means of achieving operational cost reductions and scaling back airport fuel and power demand. The goal of this Case Study is to provide some insight into the requisite steps an airport would take to implement a renewable energy system, including planning, implementation, operations and maintenance considerations, and staff demands. The return on investment (ROI), or simple payback, of these systems can vary considerably, highlighting the need for a careful assessment of available resources and other considerations throughout the decision-making process.

This case study will focus on the installation of photovoltaics (PV), or solar energy systems, at small hub commercial service airports such as Tallahassee Regional Airport (TLH) and Santa Barbara Municipal Airport (SBA), to provide details on available options and methods, and to demonstrate what can be expected throughout the process.

## Case Narrative—Tallahassee Regional Airport (TLH)

### Initiative Driver

Due to persistent main terminal roof leaks and water intrusion problems, TLH staff initiated a Terminal Rehabilitation Project approximately 10 years ago. A component of this project involved repairing a 22-year old section of the roof that was lined with cracked and breaking concrete tiles. About eight years into the planning process, TLH had the idea to include PV into the new roof structure, furthering an initiative in place by the City of Tallahassee local government to develop renewable energy programs in the community. It was evident to planners and staff that such a measure may fit within the budget of the Terminal Rehabilitation Project as well as improve the community's opinion of the airport.

## Implementation Strategy

For the Terminal Rehabilitation Project as a whole, airport officials note that they had to apply for standard building permits. Since TLH announced that it planned to incorporate PV panels into the new terminal roof, they have been approached by many third party vendors and engineers offering to install an extensive solar panel array at the airport. The airport has declined this approach because they would have to somehow garner funds to cover the costs of installing and maintaining the larger array, as well as brokering the energy produced with the local power authority.

Instead, TLH has opted for a more cost-effective approach that fits into the budget of the Terminal Rehabilitation Project (see Figure 10). They currently plan to purchase and install amorphous silicon thin-film PV laminates to the new roof section, once constructed. The new section is located on the back side of the public area, above the baggage claim. Approximately 10% of the total roof surface area is planned to be covered with the PV laminates.



**Figure 10. Tallahassee Regional Airport terminal and airfield. (Source: Tallahassee Regional Airport, 2010) (24).**

The airport investigated a range of size/capacity laminates: 25 kiloWatt (kW), 50 kW and 75 kW. Notably, because some components of the project have already exceeded budget, the airport has elected to purchase the 25 kw option, and plans to re-evaluate purchasing a higher capacity system later in the process. In addition, the airport has determined that other portions of the terminal buildings are compatible with the technology, and is not averse to expanding the PV array to these sections in the future, given sufficient budget. Engineers have recommended to the airport that a PV array would work more efficiently if the roof were slanted to a greater degree, but doing this is also currently out-of-budget. Nonetheless, the PV laminates generate energy that is immediately available to the facility, and never enters the area power grid, which would potentially incur surcharges, taxes or other fees assessed by the local power authority.

Importantly, TLH had to secure an electrical permit to tie the PV laminates into the terminal's current electrical configuration. However, the airport is quick to note that this process incurs very minimal additional costs, and does not involve much more than drilling holes and running wires through the new roof structure to connect the systems. Moreover, maintenance of the systems would only involve periodic wiring inspections and keeping the array clean of dust, soot and debris.

Once completed and installed, TLH plans to showcase the benefits of the technology to airport patrons and staff by installing a liquid crystal display monitor in the terminal area that delivers real-time statistics on the PV system's performance and generated energy. TLH hopes that this measure will further improve public relations with the airport and garner additional support for the City's renewable energy initiatives.

## Initiative Outcome and Current Status

TLH believes the PV array will be up and running upon completion of the terminal roof construction. Bids to construct were opened in early March 2010, with the desired construction start date on or around



July 1, 2010. If the desired schedule is maintained, construction could be completed as early as spring, 2011.

### **Perceived Benefits**

In October 2009, TLH stated that the planned PV array could potentially supply up to 30% of the terminal's energy consumption. Again, the airport also believes that a marked improvement in public relations is attainable through showing voluntary participation with the City's renewable energy initiatives.

TLH staff admits that they have not yet fully investigated project eligibility within the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) program, which provides guidance and evaluation of renewable energy and other sustainable design features. However, because the LEED program evaluates sustainable building design using more categories than energy efficiency, and because the airport's target is small compared to other LEED projects, the airport finds it unlikely that the project is eligible for LEED certification or ratings.

### **Obstacles Encountered/Critical Success Factors**

As of this writing, the only obstacles identified throughout the implementation process pertain to the cost of purchasing and installing the technology, and the fact that the airport's return on investment significantly depends on the level of grant funding secured. This issue is further discussed in the "Estimated Costs" section below. TLH is quick to acknowledge that funding is the most critical success factor to implementation.

### **Estimated Level of Effort**

TLH currently has no full-time environmental support staff. The airport's Capital Program Administrator also serves as Environmental Manager, performing the associated job tasks part-time. Job tasks include environmental compliance and planning. As such, the staff has strongly depended upon the aid of engineers and consultants to guide the airport through the planning, design, and construction process. The Capital Program Administrator also highly recommends consulting with an electrical engineer often when developing a solar energy system.

### **Estimated Costs**

The Terminal Rehabilitation Project is expected to cost around 4 million dollars to implement. Purchase and installation costs for the PV array range from approximately \$125,000 for the 25 kW option to between \$350,000 and \$400,000 for the 75 kW option. Accordingly, acquiring funds to cover these costs is essential to the project's success. According to TLH staff, much of the Terminal Rehabilitation Project has been funded by Passenger Facility Charges levied by the airport upon its patrons and other users. In addition, TLH has initiated the grant application process for FAA's Airport Improvement Program (AIP) grant, which can provide necessary federal funds "for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (FAA, 2010).

The airport has stated that it received some grant funding through the Florida Department of Transportation for the Terminal Rehabilitation Project, which included a five-year application and approval process. Notably, however, this funding was awarded to the project as a whole and not necessarily on the merits of its solar energy component.

A significant factor in implementing a renewable energy system is the simple payoff associated with the action, also referred to as the ROI. The expected ROI for the action, given a few assumptions and alternatives, is summarized in Table 7 below. As shown, the ROI expected for this project greatly improves if the airport can secure funds through the Energy Efficiency and Conservation Block (EECB) Grant.

**Table 7. Expected return on investment for the Photovoltaic laminates.**

Energy Capacity (in kW)	Annual Savings	Electricity Rate (\$/kWh)	ROI Payback Horizon (years)	
			With Energy Efficiency and Conservation Block Grant	Without Energy Efficiency and Conservation Block Grant
25	\$3,200	\$0.11	8.6	40
50	\$6,500		19.1	34
75	\$9,700		23.8	34

SOURCE: RS&H for Tallahassee Regional Airport, 2010 (25).

The Energy Efficiency and Conservation Block Grant has been established by the Florida Energy and Climate Commission, made possible by a portion of American Recovery and Reinvestment Act of 2009 funds allocated to the State of Florida for renewable energy projects and other sustainable activities. Total funds secured by the State through this program total over 30 million dollars, however many of these funds have already been allocated or assigned. TLH is currently developing an application to receive some of the Energy Efficiency and Conservation Block funding reserved for smaller scale renewable energy projects.

## Case Narrative—Santa Barbara Municipal Airport (SBA)

### Initiative Driver

As part of their new main terminal construction, SBA wanted to include a rental car storage and quick turnaround facility, where rental cars would be taken to be serviced, cleaned, fueled, and returned to the rental area. However, there was insufficient space in the existing main terminal area to accommodate the new planned facility. Throughout the planning process, SBA decided to construct the facility in a separate area. The quick turnaround facility is not planned to be a public use area because all car rental counters and associated areas that patrons would frequent shall remain connected to the main terminal area. Because the facility was to be newly constructed, and because the City Council of Santa Barbara wished to attain LEED Silver ratings on all newly constructed buildings, SBA staff decided to incorporate an extensive array of sustainable design features into the quick turnaround facility, including on-site renewable energy generated via a PV array (see Figure 11).



**Figure 11. Photovoltaic array at Consolidated Rental Car Facility at Santa Barbara Municipal Airport (Source: Lynn Houston, Santa Barbara Municipal Airport, 2010) (26).**

## Implementation Strategy

Overall, the building is approximately 10,000 square feet in size, with a 4,500 square foot fuel island canopy and a 12,000 gallon aboveground fuel storage facility. There is sufficient space to store around 300 rental cars.

The PV array installed at SBA comprises 816 total panels, with 520 mounted onto the roof and 296 onto a self standing canopy covering the car storage lot, with each panel measuring 53'' x 35'' x 2''. SBA chose the Sanyo brand HIT Double bifacial solar panels capable of capturing energy on both the top and bottom face, each with a rated power of 195 watt. Because the panels generate power as direct current, SBA also had to purchase two Solectria brand power inverters (PVI 95 kW) to convert the energy to alternating current, a form that can be readily used by the building infrastructure.

SBA officials have conveyed that the process was relatively straightforward and unremarkable compared to other construction projects they've conducted. Because they began the project planning with sustainability in mind, SBA involved LEED experts and support staff very early in the process.

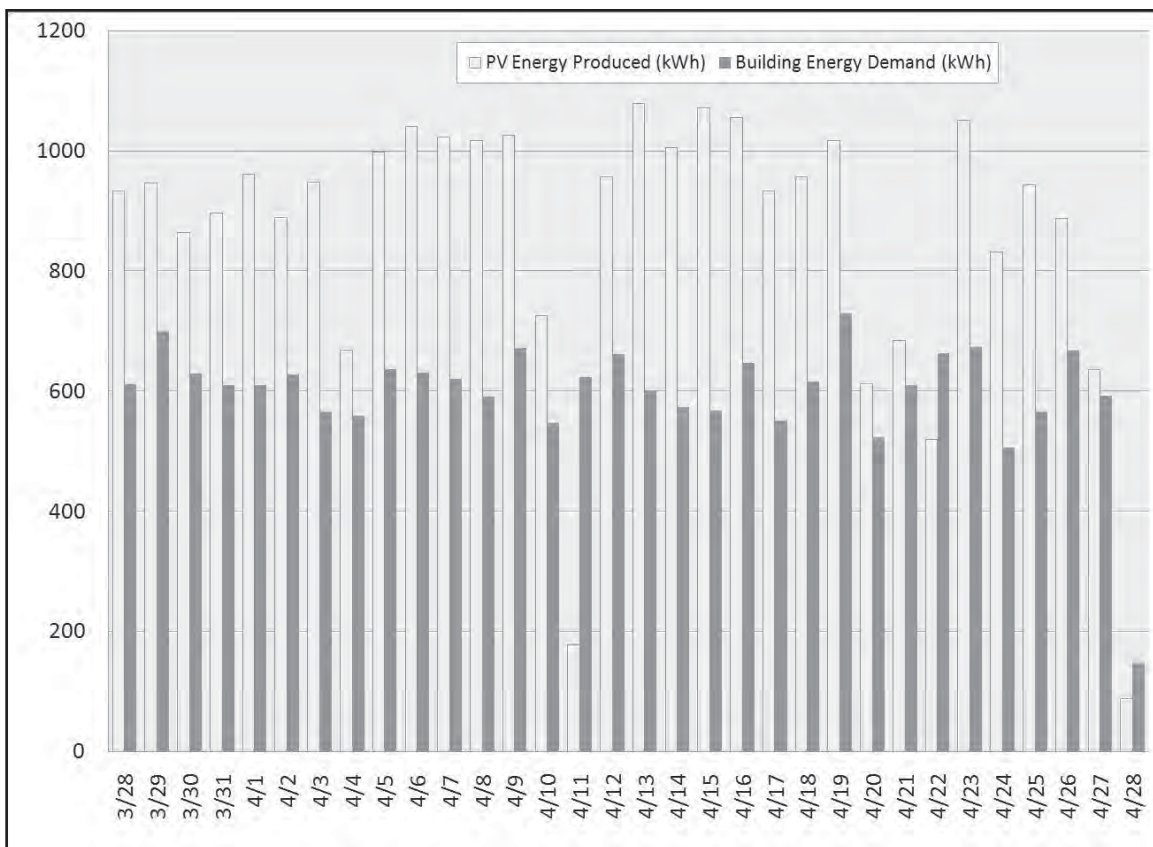
## Initiative Outcome and Current Status

The selection process for engineers, consultants, and other contractors began in 2006. Construction of the facility began in 2008 and was finished in November 2009. The PV array is fully operational and has begun generating power and revenue for the airport.

Importantly, even though SBA designed the building with the hopes of attaining the LEED Silver rating (between 33 and 38 points out of a possible total score of 69), the project received an improved rating of LEED Gold (between 39 and 51 points). Of note, the "Energy and Atmosphere" scoring category, under which on-site renewable energy components are evaluated, constitutes up to 17 points of the total score.

## Benefits

In sum, the panels constitute a 159,120 watt alternating current system with an expected output of approximately 200,315 kWh per year. Notably, the building is forecast to consume about 208,425 kWh of electricity per year. SBA officials have established a website that displays real time monitoring of the energy produced by the PV array, the energy used at the facility, and the quantity of GHG saved by using solar power. Figure 12 compares the output of the PV system versus the power demand of the building, in kWh, for the period of March 28<sup>th</sup> to April 28<sup>th</sup> 2010. As shown, on most days the energy produced by the PV array meets a large percentage of the building's power demand, and sometimes generates surplus power. During this time interval, the PV energy produced accounts for between 42 and 303% of the building's daily power demand, with an average of 116%.



**Figure 12. Solar power output at Santa Barbara Municipal Airport, 3/28/2010 – 4/28/2010 (Source: Fat Spaniel Monitoring Site, Santa Barbara Municipal Airport, 2010) (27).**

**Obstacles Encountered/Critical Success Factors**

SBA officials identified two main factors deemed critical to the successful implementation of the quick turnaround facility. First, it was important to secure input from the rental car agencies servicing SBA early in the planning process, to properly gauge their needs and demands for the quick turnaround facility, and account for them in the design process. Secondly, SBA officials stated that involvement of the LEED design team from the start of the design and implementation phase had a large bearing on the project’s LEED Gold rating.

**Estimated Level of Effort**

Notably, SBA staff remarked that the level of effort required to produce the sustainably designed QTA was no greater than that of other improvements in place or planned at the airport. In terms of environmental support and sustainable design staff, SBA currently staffs two full-time planners, one full-time environmental compliance manager, and one full-time design engineer that assists the compliance manager as needed.

**Estimated Costs**

From an operational standpoint, SBA officials are still finalizing cost estimates. In terms of design and construction costs, the bulk of the airport’s expenditures were allocated to the construction of the facility. Specifically, \$773,000 was allocated to the facility’s design, \$6,697,000 to construction, and \$881,000 to construction support, for a grand total of \$8,351,000. Notably, the PV array comprised \$1,100,000 of the \$8,352,000 design and construction costs.

SBA states that they neither applied for nor received any grants or other funding assistance to implement the project. The implementation and construction costs of the quick turnaround facility were completely absorbed by the Consolidated Rental Car Facility Customer Facility Charge program in place at the airport. Simply put, the Consolidated Rental Car Facility Customer Facility Charge program assessed a \$10 surcharge on every rental contract executed at the airport to support the planned infrastructure improvements.

It is expected that the PV array will yield an approximate ROI of 19 years, based on a conservative 4% annual increase in power rates and an assumed 1% degradation in the output capacity of the PV panels per year. However, the PV array is grid-tied and net metered by the local power authority (Southern California Edison), and any excess PV power generated at the facility is eligible for credit by Southern California Edison. Consequently, the ROI payoff may occur sooner than 19 years. In addition, it is expected that the project will receive reimbursement from the California Solar Initiative in the form of a performance based rebate. Specifically, the project is slated to receive a rebate of \$0.32/kWh generated for the first five years of its operation. Because the expected output is approximately 200,315 kWh per year, as much as \$320,504 ( $200,315 \text{ kWh/year} * 5 \text{ years} * \$0.32/\text{kWh}$ ) can be recovered through the rebate program, which can also lower the expected 19-year ROI considerably.

## Findings and Key Considerations

### Planning

Based on TLH's experience, construction planning can take as long as 10 years, and acquisition of funds can take up to five years. Because SBA's project required no outside funding, and because the PV array was occurring in a newly constructed area rather than being tied into existing infrastructure, the process took considerably less time.

Either way, starting such components of the planning process as early as possible is highly recommended to ensure a successful renewable energy venture. With a limited staff, small airports might not have the resources available to assign these tasks to environmental support or planning staff, and accordingly contracting with outside consultants and engineers to assist in the process is also very important. The utility of this approach is echoed in the experience of both airports, albeit SBA had a larger available budget and slightly greater staff resources to work with. Overall, the fact that both airports involved consultants and sustainable design engineers early in the process, and were able to fund the project using airport revenue, factored largely into their project's relatively quick and successful realization.

From a planning standpoint, making a renewable energy project cost-beneficial hinges directly upon the level of funding the airport can secure, whether through its own budget (SBA) or through a combination of its own budget and available state and federal grants (TLH).

### Implementation

The case studies presented herein have provided valuable insight into implementation strategies. TLH's venture was in part successful because they were able to integrate the renewable energy project into a larger, necessary infrastructure improvement, making them eligible for additional funding through grant programs. The airport was also prudent in selecting an alternative that provided them with some energy savings within the constraints of the available budget.

Overall, the directed-revenue approach realized by SBA using their Consolidated Rental Car Facility Customer Facility Charge program, and by TLH using passenger facility charges, provided budgetary



latitude that facilitated implementing the PV projects. Moreover, TLH's experience has demonstrated that careful planning and implementation can allow for the project to be expanded in the event that additional funding is secured.

### Ongoing Maintenance

In the case of the TLH PV array, ongoing maintenance is expected to be minimal. Because the SBA project utilizes a more traditional, roof-mounted PV array, the associated maintenance costs could potentially be greater. Generally speaking, airports wishing to engage in similar activity should be conservative in allocating funds to maintenance and upkeep when conducting their cost-benefit analysis.

### Additional Resources

- More information on FAA AIP Program  
<http://www.faa.gov/airports/aip/>
- More information on the City of Tallahassee Solar Energy Projects  
<http://www.talgov.com/you/electric/solar.cfm>
- More information on State and Federal Energy Efficiency and Conservation Block Grants  
[http://myfloridaclimate.com/climate\\_quick\\_links/florida\\_energy\\_climate\\_commission/arra\\_funding\\_and\\_opportunities](http://myfloridaclimate.com/climate_quick_links/florida_energy_climate_commission/arra_funding_and_opportunities)  
<http://www.eecbg.energy.gov/>
- More information on the LEED Program  
<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>
- More information on TLH  
<http://www.talgov.com/airport/>
- More information on PV Technology  
<http://www.solarpanelinfo.com/>  
<http://us.sanyo.com/HIT-Power-Double/HIT-Double-Bifacial-Photovoltaic-Module>  
[http://us.sanyo.com/dynamic/product/Downloads/solarPower\\_HIT\\_Double\\_195\\_Data\\_Sheet-13054720.pdf](http://us.sanyo.com/dynamic/product/Downloads/solarPower_HIT_Double_195_Data_Sheet-13054720.pdf)  
[http://www.solren.com/PVI\\_60KW\\_PVI82KW\\_PVI95KW.pdf](http://www.solren.com/PVI_60KW_PVI82KW_PVI95KW.pdf)
- More information on SBA's PV Monitor  
<http://siteapp.fatspaniel.net/siteapp/simpleView.jsf?eid=329264>
- More information on the California Solar Initiative Rebate Program  
<http://www.gosolarcalifornia.org/csi/apply.html>
- More information on SBA  
<http://www.flysba.com/>



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# Glossary of Terms

## A

**Abatement**—Any measure or set of measures designed to permanently eliminate lead-based paint or other hazards.

**Action**—Defined by the CEQ as new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies, or procedures; and legislative proposals.

**All Appropriate Inquiries**—Must be conducted within one year prior to the date of acquisition of the subject property and include an inquiry by an environmental professional, collection of information pursuant to 40 CFR 312.22, and searches for recorded environmental cleanup liens.

**Applicable State Implementation Plan (SIP)**—Refers to the portion(s) of the most recent SIP that have been approved by EPA under §110 and 301(d) of the CAA.

**Applicability Test**—The process by which air emissions related to a Federal action are inventoried and compared against de minimis thresholds and subject to a regional significance test.

**Asbestos**—Asbestiform varieties of Chrysotile (serpentine), crocidolite (riebeckite), amosite (cummingtonitegrunerite), anthophyllite, tremolite, and actinolite.

**Asbestos-containing Material (ACM)**—A material or product which contains more than 1% asbestos.

**Asbestos-containing Product (ACP)**—A product to which asbestos is deliberately added in any concentration or which contains more than 1% asbestos by weight or area.

**Associated Funerary Objects**—Objects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later, and both the human remains and associated funerary objects are presently in the possession or control of a federal agency or museum, except that other items exclusively made for burial purposes or to contain human remains shall be considered as associated funerary objects.

**Attainment/Non-attainment**—An area that has monitored air pollutant concentrations below the established NAAQS is considered “attainment.” An area with concentrations above the NAAQS is considered “non-attainment.”

## B

**Baseline**—Used to describe the amount of Class I or II ozone depleting substances in use by an applicable facility in the year 1989, against which monitoring and reporting in subsequent years would be compared.

**Best Management Practices (BMPs)**—Schedules of activities, prohibitions of practices, maintenance procedures, structural controls, and other administrative practices to prevent or reduce the pollution of waters of the U.S.

**Bulk Oil Storage Container**—A container used to store oil that has a shell capacity equal to or greater than 55 gallons.

## C

**Cap-and-Trade**—A system by which air emissions levels are limited to a specific threshold. Emissions credits are awarded to facilities with emissions below the threshold. These facilities are allowed to sell these credits to others that are violating the threshold, so that overages and shortages cancel each other out and the limit is maintained.

**Carbon Dioxide Equivalent (CO<sub>2</sub>e)**—An expression used in GHG assessment and reporting. To determine CO<sub>2</sub>e, individual GHG emissions are quantified and adjusted to the global warming potential of carbon dioxide.

**Carrier**—A person who transports passengers or property in commerce by rail car, aircraft, motor vehicle, or vessel.

**Categorical Exclusion (CATEX)**—Defined by the CEQ as a category of actions which do not individually or cumulatively have a significant effect on the human environment and for which neither an environmental assessment nor an environmental impact statement is required.

**Cathodic Protection**—A technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. For example, a tank system can be cathodically protected through the application of either galvanic anodes or impressed current.

**Cause or Contribute**—Implies that a Federal action would cause a new violation of the NAAQS in a non-attainment area or contribute, in conjunction with other reasonably foreseeable actions, to a new violation.

**CERCLA Hazardous Substance**—Chemicals regulated under CERCLA and included in the following regulatory lists:

- Element, compound, mixture, solution, or substance designated as hazardous under Section 102 of CERCLA
- CWA hazardous substances and toxic pollutants
- RCRA hazardous wastes
- Clean Air Act of 1970, as amended (CAA) hazardous air pollutants
- Toxic Substances Control Act of 1976, as amended (TSCA) imminently hazardous chemical substances or mixtures

**Characteristic Hazardous Waste**—A solid waste, as defined in 40 CFR 261.2, which is not excluded from regulation as a hazardous waste under §261.4(b), and exhibits any of the characteristics of ignitability, corrosivity, reactivity or toxicity.

**Child-occupied Facility**—Building constructed prior to 1978 that is visited regularly by the same child, under six years of age, on at least two different days within any week (Sunday through Saturday

period), provided that each day's visit lasts at least three hours and the combined weekly visits last at least six hours, and the combined annual visits last at least 60 hours.

**Chlorofluorocarbons (CFCs)**—Chlorofluorocarbon, an example of a Class I ozone depleting substance that had commonly been used as a refrigerant or propellant in commercial and industrial applications.

**Class I Substance**—Any substance listed in §7671(a) of the CAA that has a very high potential to damage the ozone layer and contribute to global warming. These substances were to be phased out of production by the year 2000.

**Class II Substance**—Any substance listed in §7671(b) of the CAA that has a significant potential to damage the ozone layer and contribute to global warming. These substances are to be phased out of production by 2015.

**Commercial Applicator**—Certified applicator (whether or not he is a private applicator with respect to some uses) who uses or supervises the use of any pesticide which is classified for restricted use for any purpose or on any property.

**Conditionally Exempt Small Quantity Generator (CESQG)**—Generators that generate  $\leq 220$  pounds per month of hazardous waste,  $\leq 2.2$  pounds per month of acutely hazardous waste, or  $<220$  pounds per month of acute spill residue or contaminated soil. Conditionally Exempt Small Quantity Generators may not store more than 1,000 kg of hazardous waste at any time.

**Construction Activity**—An activity involving the alteration, replacement, or addition to existing processes or production equipment; placement, assembly, or installation of facilities or equipment; or significant site preparation work including clearing, excavation or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment.

**Constructive Use**—Indirect uses of a property/resource that result in substantially impairing the activities, features, or attributes of a resource that qualifies under Section 4(f) of the U.S.DOT Act of 1966.

**Cradle-to-Grave**—A general RCRA term that describes regulation of a hazardous waste from the time it is generated to the time it is disposed.

**Criteria Pollutant**—A term describing air pollutants for which NAAQS have been established.

**Cultural Items**—Human remains, associated funerary objects, unassociated funerary objects, sacred objects, and cultural patrimony.

**Cultural Patrimony**—An object having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself, rather than property owned by an individual Native.

## D

**Day-Night Average Sound Level (DNL)**—The 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of 10 decibels to sound levels for the periods between midnight and 7:00 a.m., and between 10:00 p.m. and midnight local time.

**De minimis Thresholds**—Maximum allowable levels of pollutants and precursors for a Federal action, governed by the severity of non-attainment in the area within which the action occurs.

**Destination Facility**—A facility that treats, disposes of, or recycles a particular category of universal waste. A facility at which a particular category of universal waste is only accumulated is not a destination facility for purposes of managing that category of universal waste.

**Direct/Indirect Emissions**—Direct emissions are pollutant emissions that are caused or initiated directly by Federal action, taking place at the same time and location of that action. Indirect emissions refer to those emissions that are caused by the Federal action and yet occur at a distant time or place from the action, are reasonably foreseeable, and under the practical control of the Lead Agency.

**Direct Use**—Direct impacts to a property/resource, such as taking of land, that qualifies under Section 4(f) of the U.S.DOT Act of 1966.

## E

**Effluent Limitation**—Any restriction on quantities, discharge rates, and concentrations of pollutants discharged from point sources into waters of the U.S.

**Effluent Limitation Guideline (ELG)**—Technology-based regulations to control industrial discharges directly to surface waters and those discharging to POTWs. ELGs are intended to work in conjunction with water quality standards, to protect surface waters.

**EONS**—The definition for airport sustainability developed by Airports Council International-North America: “...a holistic approach to managing an airport so as to ensure the integrity of the Economic viability, Operational efficiency, Natural resource conservation and Social responsibility (EONS) of the airport.”

**Emission Factors**—A term describing the rate at which an air pollutant(s) is emitted from a mobile source per unit of fuel consumed. For example, aircraft engine emissions factors are often reported in grams of pollutant per kilogram of fuel (e.g., 1.5 grams NO<sub>x</sub>/1,000 grams Jet A).

**Endangerment Finding**—An EPA ruling after review of available evidence declaring that an air pollutant causes or contributes to the deterioration of human health or environmental welfare. This finding is requisite for EPA to establish NAAQS, or otherwise regulate the air pollutant under the CAA.

**Energy Savings Performance Contract**—A partnership between an organization and an energy service company, in which the energy service company provides capital for an initial energy-related investment and is paid back through the returns obtained through energy savings.

**Environmental Assessment (EA)**—Defined by the CEQ as a concise public document that provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. The EA must facilitate compliance with NEPA when no environmental impact statement is necessary, or facilitate preparation of a statement when one is necessary.

**Environmental Impact Evaluation**—A detailed written document concerning the environmental impacts of a proposed action. The Environmental Impact Evaluation may be in the form of an EA or an EIS.



**Environmental Impact Statement (EIS)**—Defined by the CEQ as an action-forcing device to ensure that the policies and goals defined in NEPA are infused into the proposed action. An EIS provides complete, unbiased, and factually supported discussion of significant environmental impacts to inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.

**Environmental Professional**—A person who possesses sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding conditions indicative of releases or threatened releases.

**Environmentally Preferable Purchasing**—Products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. Products or services can relate to raw materials, manufacturing, packaging, distribution, use, reuse, operation, maintenance, and disposal.

**Essential Fish Habitat (EFH)**—Waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

**Extremely Hazardous Substances (EHS)**—A substance listed in Appendices A and B of 40 CFR 355 regulations for EPCRA.

## F

**Facility**—All buildings, equipment, structures, and other stationary items that are located on a single site or on contiguous or adjacent sites and that are owned or operated by the same person (or by any person that controls, is controlled by, or under common control with, such person).

**Federal Action**—Any action taken on part of an agency or entity of the federal government, as well as any action funded, permitted, approved or otherwise developed by the entity.

**Finding of No Significant Impact (FONSI)**—A written document concerning the environmental impacts of a proposed action listed in an EA document, which would not have a significant environmental impact.

**Friable**—Material that when dry may be crumbled, pulverized, or reduced to powder by hand pressure.

## G

**General Secondary Containment**—SPCC-required containment to address the most likely discharge from a bulk oil storage container or transfer operation including dike, berms, or sorbent materials.

**Generator**—Any entity, by site, whose act or process produces hazardous waste identified or listed in part 40 CFR 261 or whose act first causes a hazardous waste to become subject to regulation.

**Greenhouse Gases (GHG)**—Any gas emitted into the atmosphere that has the potential to trap heat. The most common GHG occurring at airports are carbon dioxide, methane and nitrous oxide.

## H

**Hazardous Air Pollutants (HAPs)**—Any compound listed in §112(b) of the CAA having no established NAAQS but for which toxicity data exists.

**Hazardous Chemical**—Any chemical for which a facility is required to maintain an MSDS under OSHA.

**Hazardous Material**—A substance or material that the Secretary of the U.S. Department of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has been designated as hazardous under Section 5103 of federal hazardous materials transportation law (49 U.S.C 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated in 49 CFR 172.101, and materials that meet the defining criteria for hazard classes and divisions in 49 CFR 173.

**Historic Property**—“Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the NRHP” (36 CFR Section 800.16).

**Hydrochlorofluorocarbon (HCFC)**—An example of a Class II ozone depleting substance that is commonly used as a refrigerant or propellant in commercial and industrial applications.

## I

**Illicit Discharge**—A discharge to a storm sewer that is not composed entirely of storm water except discharges pursuant to an NPDES permit and discharges resulting from fire fighting activities.

**Industrial Activities**—EPA defines industrial activities as activities, such as material handling and storage, which are often exposed to the weather and take place at facilities included in one of 29 industrial sectors. The sectors group similar facilities by the nature of industrial activity, type of materials handled, and material management practices employed. Most sectors are based on a facility’s Standard Industrial Classification (SIC) code.

**Interference**—A discharge which, alone or in conjunction with a discharge or discharges from other sources, both: (1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and (2) is a cause of a violation of any requirement of the POTW’s NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the statutory provisions and regulations or permits issued there under.

## L

**Lamp**—The bulb or tube portion of an electric lighting device designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common universal waste electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide.

**Large Quantity Generator (LQG)**—Generators that generate  $\geq 2,200$  pounds per month of hazardous waste,  $>2.2$  pounds per month of acutely hazardous waste, or  $>220$  pounds per month of acute spill residue or contaminated soil.

**Large Quantity Handler of Universal Waste (LQHUW)**—A universal waste handler who accumulates a total of 5,000 kg or more of universal waste at any time. This designation as a large quantity handler of universal waste is retained through the end of the calendar year in which the 5,000 kg limit is met or exceeded.

**Lead**—Naturally occurring, bluish-grey toxic metal that can result in significant health effects when inhaled or ingested.

**Lead Agency**—The federal agency responsible for the planning, implementation and conformity determination of a federal action.

**Lead-based Paint**—Paint or other surface coatings that contain lead equal to or in excess of 1.0 mg/cm<sup>2</sup> or more than 0.5% by weight.

**Lead-based Paint Activities**—Inspection, risk assessment, and abatement activities for target housing and child-occupied facilities.

**Life Cycle Cost Analysis (LCCA)**—A decision making tool that can provide important information for an airport to understand long term paybacks relative to the useful life of existing and future infrastructure.

**Listed Hazardous Waste**—A solid waste is a hazardous waste if it is listed in this subpart, unless it has been excluded from this list under 40 CFR 260.20 and §260.22, including F-, K-, P- and U-listed hazardous wastes.

**Local Emergency Planning Committee (LEPC)**—Defined by the EPA as a group of individuals that work together to understand chemical hazards in the community, develop emergency plans in case of an accidental release, and look for ways to prevent chemical accidents. LEPCs are made up of emergency management agencies, responders, industry and the public.

## M

**Marking**—A descriptive name, identification number, instructions, cautions, weight, specification, or United Nations marks, or combinations thereof, on outer packaging of hazardous materials.

**Maximum Contaminant Level (MCL)**—The maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

**Medium and Large Municipal Separate Storm Sewer Systems MS4**—Municipal Separate Storm Sewer Systems that generally serve populations of 100,000 people or greater.

**Mercury-containing Equipment**—A device or part of a device (including thermostats, but excluding batteries and lamps) that contains elemental mercury integral to its function.

**Migratory Bird**—Any bird listed in 50 CFR 10.13.

**Mitigation**—Any action taken in pre-emption or response to an adverse environmental impact (including those associated with air quality), meant to decrease or negate the severity of that impact.

**Mobile Refueler**—A type of bulk oil storage container onboard a vehicle or towed, that is designed or used solely to store and transport fuel for transfer into or from an aircraft, motor vehicle, or other oil storage container.

## N

**National Ambient Air Quality Standards (NAAQS)**—Maximum acceptable levels of regulated air pollutants, including an acceptable margin of error, meant to safeguard human health (primary NAAQS) and environmental welfare (secondary NAAQS).

**National Emissions Standards for Hazardous Air Pollutants (NESHAPs)**—A series of emissions standards set by EPA pursuant to their authority under §112 of the CAA, describing the maximum levels of HAPs listed in §112(b). Operators of HAP emissions sources must apply control technologies to ensure that emission levels do not exceed the NESHAP.

**National Pollutant Discharge Elimination System (NPDES)**—EPA's program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under the CWA.

**Navigable Waters of the U.S.**—Applicable to the SPCC rule, includes waters as defined in section 502(7) of the FWPCA, including all navigable waters of the U.S., as defined in judicial decisions prior to passage of the 1972 Amendments to the FWPCA, and tributaries of such waters; interstate waters; intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes; and intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce.

**National Response Center (NRC)**—Federal point of contact for reporting oil and chemical spills.

**New Construction**—Draining, dredging, channelizing, filling, diking, impounding, and related activities, including construction of any structures or facilities begun or authorized after the effective date of Executive Order 11990 Protection of Wetlands.

**New Underground Storage Tank (UST) System**—Tank system that contains an accumulation of regulated substances and for which installation has commenced after December 22, 1988.

**Noise Contour**—A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

**Noise Exposure Map**—A scaled, geographic map of an airport, its noise contours, and surrounding area developed in accordance with ASNA and 14 CFR Part 150.

**Non-compatible Land Uses**—Land uses that are not compatible with levels of aircraft noise identified in Table 1 in Appendix B of 14 CFR Part 150.

**Non-navigable Tributaries of Traditional Navigable Waters that are Relatively Permanent**—Those water bodies whose waters flow into a traditional navigable water either directly or indirectly by means of other tributaries. Relatively permanent bodies are those which typically flow year-round or waters that have a continuous flow at least seasonally (e.g., typically three months) (126 S. Ct. at 2221 n. 5).

**Non-transient Non-community Drinking Water System**—A public water system that regularly supplies water to at least 25 of the same people at least six months per year, but not year-round (e.g., schools, factories, office buildings).

**Non-transportation-related**—Not related to the transport of oil in commerce as defined in the Memorandum of Understanding between the Secretary of the U.S. Department of Transportation (U.S.DOT) and the Administrator of the EPA (Appendix A of 40 CFR 112).

## O

**Offeror**—A person who performs, or is responsible for performing, any pre-transportation function for transportation of a hazardous material in commerce and/or tenders or makes the hazardous material available to a carrier for transportation in commerce.

**Oil**—Oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil.

**Oil-filled Operational Equipment**—A type of oil storage container in which oil is present solely to support the function of the apparatus or the device (e.g., elevator hydraulic reservoirs, hydraulic systems, lubricating systems, and electrical transformers).

## P

**Packaging**—A receptacle and any other components or materials necessary for the receptacle to perform its containment function.

**Pass Through**—A discharge which exits the POTW into waters of the U.S. in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

**Pesticide**—A substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant.

**Petroleum**—Petroleum and petroleum-based substances including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure. The term includes motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

**Photovoltaic (PV) Modules**—Arrays of cells that contain a material that converts solar radiation into direct current electricity.

**Point Source**—Any discernible, confined, and discrete conveyance of storm water.

**Polychlorinated Biphenyls (PCBs)**—A chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees, or any combination of substances which contains such substance.

**Polychlorinated Biphenyls (PCBs) Article**—A manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCBs. “PCB article” includes capacitors, transformers, electric motors, pumps, pipes and any other manufactured item which is formed to a specific shape or design during manufacture, has end use function(s) dependent in whole or in part upon its shape or design during end use, and has either no change of chemical composition during its end use or only those changes of composition which have no commercial purpose separate from that of the PCB article.

**Polychlorinated Biphenyls (PCBs) Transformer**—Transformers containing dielectric fluid with PCB concentrations greater than or equal to 500 ppm.

**Polychlorinated Biphenyls (PCBs) Waste**—PCB articles, PCB article containers, PCB containers, PCB equipment, or anything that deliberately or unintentionally contains or has as a part of it any PCBs subject to PCB storage and disposal requirements.

**Presumed to Conform**—Components of a federal action that are considered to have a negligible effect on air quality, and thus are exempted from conformity determination.

**Pre-transportation Function**—A function that is required to assure the safe transportation of a hazardous material in commerce. Examples include determining the hazard class of a hazardous material; selecting, filling, and closing a hazardous materials packaging or container; package marking and labeling; preparing and reviewing shipping papers; providing and maintaining emergency response information; loading, blocking, and bracing a hazardous materials package in a freight container or transport vehicle; and/or selecting, providing, or affixing placards for a freight container or transport vehicle to indicate that it contains a hazardous material.

**Prevention of Significant Deterioration (PSD)**—A program meant to regulate new sources of air pollution in non-attainment areas in a manner such that the sources do not contribute to new infractions, exacerbate existing infractions, or otherwise delay attainment of the NAAQS.

**Private Applicator**—Certified applicator that uses or supervises the use of any pesticide which is classified for restricted use for purposes of producing any agricultural commodity.

**Public Hearing**—A gathering under the direction of a designated hearing officer for the purpose of allowing interested parties to speak and hear about issues of concern. 40 CFR 1506.6(c), states that public hearings should be held whenever appropriate or to meet statutory requirements applicable to an agency.

**Public Water System**—A system for providing piped water for human consumption through a minimum of 15 service connections or regularly servicing at least 25 individuals.

**Publicly Owned Treatment Works (POTW)**—A treatment works, as defined by §212 of the CWA, which is owned by a state or municipality. A POTW includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature; and it may include sewers, pipes, and other conveyances only if they convey wastewater to the POTW.

## R

**Reasonably Foreseeable**—Projected future indirect air emissions that are identified at the time of conformity determination, have a known source and location, and are quantifiable.



**Regionally Significant**—The distinction of a federal action whereby the direct and indirect air emissions associated with it exceed 10% of the regional emissions budget.

**Regulated Medical Waste**—Waste or reusable material derived from the medical treatment of an animal or human, which includes diagnosis and immunization, or from biomedical research, which includes the production and testing of biological products.

**Regulated Substance**—Any substance defined in section 101(14) of the CERCLA (but not including any substance regulated as a hazardous waste under subtitle C), and petroleum, including crude oil or any fraction thereof that is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute). The term includes but is not limited to petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading, and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, petroleum solvents, and used oils.

**Release**—A spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any hazardous chemical, extremely hazardous substance, or CERCLA hazardous substance.

**Release Detection**—Determining whether a release of a regulated substance has occurred from the UST system into the environment or into the interstitial space between the UST system and its secondary barrier or secondary containment around it.

**Renovation**—Modification of any existing structure, or portion thereof, that results in the disturbance of painted surfaces, unless that activity is performed as part of an abatement.

**Reportable Quantity (RQ)**—For any CERCLA hazardous substance, the quantity (established in Table 302.4 of 40 CFR 302.4) for such substance. For any extremely hazardous substance, reportable quantity means the quantity established in Appendices A and B of 40 CFR 355 for such substance. Unless and until superseded by regulations establishing a reportable quantity for newly listed EHS or CERCLA hazardous substances, a weight of one pound shall be the reportable quantity.

**Restricted Use Pesticide**—Restricts pesticide use to a certificated pesticide applicator or under the direct supervision of a certified applicator.

**Return on Investment**—The calculation used to determine the length of time required to recoup an investment.

## S

**Sacred Objects**—Specific ceremonial objects that are needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present day adherents.

**Scoping**—An early and open process for determining the scope of issues to be addressed in an EA or EIS and identifying the significant issues related to a proposed action (40 CFR 1501.7). It is an important and required part of the EIS process, and an optional part of the EA process. The purpose of scoping is to identify significant environmental issues to be analyzed in greater depth, identify and eliminate from detailed study issues that are insignificant or that have been covered by prior environmental review, and set the temporal and geographic boundaries of the EIS. Scoping (with agencies and/or the public) also

allows the responsible FAA official to identify available technical information and additional reasonable alternatives.

**Secondary Maximum Contaminant Level (SMCL)**—The maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system.

**State Emergency Response Commission (SERC)**—The State Emergency Response Commission for the state in which the facility is located except where the facility is located in Indian Country. In the absence of a SERC for a state or Indian Tribe, the Governor or the chief executive officer of the tribe, respectively, shall be the SERC. Where there is a cooperative agreement between a state and a Tribe, the SERC shall be the entity identified in the agreement.

**Significant Impact Threshold**—The impact level or “threshold” that the responsible FAA official uses to determine if the environmental effects of a proposed action or its reasonable alternatives would cause significant environmental effects. If FAA has established a threshold for a resource, the responsible FAA official must use that threshold to determine impact severity and context.

**Sized Secondary Containment**—A secondary means for containment to address entire shell capacity of the largest single container with sufficient freeboard for precipitation.

**Slug Control Plan**—A written plan required by industrial wastewater pretreatment permits that describe the procedures and controls that a discharger will use to prevent an accidental discharge to a POTW.

**Small Municipal Separate Storm Sewer Systems (MS4)**—Municipal Separate Storm Sewer Systems that generally serve populations of less than 10,000 people.

**Small Quantity Generator (SQG)**—Generators that generate >220 pounds, but <2,200 pounds, of hazardous waste per month.

**Small Quantity Handler of Universal Waste (SQHUW)**—A universal waste handler who does not accumulate 5,000 kg or more of universal waste at any time.

**Solid Waste**—A waste, as defined in 40 CFR 261.2, including any garbage, refuse, sludge from a waste treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and community activities, but does not include solid or dissolved material in domestic sewage.

**Species of Concern**—Those species listed in the periodic report "Migratory Nongame Birds of Management Concern in the U.S.," priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 CFR 17.11.

**Stage 2 Aircraft**—An aircraft that has been shown to comply with the Stage 2 requirements of 14 CFR Part 36. On January 1, 2000, civilian Stage 2 aircraft weighing greater than 75,000 lbs. were not allowed to operate in the U.S.

**Stage 3 Aircraft**—An aircraft that has been shown to comply with the Stage 3 requirements of 14 CFR Part 36.

**State Implementation Plan (SIP)**—A state-level compilation of air emissions levels, control strategies and timelines in non-attainment areas developed to demonstrate attainment of the NAAQS by EPA’s mandated deadline.

**Storm Water Management Program**—A program developed by an MS4 to comply with the requirements of their NPDES permit. Programs include government coordination, comprehensive planning, funding and staffing, public education and participation, and BMP selection.

**Storm Water Pollution Prevention Plan (SWPPP) for Construction Activities**—A site-specific plan to prevent or minimize impacts to storm water quality from construction sites/activities. Plans typically include storm water control measures, erosion and sediment control measures, maintenance and inspection procedures, identification of non-storm water discharges, and employee training.

**Storm Water Pollution Prevention Plan (SWPPP) for Industrial Activities**—A site-specific plan to minimize impacts to storm water quality from industrial sites/activities. Plans typically include storm water control measures, maintenance and inspection procedures, identification of non-storm water discharges, and employee training.

**Structures**—Dams, dikes, bridges, and causeways or other obstacles (i.e., jetty, breakwater, wharf pier, boom, bulkhead, etc.).

## T

**Take**—To attempt or actually pursue, hunt, shoot, wound, kill, trap, capture, or collect.

**Target Housing**—Housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any child who is less than six years of age resides or is expected to reside in such housing) or any no-bedroom dwelling (e.g., studio apartment, dormitory).

**Terne-plated**—A plating mixture of tin and lead typically on steel.

**Threshold Planning Quantity (TPQ)**—For a substance listed in Appendices A and B of 40 CFR 355, the quantity listed in the column “threshold planning quantity” for that substance.

**Total of Direct and Indirect Emissions**—All reasonably foreseeable and practicably controllable air emissions associated with a Federal action, some of which may be presumed to conform to the SIP. However, although such emissions would not be considered during determination, they must be accounted for in the Applicability Test.

**Total Maximum Daily Load (TMDL)**—The sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background applicable to a body of water (e.g., a river).

**Traditional Navigable Waters of the U.S.**—Defined by 33 CFR 329.4 as those waters that are subject to the ebb and flow of the tide and/or are used, have been used in the past, or may be susceptible to use to transport interstate or foreign commerce.

**Transient Non-community Drinking Water System**—A public water system that provides water in areas where people do not remain for long periods of time (e.g., campgrounds).

**Transportation**—The movement of property and loading, unloading, or storage incidental to that movement.

**Type I Technician**—A technician that services or disposes of small appliances containing ozone depleting substances, subject to the minimum certification requirements by EPA.

**Type II Technician**—A technician that services or disposes of high and very high pressure appliances containing ozone depleting substances, subject to the most stringent certification requirements by EPA.

**Type III Technician**—A technician that services or disposes of low pressure appliances containing ozone depleting substances, subject to the most stringent certification requirements by EPA.

## U

**Ultrafine Particulate Matter (UFP or PM<sub>0.1</sub>)**—Particles contained in exhaust emissions that measure 0.1 micrometers or less in diameter.

**Unassociated Funerary Objects**—Objects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later, where the remains are not in the possession or control of the federal agency or museum and the objects can be identified by a preponderance of the evidence as related to specific individuals or families or to known human remains or, by a preponderance of the evidence, as having been removed from a specific burial site of an individual culturally affiliated with a particular Indian tribe.

**Uniform Hazardous Waste Manifest**—EPA form 8700-22 and any continuation sheet attached to the form that provides information about the generator of the waste; the facility receiving the waste; the nature of and quantity of the waste; shipping container types and numbers; and shipping method. The manifest was developed to meet both EPA's requirements for a manifest, and U.S.DOT's requirements for shipping papers.

**Universal Technician**—A technician that services all types of appliances or equipment that contain ozone depleting substances and are subject to regulation under Title IV, for which the most stringent EPA certification is required.

**Universal Waste**—Any of the following hazardous wastes that are managed under the universal waste requirements: batteries, pesticides, mercury-containing equipment, and lamps.

**Universal Waste Handler**—A generator of universal waste; or the owner or operator of a facility, including all contiguous property, that receives universal waste from other universal waste handlers, accumulates universal waste, and sends universal waste to another universal waste handler, to a destination facility, or to a foreign destination.

**Universal Waste Transporter**—A person engaged in the off-site transportation of universal waste by air, rail, highway, or water.

**Used Oil**—Oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use is contaminated by physical or chemical impurities.

**Used Oil Transporter**—Any person who transports used oil; collects used oil from more than one generator and transports the collected oil; and owners and operators of used oil transfer facilities. Used oil

transporters may consolidate or aggregate loads of used oil for purposes of transportation but, may not process used oil. Transporters may conduct incidental processing operations that occur in the normal course of used oil transportation (e.g., settling and water separation), but that are not designed to produce (or make more amenable for production of) used oil derived products or used oil fuel.

## W

**Water Quality Standards**—EPA or state-established standards for pollutants applicable to waters of the U.S.

**Waters of the U.S.**—Broadly defined by 40 CFR 230.3(s) as:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- All interstate waters including interstate wetlands;
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
  - i. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
  - ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
  - iii. Which are used or could be used for industrial purposes by industries in interstate commerce;
- All impoundments of waters otherwise defined as waters of the U.S. under this definition;
- Tributaries of waters identified in paragraphs (s)(1) through (4) of this section; and
- The territorial sea.

**Watering Points**—Facilities where water is transferred from a water supply to an aircraft, including water cabinets, carts, trucks, and hoses.

**Wetlands**—Under the USACE jurisdiction, wetlands are defined as areas that surface or groundwater inundate or saturate at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, and similar areas.

**Wetlands Adjacent to Traditional Navigable Waters**—Those wetlands which are bordering, contiguous or neighboring traditional navigable waters. Adjacent wetlands include those separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes and the like (see 33 CFR Section 328.3(c)).

**Work in Navigable Waters of the U.S.**—Dredging or disposal of dredged material, excavation, filling, or other modification of a navigable water of the U.S.

# Acronyms

<b>AC</b>	Advisory Circular
<b>ACHP</b>	Advisory Council on Historic Preservation
<b>ACM</b>	Asbestos Containing Material
<b>ACP</b>	Asbestos Containing Products
<b>ADF</b>	Aircraft Deicing Fluid
<b>AHPA</b>	Archeological and Historic Preservation Act of 1974, as amended
<b>AIP</b>	Airport Improvement Program
<b>AIRFA</b>	American Indian Religious Freedom Act of 1978
<b>ALP</b>	Airport Layout Plan
<b>ANCA</b>	Airport Noise and Capacity Act of 1990, as amended
<b>APU</b>	Auxiliary Power Units
<b>ARP</b>	Office of Airports
<b>ARPA</b>	Archeological Resources Protection Act of 1979, as amended
<b>ASNA</b>	Aviation Safety and Noise Abatement Act of 1979, as amended
<b>AST</b>	Aboveground Storage Tank
<b>BMP</b>	Best Management Practice
<b>CAA</b>	Clean Air Act of 1970, as amended
<b>CATEX</b>	Categorical Exclusion
<b>CEQ</b>	Council on Environmental Quality
<b>CERCLA</b>	Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended
<b>CESQG</b>	Conditionally Exempt Small Quantity Generator
<b>CFC</b>	Chlorofluorocarbon
<b>CFR</b>	Code of Federal Regulations
<b>CO<sub>2</sub>e</b>	Carbon Dioxide Equivalent
<b>CWA</b>	Clean Water Act, as amended
<b>dB</b>	Decibel
<b>DNL</b>	Day Night Average Sound Level
<b>EA</b>	Environmental Assessment
<b>EFH</b>	Essential Fish Habitat
<b>EHS</b>	Extremely Hazardous Substances
<b>EIS</b>	Environmental Impact Statement
<b>ELG</b>	Effluent Limitation Guidelines
<b>EMS</b>	Environmental Management System
<b>EONS</b>	Economic viability, Operational efficiency, Natural resource conservation, and Social responsibility
<b>EPCRA</b>	Emergency Planning and Community Right-to-Know Act of 1986, as amended
<b>EPP</b>	Environmentally Preferable Purchasing
<b>ESA</b>	Environmental Site Assessment
<b>FBO</b>	Fixed Based Operator
<b>FDA</b>	Food and Drug Administration
<b>FIFRA</b>	Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended
<b>FONSI</b>	Finding of No Significant Impact
<b>FPO</b>	Federal Preservation Officer
<b>FWPCA</b>	Federal Water Pollution Control Act, as amended
<b>GHG</b>	Greenhouse Gases
<b>GSE</b>	Ground Support Equipment
<b>HAP</b>	Hazardous Air Pollutant



<b>HCFC</b>	Hydrochlorofluorocarbon
<b>HMR</b>	Hazardous Materials Regulations
<b>HMTA</b>	Hazardous Materials Transportation Act of 1974, as amended
<b>HVAC</b>	Heating Ventilation and Air Conditioning
<b>ISO</b>	International Organization for Standardization
<b>LCCA</b>	Life Cycle Cost Analysis
<b>LED</b>	Low Emitting Diode
<b>LEED</b>	Leadership in Energy and Environmental Design™
<b>LEPC</b>	Local Emergency Planning Committee
<b>LQG</b>	Large Quantity Generator
<b>LQHUW</b>	Large Quantity Handler of Universal Waste
<b>LUST</b>	Leaking Underground Storage Tank
<b>MCL</b>	Maximum Contaminant Level
<b>MCLG</b>	Maximum Contaminant Level Goals
<b>MS4</b>	Municipal Separate Storm Sewer System
<b>MSA</b>	Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended
<b>MSDS</b>	Material Safety Data Sheet
<b>NAAQS</b>	National Ambient Air Quality Standards
<b>NAGPRA</b>	Native American Graves Protection and Repatriation Act of 1990
<b>NAVAIDS</b>	Navigational Aids
<b>NCP</b>	Noise Compatibility Program
<b>NEPA</b>	National Environmental Policy Act of 1969, as amended
<b>NESHAPs</b>	National Emissions Standards for Hazardous Air Pollutants
<b>NHPA</b>	National Historic Preservation Act of 1966, as amended
<b>NMFS</b>	National Marine Fisheries Service
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NOI</b>	Notice of Intent
<b>NO<sub>x</sub></b>	Oxides of Nitrogen
<b>NPDES</b>	National Pollutant Discharge Elimination System
<b>NPDWR</b>	National Primary Drinking Water Regulations
<b>NPL</b>	National Priorities List
<b>NRC</b>	National Response Center
<b>NRHP</b>	National Register of Historic Places
<b>OPA</b>	Oil Pollution Act of 1990, as amended
<b>OSHA</b>	Occupational Safety and Health Administration
<b>PCB</b>	Polychlorinated Biphenyl
<b>P-D-C-A</b>	Plan Do Check Act
<b>PM<sub>0.1</sub> or UFP</b>	Ultrafine Particulate Matter
<b>PM<sub>10</sub></b>	Particulate Matter with mean diameters of 10 micrometers or less
<b>PM<sub>2.5</sub></b>	Particulate Matter with mean diameters of 2.5 micrometers or less
<b>POTW</b>	Publically Owned Treatment Works
<b>PPE</b>	Personal Protective Equipment
<b>ppm</b>	parts per million
<b>PSD</b>	Prevention of Significant Deterioration
<b>PV</b>	Photovoltaic
<b>RCRA</b>	Resource Conservation and Recovery Act of 1976, as amended
<b>ROD</b>	Record of Decision
<b>ROI</b>	Return on Investment
<b>RQ</b>	Reportable Quantities
<b>SAGA</b>	Sustainable Aviation Guidance Alliance

<b>SARA</b>	Superfund Amendments and Reauthorization Act of 1986
<b>SDWA</b>	Safe Drinking Water Act of 1974, as amended
<b>SERC</b>	State Emergency Response Commission
<b>SHPO</b>	State Historic Preservation Officer
<b>SIC</b>	Standard Industrial Classification
<b>SIP</b>	State Implementation Plan
<b>SMCL</b>	Secondary Maximum Contaminant Level
<b>SPCC</b>	Spill Prevention Control and Countermeasure
<b>SQG</b>	Small Quantity Generator
<b>SQHUW</b>	Small Quantity Handler of Universal Waste
<b>SWPP</b>	Storm Water Pollution Prevention
<b>SWPPP</b>	Storm Water Pollution Prevention Plan
<b>THPO</b>	Tribal Historic Preservation Officer
<b>TMDL</b>	Total Maximum Daily Load
<b>TPQs</b>	Threshold Planning Quantities
<b>TSCA</b>	Toxic Substances Control Act of 1976, as amended
<b>TSD</b>	Transfer, Storage and Disposal
<b>UIC</b>	Underground Injection Control
<b>USACE</b>	United States Army Corps of Engineers
<b>USDOT</b>	United States Department of Transportation
<b>USFWS</b>	U.S. Fish and Wildlife Service
<b>UST</b>	Underground Storage Tank
<b>VOC</b>	Volatile Organic Compound

*Abbreviations and acronyms used without definitions in TRB publications:*

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI-NA	Airports Council International-North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation