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EPA Office of Compliance Sector Notebook Project

Air Transportation Industry

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Electronic versions of all Sector Notebooks are available free of charge at the following web address: **www.epa.gov/oeca/sector**. Direct technical questions to the "Feedback" button at the bottom of the web page.

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EPA/310-R-98-008.	Local Government Operations	John Dombrowski	564-7036

*Spanish translations available.

AIR TRANSPORTATION INDUSTRY

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF ACRONYMS

AFS	AIRS Facility Subsystem (CAA database)
AIRS	Aerometric Information Retrieval System (CAA database)
BIFs	Boilers and Industrial Furnaces (RCRA)
BOD	Biochemical Oxygen Demand
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CATC	Clean Air Technology Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CFCs	Chlorofluorocarbons
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSI	Common Sense Initiative
CWA	Clean Water Act
D&B	Dun and Bradstreet Marketing Index
DOT	U.S. Department of Transportation
ELP	Environmental Leadership Program
EMS	Environmental Management System
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FAA	Federal Aviation Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FINDS	Facility Indexing System
FWPCA	Federal Water Pollution Control Act
HAP	Hazardous Air Pollutant (CAA)
HSDB	Hazardous Substances Data Bank
HSWA	Hazardous and Solid Waste Amendments
ICAO	International Civil Aviation Organization
IDEA	Integrated Data for Enforcement Analysis
LDR	Land Disposal Restriction (RCRA)
LEPC	Local Emergency Planning Committee
MACT	Maximum Achievable Control Technology (CAA)
MCLG	Maximum Contaminant Level Goal
MCL	Maximum Contaminant Level
MEK	Methyl Ethyl Ketone
MSDS	Material Safety Data Sheet
NAAQS	National Ambient Air Quality Standards (CAA)
NAFTA	North American Free Trade Agreement
NAICS	North American Industrial Classification System
NCDB	National Compliance Database (for TSCA, FIFRA, EPCRA)
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEIC	National Enforcement Investigation Center
NESHAP	National Emission Standards for Hazardous Air Pollutants

NO_2	Nitrogen Dioxide
NOI	Notice of Intent
NOV	Notice of Violation
NO_X	Nitrogen Oxide
NPDES	National Pollutant Discharge Elimination System (CWA)
NPL	National Priorities List
NRC	National Response Center
NSPS	New Source Performance Standards (CAA)
OAR	Office of Air and Radiation
OECA	Office of Enforcement and Compliance Assurance
OPA	Oil Pollution Act
OPPTS	Office of Prevention, Pesticides, and Toxic Substances
OSHA	Occupational Safety and Health Administration
OSW	Office of Solid Waste
OSWER	Office of Solid Waste and Emergency Response
OW	Office of Water
P2	Pollution Prevention
PCS	Permit Compliance System (CWA Database)
PM_{10}	Particulate matter of 10 microns or less
PMN	Premanufacture Notice
POTW	Publicly Owned Treatments Works
PT	Total Particulates
RACT	Reasonably Available Control Technology
RCRA	Resource Conservation and Recovery Act
RCRIS	RCRA Information System
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SEP	Supplemental Environmental Project
SERC	State Emergency Response Commission
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_X	Sulfur Oxide
SPCC	Spill Prevention Control and Countermeasures
TOC	Total Organic Carbon
TRI	Toxic Release Inventory
TRIS	Toxic Release Inventory System
TSCA	Toxic Substances Control Act
TSD	Treatment, storage, and disposal
TSS	Total Suspended Solids
UIC	Underground Injection Control (SDWA)
UST	Underground Storage Tank (RCRA)
VOC	Volatile Organic Compound

AIR TRANSPORTATION INDUSTRY (SIC 45)

I. INTRODUCTION TO THE SECTOR NOTEBOOK PROJECT

I.A. Summary of the Sector Notebook Project

Integrated environmental policies based upon comprehensive analysis of air, water, and land pollution are a logical supplement to traditional single-media approaches to environmental protection. Environmental regulatory agencies are beginning to embrace comprehensive, multi-statute solutions to facility permitting, enforcement and compliance assurance, education/outreach, research, and regulatory development issues. The central concepts driving the new policy direction are that pollutant releases to each environmental medium (air, water, and land) affect each other, and that environmental strategies must actively identify and address these inter-relationships by designing policies for the "whole" facility. One way to achieve a whole facility focus is to design environmental policies for similar industrial facilities. By doing so, environmental concerns that are common to the manufacturing of similar products can be addressed in a comprehensive manner. Recognition of the need to develop the industrial "sector-based" approach within the EPA Office of Compliance led to the creation of this document.

The Sector Notebook Project was originally initiated by the Office of Compliance within the Office of Enforcement and Compliance Assurance (OECA) to provide its staff and managers with summary information on major industrial sectors. As other EPA offices, states, the regulated community, environmental groups, and the public became interested in this project, the scope of the original project was expanded to its current form. The ability to design comprehensive, common sense environmental protection measures for specific industries is dependent on knowledge of several inter-related topics. For the purposes of this project, the key elements chosen for inclusion are: general industry information (economic and geographic); a description of industrial processes; pollution outputs; pollution prevention opportunities; Federal statutory and regulatory framework; compliance history; and a description of partnerships that have been formed between regulatory agencies, the regulated community and the public.

For any given industry, each topic listed above could alone be the subject of a lengthy volume. However, in order to produce a manageable document, this project focuses on providing summary information for each topic. This format provides the reader with a synopsis of each issue, and references where more in-depth information is available. Text within each profile was researched from a variety of sources, and was usually condensed from more detailed sources pertaining to specific topics. This approach allows for a wide coverage of activities that can be further explored based upon the citations

and references listed at the end of this profile. As a check on the information included, each notebook went through an external review process. The Office of Compliance appreciates the efforts of all those that participated in this process who enabled us to develop more complete, accurate and up-to-date summaries.

I.B. Additional Information

Providing Comments

OECA's Office of Compliance plans to periodically review and update the notebooks and will make these updates available both in hard copy and electronically. If you have any comments on the existing notebook, or if you would like to provide additional information, please send a hard copy and computer disk to the EPA Office of Compliance, Sector Notebook Project, 401 M St., SW (2223-A), Washington, DC 20460.

Adapting Notebooks to Particular Needs

The scope of the industry sector described in this notebook approximates the national occurrence of facility types within the sector. In many instances, industries within specific geographic regions or states may have unique characteristics that are not fully captured in these profiles. The Office of Compliance encourages state and local environmental agencies and other groups to supplement or re-package the information included in this notebook to include more specific industrial and regulatory information that may be available. Additionally, interested states may want to supplement the "Summary of Applicable Federal Statutes and Regulations" section with state and local requirements. Compliance or technical assistance providers may also want to develop the "Pollution Prevention" section in more detail. Please contact the appropriate specialist listed on the opening page of this notebook if your office is interested in assisting us in the further development of the information or policies addressed within this volume. If you are interested in assisting in the development of new notebooks for sectors not covered in the original eighteen, please contact the Office of Compliance at (202) 564-2395.

II. INTRODUCTION TO THE AIR TRANSPORTATION INDUSTRY

This section provides background information on the size, geographic distribution, employment, production, sales, and economic condition of the air transportation industry. Facilities described within this document are described in terms of their Standard Industrial Classification (SIC) codes.

II.A. Introduction, Background, and Scope of the Notebook

This notebook pertains to the transportation industry as classified within SIC code 45 (Transportation by Air). (Please note that this section provides both the SIC code and the new North American Industrial Classification System (NAICS) code, which went into effect January 1, 1997. While the NAICS code is identified in this section, the remainder of the document will refer to the SIC codes for specific air transportation activities.)

The transportation industry includes other modes of transport, such as trucking, railroad, pipeline, and water, which make up an important portion of overall transportation activity in the United States. These modes are addressed in two sector notebooks. Trucking, railroad, and pipeline transportation are addressed in *Ground Transportation Industry* [EPA/310-R-97-002], and water transportation is addressed in *Water Transportation Industry* [EPA/310-R-97-003].

The air transportation industry (SIC 45) includes establishments engaged in furnishing domestic and foreign transportation by air and also operating airports and flying fields and furnishing terminal services. Specifically, this notebook includes the following groups:

SIC 4512 - Air Transportation, Scheduled (NAICS 481111 and 481112). This sector includes establishments primarily engaged in furnishing air transportation over regular routes and on regular schedules. This industry includes Alaskan carriers operating over regular or irregular routes.

SIC 4513 - Air Courier Services (NAICS 49211). This sector includes establishments primarily engaged in furnishing air delivery of individually addressed letters, parcels, and packages (generally under 100 pounds), except by the U.S. Postal Service. Separate establishments of air courier companies which provide pick-up and delivery only, "drop-off points," or distribution centers are all classified in this industry.

SIC 4522 - Air Transportation, Nonscheduled (NAICS 481211, 481212, 48799, 62191). This sector includes establishments engaged in furnishing nonscheduled air transportation. Also included in this industry are establishments primarily engaged in furnishing airplane sightseeing services,

air taxi services, and helicopter passenger transportation services to, from, or between local airports, whether scheduled or not scheduled.

SIC 4581 - Airports, Flying Fields, and Airport Terminal Services (NAICS 488111, 488119, 56172, 48819). This sector includes establishments primarily engaged in operating and maintaining airports and flying fields; in servicing, repairing (except on a factory basis), maintaining, and storing aircraft; and in furnishing coordinated handling services for airfreight or passengers at airports. This industry also include private establishments primarily engaged in air traffic control operations (except government).

II.B. Characterization of the Air Transportation Industry

II.B.1. Industry Characterization

The transportation industry affects nearly every American. Either through the necessity of traveling from one place to another, shipping goods and services around the country, or working in a transportation-related job, transportation's share of the national economy is significant. According to the Eno Transportation Foundation, for all transportation-related industries, total transportation expenditures in the U.S. accounted for 16.1 percent of the gross national product in 1993.

The airline industry in particular provides transportation of passengers, cargo, mail and perishable goods. American citizens have come to rely on domestic and international air transportation more and more every year. Airline travel in the United States has been getting safer over the years and is the safest in the world. The National Safety Council's latest fatality totals for 1995 show 175 deaths caused by United States airline accidents. By contrast, five times as many people died in boating accidents and accidents involving bicycles and tricycles.

II.B.1.1. Types of Aircrafts and Airports

Generally, the air transportation sector can be broken down into two categories: (1) facilities providing scheduled, non-scheduled, and air courier services using aircraft, and (2) airports and airport operations. It is these two major topics (i.e., aircraft facilities and airports) and the activities and operations that occur within each of these areas that are the primary focus of this notebook.

Categories of Aircraft

There are five types of aircraft that compose the aviation industry: commercial, air taxi operations, commuter, general, and military.

Commercial aircraft encompass air carriers and air taxi flights. Air carriers are airlines holding a certificate issued of public convenience and necessity under Section 401 of the Federal Aviation Act of 1958 authorizing them to perform passenger and cargo services. Air carriers operate aircraft designed to have a maximum seating capacity of more than 60 seats, to have a maximum payload capacity of more than 18,000 pounds, or to conduct international operations. The four different types of air carriers (and their annual operating revenues) are:

- Majors (greater than $1 billion)
- Nationals ($100 million to $1 billion)
- Large regionals ($20 million to $100 million)
- Medium regionals (Up to $20 million).

Air taxi operations are those in which departure time, departure location, and arrival location are specifically negotiated with the customer or by the customer's representative and are conducted with airplanes or rotorcraft having a seating configuration of 30 or fewer seats.

Commuter aircraft are noncertified small regionals who perform scheduled service to smaller cities and serve as feeders to the major hub airports. They generally carry 60 or fewer passengers.

General aviation is all aviation that is not commercial or military. General aviation is the segment of civil aviation that encompasses all facets of aviation except air carriers and commuters. General aviation includes corporate-executive transportation, instruction, rental, aerial application, aerial observation, business, pleasure, and other special uses.

Military refers to the operators of all military (e.g., Air Force, Army, Navy, U.S. Coast Guard, Air National Guard, and military reserve organizations) aircraft using civil airports.

Classification of Airports

The system of airports in the U.S. is the largest and most complex in the world. As of 1990, there were 17,451 civil landing areas (e.g., airports, heliports, seaplane bases, etc.) in the U.S. The activity and services at individual airports vary greatly. Regardless of size, many activities occur at airports including fueling, aircraft maintenance, aircraft washing, and deicing. In addition, two primary activities at most airports are enplaning passengers and enplaning air cargo. Enplaning passengers is defined as the total number

of passengers departing on aircraft at the airport. Enplaning air cargo includes the total tonnage of priority, nonpriority, and foreign mail, express, and freight (property other than baggage accompanying passengers) departing on aircraft at an airport.

Airport Ownership. Public airports in the U.S. are owned and operated under a variety of organizational and jurisdictional arrangements. Commercial airports might be owned and operated by a city, county, or State; or by more than one jurisdiction. Additionally, some airports may be operated by a separate public body, such as an airport authority. Regardless of ownership, legal responsibility for day-to-day operations can be vested in any of five kinds of governmental or public entities:

- Municipal or county government. Municipally operated airports are city owned and run as a department of the city.
- A multipurpose port authority. Port authorities are legally chartered institutions with the status of public corporations.
- An airport authority.
- State government.

Classification of airports with scheduled services. Airports with scheduled passenger service have several classifications:

- Commercial service airports are those airports receiving passenger service and having 2,500 or more annual enplanements.

- Primary airports are commercial service airports having 10,000 or more enplanements.

- Hub airports are airports that serve as a transfer point for passengers changing flights. Commercial service airports are classified as large, medium, or small hub airports or non-hub airports, depending on the percentage of total national enplanements for which they account.

- General aviation airports encompass the bulk of civil aircraft operations. The general aviation system includes 98% of all registered civil aircraft and 95% of all airports.

- Reliever airports are a special category of general aviation airports. Located in the vicinity of major air carrier airports and classified by the Federal Aviation Administration as a reliever, these airports are designed to provide relief to congested major airports.

Terminal Facilities. The terminal and associated landside facilities such as the parking areas and access roads provide the transition zone for passengers

between surface and air transportation. Landside facilities are long-term installations and are largely independent of activities that occur airside. Concession and food service operations provide food and materials goods for passengers.

II.B.1.2. Requirements Pertaining to the Aviation Industry

The Federal Aviation Administration's (FAA's) major responsibilities include overseeing aircraft safety and the competency of pilots and mechanics. The FAA does this by providing mandatory safety rules, conducting safety inspections, and setting high standards for civil aviation.

Noise Abatement. In addition to safety, the FAA also addresses issues such as noise abatement. As a result of complaints against aircraft noise, which increased dramatically with the introduction of jet aircraft, the *Federal Aviation Act of 1958* was amended to include noise abatement regulations designed to establish noise levels which aircraft manufacturers cannot exceed in the development of new aircraft. In 1979, the *Aviation Safety and Noise Abatement Act* authorized the FAA to help airport operators develop noise mitigation abatement programs.

The *Airport Noise and Capacity Act of 1990* authorized DOT/FAA to reduce aircraft engine noise by requiring an aircraft fleet replacement program. The estimated effect of the phase out of larger, noisier aircraft is estimated to reduce the number of people exposed to significant noise levels of aircraft noise in the U.S. from 2.7 million in 1990 to 400,000 by the year 2000, when the phaseout is complete. The law also limited airport operators' abilities to place noise or access restrictions on airports in the interest of avoiding an overly burdensome patchwork of individual operating limitations across the United States.

Standards for Aircraft Design. The FAA works closely with aircraft manufacturers while examining designs for new planes. The FAA sets very high standards for aircraft designs. Once the design has been thoroughly examined and the first model has completed a grueling series of flight tests and evaluations, the model is certificated for production by the FAA (http://www.faa.gov/publicinfo.htm).

Monitoring and Maintenance of Existing Aircraft. Once the aircraft has been certified and put into service, the FAA continues to monitor its performance. When necessary, the FAA will issue repair notices known as "Airworthiness Directives" to the manufacturers and airlines when problems are spotted. The FAA issues several hundred notices a year. In addition, manufacturers often issue Service Bulletins to advise aircraft carriers of safety improvements or procedures that will enhance safety.

FAA airworthiness requirements specify materials to be used during maintenance or other technical specifications and standards (e.g., cleaning, deicing) that limit the airlines' ability to change materials, procedures, or processes.

Flight Personnel. The FAA sets standards for training, health, experience, number of hours worked, and qualifications for pilots and other flight personnel. Because pilots play such a vital role in maintaining aircraft operations safety, they are especially heavily regulated by the FAA. Pilots must have their health examined every six months. They must pass special examinations and flight tests, and those serving as captains are required to possess hundreds of hours of additional flying time. FAA tests their flying skills on a regular basis. DOT and FAA safety policies and rules expressly place the ultimate legal authority for aircraft operation fully and solely on the pilot in command of the aircraft (14 CFR §91.3(a)).

Air Traffic Control Operations. FAA is responsible for developing, maintaining, and operating the nation's Air Traffic Control System, which is in charge of ensuring the safe separation of aircraft during flight and sequencing aircraft for taxiing, takeoff, and landing.

Maintenance Personnel. Airline mechanics and technicians must be certified by the FAA. In addition, repair stations must obtain an FAA operating certificate and are subject to regular inspection by the agency.

For more information about FAA airworthiness requirements, see the FAA website at http://www.faa.gov/publicinfo.htm.

II.B.1.3. International Aviation

After 1945, commercial air transportation began to transcend domestic markets into the international arena, therefore, the standardization of operational practices for international services, such as navigational aids and weather reporting systems, became essential. There were also many political and technical problems that needed to be solved. For example, there was the issue of commercial rights: what arrangements were needed for the airlines of one country to fly into and through territories of another? For more information relating to International Civil Aviation Organization (ICAO) and other international milestones, refer to *Memorandum on ICAO,* January 1994.

II.B.2. Industry Size and Geographic Distribution

Industry Size

According to Dun & Bradstreet, there were an estimated 16,282 air transportation establishments in the U.S. as of April 1997. Exhibit 1 provides information on each of the SIC codes in the air transportation industry, including total number of establishments and employees, and total annual sales.

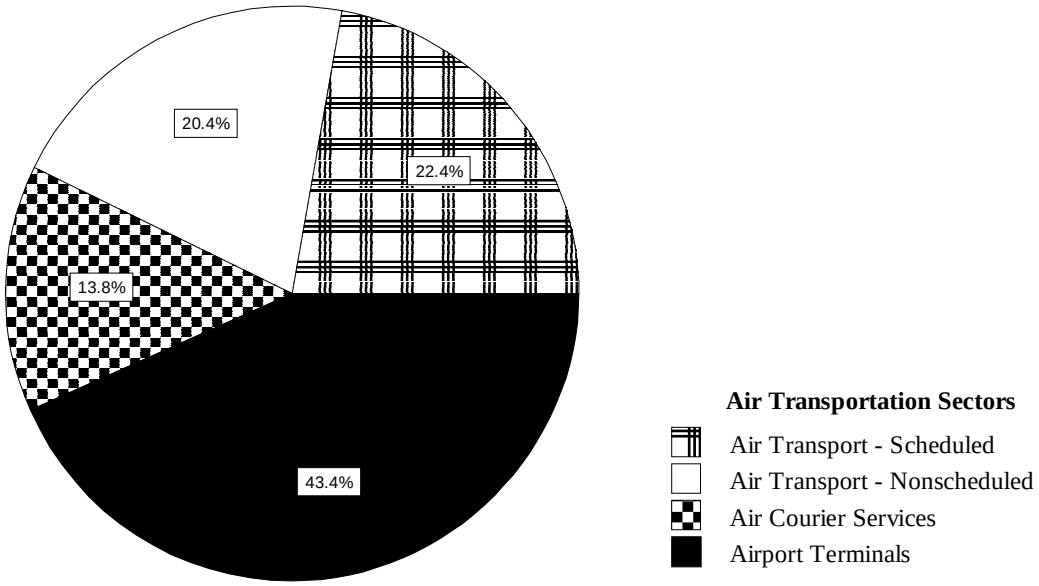
Exhibit 1. Market Size Analysis of Air Transportation Industry

SIC Code	No. of Establishments	No. of Employees	Annual Sales (millions)
4512	3,638	320,837	147,858.6
4513	2,252	75,493	15,172.9
4522	3,321	39,253	7,019.0
4581	7,071	220,986	15,616.8
Total	16,282	656,569	185,667.3

Source: Dun & Bradstreet Marketplace (www.dnb.imarketinc.com), December 1997

Exhibit 2 displays the percentages of establishments per air transportation sector discussed above.

Exhibit 2: Distribution of Establishments by Sector



Source: Dun & Bradstreet Marketplace, December 1997 (www.dnb.imarketinc.com)

Exhibit 3 lists the busiest airports in terms of the total passengers and cargo. Keep in mind that 99% of the nation's airports are much smaller than these airports, but conduct the same activities to a lessor extent or volume.

Exhibit 3. Activity at the 10 Busiest Airports (1996)			
Leading Airports in Passengers Arriving & Departing (Millions)		**Leading Airport in Cargo Tons Enplaned & Deplaned (Thousands)**	
Chicago O'Hare	69.2	Memphis	1934
Atlanta	63.3	Los Angeles	1719
Dallas/Ft. Worth	58	Miami	1710
Los Angeles	57.9	New York Kennedy	1636
San Francisco	39.3	Louisville	1369
Miami	33.5	Anchorage	1269
Denver	32.3	Chicago O'Hare	1259
New York Kennedy	31.2	Newark	958
Detroit	30.6	Atlanta	800
Las Vegas	30.5	Dallas/Ft. Worth	774

Source: 1997 Air Transport Association Annual Report

The activity and services of the aviation industry vary greatly. Exhibit 4 presents the top 10 airlines of scheduled service in the U.S.

Airline	
Delta	97.2
United	81.9
American	79.3
US Airways	56.6
Southwest	55.3
Northwest	52.7
Continental	35.7
Trans World	23.3
America West	18.1
Alaska	11.8

Source: 1997 Air Transport Association Annual Report

Company size varies greatly among air transportation facilities. Exhibit 5 presents an analysis of the number of businesses compared to the number of employees per air transportation sector. The distribution of establishments with a specific employee size varies from one SIC code to another.

Exhibit 5. Number of Businesses by Company Size

No. of Employees	Number of Businesses			
	Scheduled	Nonscheduled	Air courier	Airports
1	147	381	104	854
2 to 4	436	1533	985	1699
5 to 9	415	572	265	1092
10 to 24	484	450	244	837
25 to 49	286	172	148	386
50 to 99	219	64	151	217
100 to 249	252	41	208	189
250 to 499	75	6	7	79
500 to 999	31	2	5	27
1,000 to	43	3	2	25
> = 10,000	6		1	3
Unknown	1244	97	131	1674
Totals	3638	3321	2252	7071

Source: Dun & Bradstreet Marketplace, December 1997 (www.dnb.imarketinc.com)

Geographic Distribution

The air transportation industry is widely dispersed. Of the total of 16,282 U.S. establishments in the air transportation industry, most are located in California, Texas, Florida, Illinois, and New York. Exhibits 6 and 7 identify the five states with the most establishments and employees by air transportation SIC code.

SIC Code					
Air transportation, scheduled (SIC 4512)	CA (426)	FL (369)	NY (321)	TX (258)	IL (200)
Air transportation, nonscheduled (SIC 4522)	CA (348)	FL (314)	TX (236)	NY (151)	AK (146)
Air courier services (SIC 4513)	CA (328)	NY (308)	FL (208)	TX (194)	IL (91)
Airports, flying fields, & services (SIC 4581)	CA (747)	TX (641)	FL (551)	NY (304)	IL (264)

Source: Dun & Bradstreet Marketplace, December 1997 (www.dnb.imarketinc.com)

Exhibit 7. Top Five States with Air Transportation Industry Employees

SIC Code	States (Number of Employees)				
Air transportation, scheduled (SIC 4512)	TX (37,691)	CA (31,396)	MN (31,363)	GA (30,484)	NY (18,111)
Air transportation, nonscheduled (SIC 4522)	FL (3,662)	CA (3,580)	MN (2,546)	IN (2,437)	MI (2,428)
Air courier services (SIC 4513)	TN (20,374)	CA (6,299)	OH (6,299)	NY (5,762)	TX (5,143)
Airports, flying fields, & services (SIC 4581)	FL (36,414)	CA (35,225)	TX (15,755)	NY (15,702)	IL (15,762)

Source: Dun & Bradstreet Marketplace, December 1997 (www.dnb.imarketinc.com)

Exhibit 8 presents the top five states for each SIC code with the highest total sales in millions of dollars. California, Florida, New York, and Texas are consistently among the top five for these sectors.

Exhibit 8. Top Five States with Highest Air Transportation Sales					
SIC Code	**States (Total sales in millions)**				
Air transportation, scheduled (SIC 4512)	TX (41,080.5)	IL (36,807)	MN (27,512)	VA (13,859)	GA (13,109.7)
Air transportation, nonscheduled (SIC 4522)	IN (1,019.9)	OR (776.7)	FL (516.2)	CA (534.70)	NY (506.1)
Air courier services (SIC 4513)	TX (8,867.3)	CA (2,793.6)	WA (1,976)	OH (602.1)	NY (353.9)
Airports, flying fields, & services (SIC 4581)	FL (3,426.5)	NY (2,544.7)	TX (1,762.8)	VA (1,639)	CA (596.4)

Source: Dun & Bradstreet Marketplace, December 1997 (www.dnb.imarketinc.com)

II.B.3. Economic Trends

Aviation Trends and Forecasts

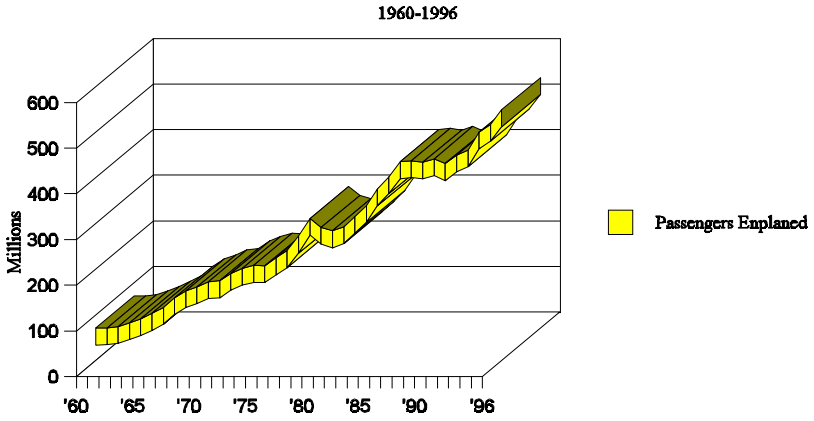
The aviation industry has been growing steadily and is expected to continue. U.S. commercial air carrier passenger enplanements, which had averaged less than 1.0 percent growth between 1990 and 1993, grew at an annual rate of 6.2 percent over the last 3 years. In 1996, the large U.S. air carriers increased their system capacity by only 2.9 percent, while passenger demand increased by 6.1 percent. Exhibit 9 presents the trends for U.S. scheduled airlines in passengers enplaned and domestic cargo from 1960 to 1996.

Exhibit 9: Summary of Domestic Passenger Traffic

The FAA predicts that domestic departures for commercial carriers will increase from 7.1 in 1997 to 9.2 million by 2008. Exhibit 10 presents additional FAA forecasts for the aviation industry.

Exhibit 10. Forecast for U.S. Commercial Carriers and Regionals/Commuters FY1998 - 2009

Year	Passengers (Millions) [1]	Revenue Passenger Miles (Billions) [1]	Jet Aircraft [2]	Aircraft Operations (Millions) [3]
1998	656.1	635.3	5,092	24.7
1999	676.3	660.7	5,224	25.1
2000	699.1	688.5	5,444	25.5
2001	724.7	720.3	5,698	26.2
2002	753.2	755.2	5,913	26.9
2003	782.9	791.7	6,119	27.5
2004	813.7	829.7	6,361	28.1
2005	845.6	869.7	6,574	28.7
2006	878.8	911.6	6,778	29.4
2007	913.4	955.6	6,983	30.0
2008	949.4	1,001.9	7,203	30.7
2009	986.7	1,050.2	7,419	31.4



Source: ATA Airline Traffic Stats 1960-1996

Source: Federal Aviation Administration.
1 U.S. commercial air carriers and regionals/commuters, domestic plus international.
2 Commercial air carriers.
3 Landings and takeoffs of air carriers and air taxi/commuters at FAA and contract tower airports.

Impacts of Deregulation

Before 1978, the United States airline economy was tightly regulated by the federal government. However, due to complaints of high airfares and growing concerns that government regulation was inhibiting the growth of the airline industry, the Deregulation Act of 1978 was passed. Since then, several important trends have characterized the airline industry.

Rapid expansion of overnight delivery of mail. Air cargo was deregulated a year before the passenger airlines. Deregulation was responsible for dramatic results for all aspects of the cargo business, but particularly for express package delivery for high value and time sensitive packages. Deregulation gave express carriers operating freedom, and the direct result was outstanding growth for that part of the aviation industry over the next decade.

Increase of Total Revenue Sales. Total sales revenues for the industry as a whole (in adjusted dollars) have increased each consecutive year except for a brief decline from 1989 through 1991. This brief decline can be explained largely by two factors: (1) Northwest Air Lines was private during those same years, so its revenues were not included in the industry data, and (2) Eastern Air Lines experienced a major labor strike that began in March 1989. As indicated by its financial data from 1989 to 1991, Eastern was able to continue

operation, in spite of the labor strike, by charging fares below its costs. Eastern's unusually low fares may have caused other airlines to reduce fares in a similar fashion, and this reduced the total revenue earned by the industry as a whole. Current projections are that industry revenues will continue to rise due to the strengthened economy and a predicted 5% increase in airline traffic.

Increased number of airlines. Following deregulation in 1978, the number of companies increased dramatically from about 36 carriers in 1978 to a total of 123 such carriers in 1984. This initial increase resulted from the market becoming more accessible to new companies that sought to operate below the costs of older, established airlines with higher cost structures. However, a clear decline in the number of air carriers in the late 1980s followed this initial increase due to weaker airlines being forced out of business or being taken over by the stronger companies. Then by 1993, the numbers increased again as numerous small airlines emerged, offering direct, low cost, no-frills service. To compete with these lower cost airlines, many of the larger airlines are initiating their own low cost divisions. The Brookings 1986 Report estimated that the traveling public was saving $5.7 billion a year (measured in 1977 dollars) as a result of deregulation (www.air-transport.org/handbk/chaptr02.htm).

Expanded market. A major development since deregulation was the creation of hub and spoke networks. The hubs are strategically located airports used as transfer points for passengers traveling from one location to another. The hub and spoke systems were developed in order to enable airlines to serve far more markets, with the same size fleet, than the traditional direct, point-to-point service.

Deregulation also sparked marketing innovations used by most major airlines and many smaller airlines that equate to fare discounts, such as the frequent flyer program that is designed to reward repeat customers with free tickets and other benefits.

The appearance of new airlines, combined with the rapid expansion into new markets by many of the established airlines, resulted in unprecedented popularity and competition in the airline industry. In 1977, the last full year of government regulation of the airline industry, the US airlines carried 240 million passengers. By 1993 they were carrying nearly 490 million. A study by the Department of Transportation a decade after deregulation found that well over 90% of airline passengers had a choice of carriers compared to only two-thirds in 1978 (www.air-transport.org/handbk/chaptr02.htm)

III. DESCRIPTION OF OPERATIONS

This section describes the major operations and maintenance activities within the air transportation industry. The section is designed for those interested in gaining a general understanding of the industry, and for those interested in the relationship between the industrial process associated with air transportation, and the associated environmental aspects and potential impacts of the processes. This section is not exhaustive; the operations and maintenance activities discussed are intended to represent the air transportation practices and activities with potentially significant environmental impacts. These activities are presented in two categories:

(1) *Aircraft operations*, including maintenance, cleaning, fueling, and deicing; and

(2) *Airport operations*, including terminal activities, loading and off loading.

This section does not attempt to replicate published engineering information that is available for this industry. Refer to Section VIII for a list of resource materials that are available.

III.A. Aircraft Operations and Associated Environmental Aspects

III.A.1. Aircraft and Aviation-Support Vehicle Maintenance

Aircraft maintenance activities include scheduled preventive maintenance, repairs required as a result of inspections, and aircraft refurbishing. When an aircraft is built, the manufacturer creates a maintenance program for the operator of the plane. Representatives from the manufacturer, the Federal Aviation Administration (FAA), subcontractors, and the airline that purchases the aircraft form a review board that develops minimum requirements of a maintenance program. This maintenance program is then documented and followed throughout the aircraft's life.

Together, scheduled maintenance and day-to-day preventive activities are necessary to keep the aircraft safe and reliable. In general, aircraft maintenance is the function of three factors: (1) hours of flight time, (2) number of landing and take off cycles, and (3) calendar length of time from prior maintenance. Aircraft preventive maintenance starts with daily inspections of items such as tires, brakes, and fluid levels. The aircraft then continues to receive many levels of maintenance that include fluid and filter changes, detailed testing, inspections for cracks and corrosion, and after many hours of flying (usually over 100,000), complete refurbishing of the aircraft to return the plane to its original condition.

Aviation-support vehicles undergo a similar, yet less rigorous schedule of inspections, testing, and maintenance that includes oil and fluid changes, battery replacement, and repairs including metal machining.

Environmental Aspects and Potential Impacts of Aircraft Maintenance

Environmental aspects of aircraft maintenance include the use and disposal of aircraft and vehicle fluids such as:

- Wastewater from parts cleaning, metal finishing, or coating applications
- Generation of hazardous wastes consisting of flammable and metals-contaminated solvents, used hand-wipes, and sludges collected during all maintenance operations
- Hazardous air pollutant (HAP) emissions from solvent-based cleaners and coatings used in all activities.

Wastes generated as a result of aircraft and aviation-support vehicle maintenance and repair activities can include used oil, spent fluids, batteries, metal machining wastes, organic solvents, and tires. Some of these wastes can be toxic or otherwise hazardous, and uncontrolled releases can contaminate surface water, groundwater, and soils. Typical materials used in each operation and the potential impacts of use and disposal of these materials are identified in Exhibit 11. A description of these operations and associated environmental impacts appear below.

Lubrication and Fluid Changes. Lubrication and fluid changes are part of the aircraft standard maintenance program. These activities occur at regular intervals, and as inspections indicate they are necessary. In conducting aircraft lubrication and fluid changes, these operations may generate waste oil and greases. These materials have the potential to contaminate water supplies and soil if not properly stored. By storing these materials in secure containers or tanks with secondary containment, the potential for releases to impact the environment is significantly reduced.

Operation	Activities	
Lubrication and Fluid Changes	Storage, transfer, and disposal of petroleum products	Potential to contaminate soil, groundwater, and surface waters, if spilled or allowed to enter storm drains

Exhibit 11. Maintenance and Refurbishing Operations: Activities and Potential Environmental Impacts		
Operation	**Activities**	**Environmental Aspects and Potential Impacts**
Battery repair and replacement	Storage of batteries containing sulfuric acid	Potential to contaminate soil, groundwater, and surface waters with hazardous material, if not contained and covered from weather
Chemical Milling Maskant Application and Chemical Milling	Use and disposal of maskants containing either toluene/xylene mixture or perchloroethylene	Air pollution from organic HAP emissions, waste maskant
Parts Cleaning	Aqueous, semi-aqueous, and solvent-based cleaner use and disposal	Water pollution from wastewater containing cleaners, waste solvents; metals, oil, and grease Air pollution from organic HAP emissions
Metal Finishing	Use and disposal of processing solutions, cyanide, heavy metal baths	Air pollution from HAP emissions; contaminated wastewater including cyanide solutions, corrosive acid and alkali solutions; heavy metal sludges
Coating Application	Primer and topcoats application and disposal	Air pollution from organic HAP emissions; waste paint; waste solvent thinner
Depainting	Chemical or blast depainting agents use and disposal	Contaminated sludge (stripper solution and paint residue); air contamination from VOC emissions from paints; solid waste containing paint chips and spent blasting media.
Painting	Paint use, storage, and disposal	Soil or water contamination from disposal of waste paint, thinners, solvents, resins; air contamination by VOC emissions.

Battery repair and replacement. Battery repair and replacement involve removing, repairing, and recharging aircraft and vehicle batteries. These operations have the potential to impact the environment if sulfuric acid in the batteries is released. Acid has the potential to contaminate soil and groundwater supplies, and to cause personnel injury if used batteries are not properly handled. By using proper safety equipment during handling, and storing batteries in a contained and covered area that is not exposed to rain water, batteries are less likely to cause a significant impact.

Chemical Milling Maskant Application and Chemical Milling. This operation uses etchant solutions to reduce the thickness of selected areas of metal parts in order to reduce weight. Chemical milling maskants are typically rubber- or polymeric-based coatings applied to an entire part or subassembly by brushing, dipping, spraying, or flow coating. After the chemical milling maskant is cured, it is removed from selected areas of the part where metal is to be removed during the chemical milling process.

Chemical milling maskants typically contain either a toluene/xylene mixture or perchloroethylene as solvent constituents. These chemical solvents vaporize when exposed to air, and if not stored in tightly sealed containers, become a source of hazardous air pollutants (HAPs). These organic HAP emissions also occur as the solvent evaporates as the chemical milling maskant is applied and cured.

Parts Cleaning. Aircraft components are cleaned frequently to remove contaminants such as dirt, grease, and oil. Cleaning is performed using a wide variety of cleaning materials, including aqueous, semi-aqueous, or, in some cases, solvent-based cleaners. Recently, many aircraft maintenance facilities have substituted solvent-based cleaners with water-based cleaning materials. Many components are cleaned with soap and water.

Parts cleaning operations can include immersion, flush, spray gun cleaning, or hand wiping of aircraft components. For most parts, cleaning is typically performed by a hand wiping process. However, parts that are either too large or too intricate to hand wipe are cleaned by immersion in large solvent baths or parts cleaning machines. Assemblies and parts with concealed or inaccessible areas may be cleaned by pouring the cleaning material over or into the part. The cleaning material is then drained from the part and the procedure is repeated as many times as necessary to ensure the required cleanliness.

The potential environmental impact of parts cleaning operations is dependent on the type of cleaning solution used. Halogenated, solvent-based cleaning materials potentially have the most significant impact. These solvents can generate organic HAP emissions from the evaporation of solvents during the cleaning process, including: (1) evaporation of solvent from open containers and solvent-soaked cloth and paper, and (2) emissions from storage tanks used to store cleaning solvents. In addition, solvent spills have the potential to contaminate soil, groundwater, or surface water. Contamination can be caused by hazardous constituents found in solvents themselves, as well as in metals, oils, and other potential contaminants found in the parts being cleaned. Spent hazardous solvents must be managed as hazardous wastes. Typically, they are reclaimed by a RCRA permitted hazardous waste recycler.

Facilities that use aqueous or semi-aqueous cleaning materials have a much less significant potential environmental impact because they do not generate hazardous air emissions. They do, however, generate metals, oil, and grease in the aqueous system that have the potential to contaminate water supplies. Wastewater from these cleaning processes is required to be treated onsite in accordance with the facility's wastewater discharge permit (known as a National Pollutant Discharge Elimination System or NPDES permit) or according to standards set by any local pretreatment programs.

Metal Finishing. Metal finishing processes are used to prepare the surface of a part for better adhesion, improved surface hardness, and improved corrosion resistance. Typical metal finishing operations include chemical conversion coating, anodizing, electroplating, and any operation that chemically affects the surface layer of a part. Each of these metal finishing operations has the potential to significantly impact the environment by discharging metals, cyanides, phosphates, acids, and other contaminants to waterways, soil, or groundwater.

HAP emissions and contaminated wastewater are the most significant environmental aspects of metal finishing operations. As the organic chemicals in the processing solutions evaporate, they generate hazardous vapors and emissions. Evaporation of solution also occurs from refurbished parts as they are removed from the processing tanks. Wastewater from these operations includes cyanide solutions, corrosive acid, and alkali solutions. This water is typically treated prior to discharge, in accordance with a facility's NPDES permit or applicable pretreatment requirements. For more details on metal finishing processes and the associated environmental aspects, see EPA's Sector notebook titled *Profile Of The Fabricated Metal Products Industry* (EPA 310-R-95-007).

Coating Application. A coating is a material that is applied to the surface of a part to form a decorative or functional solid film. The most common coatings are primers and topcoats. Coatings are applied to aircraft components using several methods of application. The methods most commonly used are spraying, brushing, rolling, flow coating, and dipping. Nearly all coatings contain a mixture of organic solvents. Spray guns and other components of coating units must be cleaned when switching from one coating to another. The cleaning of spray guns involves disassembling the gun and placing the parts in a vat containing an appropriate solvent. The residual coating is brushed or wiped off the parts.

Organic HAP emissions from coating application are generated from evaporation of solvents during mixing, application, and from overspray, which is exhausted from spray booths or hangars. Coating operations also

produce waste paint and waste solvent thinner that are typically drummed and shipped offsite as RCRA hazardous waste.

Depainting. Depainting involves the removal of coatings from the outer surface of aircraft. Two methods are chemical stripping and blast depainting. During chemical stripping, stripping agents are applied to the aircraft, allowed to degrade the coating, and then scraped or washed off with the coating residue. Blast depainting methods use a media such as plastic, wheat starch, carbon dioxide, or high pressure water to remove coatings by physically abrading the coatings from the surface of the aircraft. Depainting operations can produce either a liquid or solid waste stream, depending on the type of process used.

Air pollution and soil or water contamination are potential impacts from depainting. Chemical depainting generates organic HAPs from evaporation of the solvents in the stripping solution, while particulate emissions occur from the blasting media. Depainting operations can produce either a liquid or solid waste stream, depending on the type of process. Chemical depainting processes produce a liquid sludge that consists of the stripper solution and paint residue. Blast depainting processes produce a solid waste stream that consists of paint chips and spent blasting media. These wastes are required to be characterized as hazardous or nonhazardous and disposed of appropriately.

Painting. Aircraft painting generally occurs in an enclosed area to minimize potential environmental and human health impacts. High pressure, low volume, and electrostatic painting systems can reduce the amount of paint needed for a job.

Aspects of painting with potential environmental impacts include management of unused paints, spray paint booth air filters, and spent paint thinner, and emissions of volatile organic compounds (VOCs) from thinners and solvents. Spent paint filters often must be handled as hazardous waste because of the presence of wet paint or paint containing lead or chromium. Through proper training of employees and the use of high efficiency equipment, painting operations have been able to reduce paint waste, minimize air emissions, and protect the health of employees.

III.A.2. Fueling

An essential part of any airport operation is the fueling of aircraft. Fueling is conducted either by tank trucks or a central underground fueling system. In both operations, fueling involves the transfer of a potentially hazardous liquid to the aircraft. Aviation fuels are broken down into two classes. The reciprocating engines use various grades of aviation gasoline, while the jet class, which includes gas turbines, utilizes jet fuels. There are grades of aviation gasoline that are readily identified by the color-coded dyes added to them. The color-coded system aids maintenance personnel in finding fuel leaks when they occur and prevents fueling mixups.

For jet fuel, there are two basic grades of jet fuel, Jet-A and Jet-B. Jet-A fuel, a narrow cut kerosene product, is the standard commercial and general aviation grade available in the United States. It usually contains no additives but may be additized with an anti-icing chemical. Jet-A1 is identical to Jet-A except that it has a lower freeze point. It is used outside the United States and is the fuel of choice for long haul flights where the fuel temperature may fall to near the freeze point. It often contains a static dissipator additive. Jet-B fuel is a wide cut kerosene with lighter gasoline-type naphtha components. It is not used by the commercial air transportation sector, however, it is used by the military.

Fuel tanks are generally located in the wings of light aircraft. However, depending on the make and model of the aircraft, it is also common to find fuel tanks in the main fuselage. Fuel lines range in diameter from 1/8 of an inch to as large as 4 inches on very large aircraft. Fuel lines of aircraft using wing tanks are located back from the leading edge of the wing. With fuselage tank model twin-engine aircraft, the fuel lines run from the fuselage tanks out through the wing structure along the wing spar into the engine compartment. On single-engine aircraft, the fuel lines are routed from the fuel tank to the firewall, and then to the engine.

Environmental Aspects and Potential Impacts of Fueling

The major environmental aspect of fueling operations is managing the fuel so that it is not released to the environment, either to the air, water, or soil. Leaking pipes or improper connections between fueling lines and the aircraft can allow fuel vapors to be released to the air, causing air contamination. Leaks, improper connections, and improperly monitored storage tanks also can lead to fuel spills. As a contingency measure, many airports and airlines employ vacuum sweeper trucks as well as hand operated sweeper units for spill response. Vacuum sweepers allow the spilled material to be removed quickly from the site while minimizing the spill's potential to impact the environment. If spills are not contained or diverted to an established

treatment system, they may end up being discharged to soil and groundwater either directly through storm drains, or as sheet runoff during rain events.

Underground fueling systems that are not maintained properly can leak into the surrounding soils and eventually contaminate groundwater. EPA regulations for underground storage tanks require tanks to be upgraded and monitored to reduce the probability of leaks to groundwater.

By conducting activities to prevent releases such as maintaining fuel tanks, lines, and fueling systems, and by assuring proper training of employees, the possibility of leaking tanks, equipment leaks, or accidental spillage is reduced substantially.

III.A.3. Aircraft Cleaning

Exterior cleaning of aircraft typically consists of washing with detergent solutions and a water rinse. Small aircraft cleaning is carried out using hand held spray nozzles, hoses and brushes. For larger aircraft, wet cleaning usually is limited to wheel wells and landing gear and is conducted to facilitate inspections. In addition, wet cleaning sometimes is performed on wing structure and flap-sequencing carriage areas for overhaul and inspection processes and on the lower aircraft fuselage for removal of accumulations of oil and grease.

Because it can be more economical (e.g., lower water costs) to dry polish aircraft fuselages rather than wash them with water and cleaning solutions, aircraft are cleaned using dry methods whenever possible.

Environmental Aspects and Potential Impacts of Cleaning

The primary environmental aspect of aircraft cleaning is the generation and disposal of wastewater from cleaning aircraft exteriors. If high pressure steam cleaners are used, water use may range from 10-20 gallons for washing small aircraft, and between 100 and 200 gallons for large aircraft.[2] Wastewater from cleaning activities may contain diluted cleaning chemicals, low concentrations of metals, oil and grease, solvents, dirt and grit, or other materials that are used as detergents, or are found in the aircraft itself. If not treated, the washwater has the potential to pollute the soil, groundwater, and surface waters.

[2] A Boeing 727 is an example of a narrow-body aircraft, while MD-11's, Boeing 747's and 767's are examples of wide-body aircraft.

To prevent such contamination, wastewater from cleaning operations usually drains to catch basins where it is mixed with other airport wastewater and discharged at an onsite treatment facility prior to discharge in accordance with the facility's NPDES permit. Prior to discharge, the wastewater may also pass through a holding tank where metals, dirt, and grit settle to the bottom, oil and grease are skimmed off the water surface, and the remaining water is discharged. If the washwater is not treated onsite, it may be discharged to a publicly owned treatment works (POTW), where it is treated prior to discharge. Washwater discharged to the POTW may be subject to pretreatment requirements established by EPA and the POTW.

III.A.4. Aircraft Deicing and Anti-Icing

As noted earlier, FAA regulations govern every aspect of airline and airport operations, including procedures and standards for aircraft maintenance and airworthiness, including aircraft deicing. Aircraft deicing and anti-icing are key components in assuring cold weather aircraft safety. Deicing and anti-icing remove from and inhibit for a period of time the formation of ice and snow on wings, fuselages, and other parts of the airplane that provide lift during takeoff. Common practice is to deice (remove accumulation) then anti-ice (protect from further accumulation) aircraft before takeoff. These processes use glycol-based materials, including ethylene glycol, diethylene glycol, or propylene glycol.

Aircraft deicing is carried out either at the departure gate area or at a central or remote facility in the vicinity of the runway to minimize the amount of time between treatment and takeoff. Central and remote deicing areas facilitate collection of deicing fluids for recycling and treatment.

Deicing is almost performed exclusively using hand held nozzles and hoses. Automatic deicer spray machines, called "deicing gantries", have been developed in recent years. However, there are some limitations on the practicality of such equipment and the associated capital investment.

Environmental Aspects and Potential Impacts of Deicing

Deicing operations generate spent deicer fluids. These fluids drain from the aircraft surfaces or from the runway surfaces to drains that direct the fluids to onsite water treatment facilities, to storm drains, or simply to paved surfaces where they may be discharged to local waterways or groundwater as sheet runoff. In some cases, deicing fluids may be released directly to the environment through runoff to surface waters or infiltration to groundwater. Glycol-based fluids deplete oxygen from the waters in which they are disposed and have toxic effects on life forms in those waters (*Aviation Week and Space Technology*, January 1995).

In general, each airport has its own distinct characteristics and drainage systems and collecting deicing fluid for reuse or recycling may not be practical. However, some airports have constructed deicing fluid collection systems that prevent discharge to storm water sewers and segregate spent deicer from other wastewater for reclamation, recycling, onsite treatment, or disposal offsite. FAA allows the reuse of deicing fluids that are reformulated and re-certified to meet appropriate aircraft deicing fluid specifications. However, at this time, the aviation industry has not recycled glycols for reuse on aircraft or runways due to cost. Some reclaimed deicing fluids may be sold in secondary markets (e.g., windshield deicers for automobiles). In compliance with Clean Water Act requirements, spent deicing fluids are treated either in the facility wastewater treatment system, discharged to publicly owned wastewater treatment plants, or discharged directly to surface waters in accordance with permit conditions.

III.A.5. General Aircraft Operational Activities

As discussed earlier, the FAA has jurisdiction over all aircraft operations and prohibits states and local governments from regulating in the areas of aircraft operations and airspace management. In addition, the exclusive jurisdiction also extends to environmental statutes as they relate to the aviation industry. For example, Section 233 of the Clean Air Act specifically prohibits states from regulating air pollution from aircraft engines.

Aircraft Operation. The mode of operation of the aircraft can be broken down into five stages: idling at gate and runway; engine power up; taxiing; takeoff and climb out; and approach and landing. Depending on the type of engine and aircraft, these activities can consume varying amounts of resources and produce various pollutants. Because fuel is the airline industry's second largest expense, increasing fuel efficiency of aircraft engines has been a top priority of U.S. airlines. Over the past two decades, U.S. airlines have increased fuel efficiency nearly 50% by lowering cruising speeds, using computers to determine optimum fuel loads and to select altitudes and routes that minimize fuel burn; and keeping aircraft exteriors trimmed (i.e., stowed) to minimize aerodynamic drag.[3]

The environmental aspects of aircraft operation are related to the use and burning of fuel. Fuel has the potential to cause varying environmental impacts depending on the type of fuel, the efficiency of burning, and the manner in which excess fuel is discarded. During aircraft operations, engines emit hydrocarbons, carbon monoxide, and nitrogen oxides (NOx). Hydrocarbon and carbon monoxide emissions result from incomplete combustion at the lower power settings for descent, or when idling or taxiing on the ground.

[3] *The Airline Handbook*, Chapter 9: Airlines and the Environment from the Air Transport Association, 1997.

NOx, the result of combustion products mixing with nitrogen in the air, is produced when engines are at their hottest, such as during takeoffs and, to a lesser extent, during cruise when jet engines also produce carbon dioxide and water vapor.

Aircraft loading and off loading. Aircraft loading and off loading includes all activities associated with the movement of materials, items, and people in and out of airplanes. Regardless of the type of airport, aircraft loading and off loading occur an infinite number of times daily throughout the U.S. Aircraft cargo loads consist of several different items, including but not limited to passengers, baggage, mail, live animals, dangerous goods (including hazardous materials), and wet cargo (e.g., fresh fish, seafood, meat, casings, etc.).

The primary loading and off loading activity with a potentially significant impact on human health and the environmental is the loading and off loading of hazardous materials. Though a rare occurrence, these loading activities have the potential to contaminate soil, groundwater, or surface water in the event of a spill or release. Facilities minimize and control these impacts through development and implementation of spill prevention control and countermeasures plans, storm water pollution prevention plants, and other emergency response programs.

If hazardous materials are transported by aircraft, the materials are subject to U.S. Department of Transportation (DOT) requirements that regulate aircraft inspections, placement of materials, packaging, and shipping papers (e.g., waybills, manifests). If hazardous materials are loaded onto an airplane, containers should be inspected for proper labeling/placarding, any signs of leakage, and compatibility with other hazardous materials. If damage or spillage of a package containing hazardous materials is observed on board an aircraft or during loading/off loading, immediate action must be taken in accordance with company or airport procedures.

Transportation of Dangerous Goods. Once hazardous materials are loaded onto aircraft, they are transported to their destination. In preparation for transport, they are stored, segregated and secured to assure safety during the transportation process. If improperly stored and secured, dangerous goods have the potential to not only impact the health of workers and passengers, but also to impact the safety of the aircraft itself.

To assure that these goods are transported in a safe manner, regulations have been established by DOT and the International Civil Aviation Organization (ICAO) Dangerous Goods Panel. These standards regulate the types of materials that can be transported, and the types of aircraft in which they can be transported. The ICAO Dangerous Goods regulations include a detailed

list of individual articles and substances specifying the United Nations classification of each article or substance, their acceptability for air transport, and the conditions for their transport.

According to the regulations, dangerous goods may be transported in one of the following ways: they may not be carried on any aircraft under any circumstances; they are forbidden under normal circumstances, but may be carried with specific approvals from the States concerned; they may be carried only on cargo aircraft; or they may be safely carried on passenger aircraft, provided certain requirements are met. It should be noted that most dangerous goods fall into the latter transport category.

The ICAO Dangerous Goods regulations also provide packing instructions for all dangerous goods acceptable for air transport with a wide range of options for inner, outer, and single packaging. In addition, all individuals involved in the preparation or transport of dangerous goods must be properly trained to carry out their responsibilities. Information on the goods must be conveyed by the pilot to air traffic services to aid in the response to any aircraft incident or accident. Finally, dangerous goods accidents or incidents must be reported, so that an investigation by the relevant authorities can establish the cause and take corrective action.

Aircraft Noise. Another type of pollution generated from the operation of aircraft is noise pollution. Noise from airports is a significant negative impact for many people in the airport vicinity. Federal noise regulations require all large aircraft to meet noise standards. FAR Part 150 regulations address the issue of aircraft noise and provide a comprehensive scheme for planning and mitigation measures funded by aviation trust funds intended to reduce noise impacts on the public (US EPA Office of Federal Activities, *Pollution Prevention/Environmental Impact Reduction Checklist for Airports*).

Air Pollutants from Transportation

The EPA Office of Air Quality Planning and Standards has compiled air pollutant emission factors for determining the total air emissions of priority pollutants (e.g., total hydrocarbons, SOx, NOx, CO, particulates, etc.) from many transportation sources. The Aerometric Information Retrieval System (AIRS) contains a wide range of information related to stationary sources of air pollution, including the emissions of a number of air pollutants which may be of concern within a particular industry. Exhibit 12 summarizes annual releases (from the industries for which a Sector Notebook Profile was prepared) of carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter of 10 microns or less (PM_{10}), total particulates (PT), sulfur dioxide (SO_2), and volatile organic compounds (VOCs).

Exhibit 12. Annual Air Pollutant Releases by Industry Sector (tons/year)							
Industry Sector	CO	NO_2	PM_{10}	PT	SO_2	VOC	TOTALS
Power Generation	366,208	5,986,757	140,760	464,542	13,827,511	57,384	20,843,162
Petroleum Refining	734,630	355,852	27,497	36,141	619,775	313,982	2,087,877
Iron and Steel	1,386,461	153,607	83,938	87,939	232,347	83,882	2,028,174
Pulp and Paper	566,883	358,675	35,030	111,210	493,313	127,809	1,692,920
Stone, Clay, and Concrete	105,059	340,639	192,962	662,233	308,534	34,337	1,643,764
Transportation*	**128,625**	**550,551**	**2,569**	**5,489**	**8,417**	**104,824**	**800,475**
Organic Chemicals	112,410	187,400	14,596	16,053	176,115	180,350	686,924
Inorganic Chemicals	153,294	106,522	6,703	34,664	194,153	65,427	560,763
Nonferrous Metals	214,243	31,136	10,403	24,654	253,538	11,058	545,032
Lumber and Wood Production	122,061	38,042	20,456	64,650	9,401	55,983	310,593
Metal Mining	4,670	39,849	63,541	173,566	17,690	915	300,231
Nonmetal Mining	25,922	22,881	40,199	128,661	18,000	4,002	239,665
Plastic Resins and Synthetic Fibers	16,388	41,771	2,218	7,546	67,546	74,138	209,607
Metal Casting	116,538	11,911	10,995	20,973	6,513	19,031	185,961
Rubber and Misc. Plastics	2,200	9,955	2,618	5,182	21,720	132,945	174,620
Motor Vehicles, Bodies, Parts and Accessories	15,109	27,355	1,048	3,699	20,378	96,338	163,927
Textiles	8,177	34,523	2,028	9,479	43,050	27,768	125,025
Printing	8,755	3,542	405	1,198	1,684	103,018	118,602
Fabricated Metals	4,925	11,104	1,019	2,790	3,169	86,472	109,479
Pharmaceuticals	6,586	19,088	1,576	4,425	21,311	37,214	90,200
Furniture and Fixtures	2,754	1,872	2,502	4,827	1,538	67,604	81,097
Ship Building and Repair	105	862	638	943	3,051	3,967	9,566
Electronics and Computers	356	1,501	224	385	741	4,866	8,073
Dry Cleaning	102	184	3	27	155	7,441	7,912

* "Transportation" includes air, water, railroad, trucking, and pipeline categories and SIC codes, and as such, represents a very broad range of industries. This represents stationary source air emissions only, not mobile sources.

Source: U.S. EPA Office of Air and Radiation, AIRS Database, 1997.

III.B. Airport Operations

Airport operations include all activities related to operating and maintaining the airport. These activities include operation and maintenance of runways, control towers, maintenance facilities, aircraft gates, baggage handling facilities, and general airport operations. This section focuses on two of these activities: runway deicing and general operations.

III.B.1. Runway Deicing

Airport runways, taxiways, and gate areas are sprayed with deicer and anti-icer to remove and prevent the buildup of ice and snow that would inhibit taxing, takeoff, and landing. Pavement deicing/anti-icing breaks the bond holding ice and compacted snow to the surfaces of runways and taxiways, facilitating mechanical ice and snow removal, and allowing aircraft to maintain adequate friction between aircraft tires and the runway. Runway and ramp deicing is usually done with one or more substances (e.g., glycol, urea, sodium formate, and/or potassium acetate). Sand is usually reserved to prevent slippage at the gate area, but not on taxiways and runways due to potential engine ingestion hazards.

Environmental Aspects and Potential Impacts of Runway Deicing

Deicing mixtures have the potential to contaminate groundwater and surface water supplies as they flow from airport runways to storm drains or to waterways as sheet runoff. Sand has the potential to clog storm water drains and contaminate water bodies through increased erosion and sediment buildup. Deicing chemicals that mix with storm water discharges must be managed according to the facility's NPDES storm water permit. In an effort to control water contamination, many facilities direct storm water to an onsite treatment facility prior to discharge.

III.B.2. General Airport Operations

General airport operations encompass many activities including passenger and vehicle traffic, ticketing, baggage handling, passenger security, and concessions and food services. Airports, like other administrative offices, can generate large quantities of waste paper and consume large amounts of energy from lighting, heating and cooling systems, and computers. Concession shops and food service operations can generate significant quantities of solid waste, such as corrugated cardboard, paperboard, office paper, newspapers, magazines, wooden pallets, aluminum, plastic, and glass containers, as well as leftover food. Groundskeeping and landscaping activities can generate waste pesticides and herbicides. Airport traffic congestion can generate significant air emissions.

Environmental Aspects and Potential Impacts of General Operations

The operation of airports can have a variety of impacts on the environment. These impacts include erosion, sedimentation, soil compaction, noise pollution, chemical pollution resulting from aircraft maintenance and deicing, aircraft emissions, contaminated runway and grounds runoff, generation of waste construction materials, and litter and other debris from administrative and food service operations.

In regards to wildlife, there is typically no significant destruction of wildlife habitat. FAA is, however, aware of the problem that certain species (e.g., large waterfowl, birds that flock, deer) cause aviation. As a result, FAA encourages, and in some cases requires, airport sponsors to work with wildlife agencies to manage the habitat attracting these species. Such measures are needed to reduce the number of collisions between these species and aircraft to protect human and wildlife populations.

IV. POLLUTION PREVENTION OPPORTUNITIES

The best way to reduce pollution is to prevent it in the first place. Some companies have creatively implemented pollution prevention techniques that improve efficiency and increase profits while at the same time minimizing environmental impacts. Airlines and airports are reducing material inputs, re-engineering processes to reuse by-products, improving management practices, and employing substitution of toxic chemicals. Some operations are able to actually get below regulatory thresholds just by reducing pollutant releases through aggressive pollution prevention policies. ***While implementing pollution prevention techniques, it is important that the facility assure that the techniques are conducted in accordance with FAA safety regulations and airworthiness requirements. FAA's Advisory Circular entitled, "Management of Airport Industrial Waste"(AC#150/5320-15), provides guidance on managing industrial wastes that airport operations generate.***

The Pollution Prevention Act of 1990 established a national policy of managing waste through source reduction, which means preventing the generation of waste. The Pollution Prevention Act also established as national policy a hierarchy of waste management options for situations in which source reduction cannot be implemented feasibly. In the waste management hierarchy, if source reduction is not feasible, the next alternative is recycling of wastes, followed by energy recovery, and as a last alternative, waste treatment.

In order to encourage these approaches, this section provides both general and company-specific descriptions of some pollution prevention advances that have been implemented within the air transportation industry. While the list is not exhaustive, it does provide core information that can be used as the starting point for facilities interested in beginning their own pollution prevention projects. This section provides summary information from activities that may be or are being implemented by this sector. When possible, information is provided that gives the context in which the technique can be used effectively.

Please note that the activities described in this section do not necessarily apply to all facilities that fall within this sector. Facility-specific conditions must be considered carefully when pollution prevention options are evaluated, and the full impacts of each option must be evaluated for its effects on air, land, and water pollutant releases.

Waste minimization generally encompasses any source reduction or recycling that results in either the reduction of total volume or the toxicity of hazardous waste. Source reduction is a reduction of waste generation at the source,

usually within a process. Source reduction can include process modifications, feedstock (raw material) substitution, housekeeping and management processes, and increases in efficiency of machinery and equipment. Source reduction includes any activity that reduces the amount of waste that exits a process. Recycling refers to the use or reuse of a waste as an effective substitute for a commercial product or as an ingredient or feedstock in an industrial process.

IV.A. Air Transportation Operations

Pollution prevention/waste minimization opportunities in the air transportation industry are available for many operations including aircraft and vehicle maintenance and repair, washing and cleaning, deicing, fueling, aircraft modification, and airport layout and operations. These areas are addressed in the following sections.

IV.A.1. Maintenance and Refurbishing Operations

Aircraft maintenance activities generate wastes that are of great environmental concern to the air transportation industry. The major wastestreams from aircraft maintenance and refurbishing are lubricants, batteries, scrap metal, parts cleaning wastes (e.g., solvents), depainting wastes (e.g., chemical paint stripping wastes, abrasive blast and surface preparation wastes), and painting/painting equipment cleaning wastes. Source reduction is the best pollution prevention approach for reducing the amount of wastes produced. Source reduction can be achieved through material substitution, process or equipment modification, recycling, or better operating practices. ***Note: Such modifications must be made in accordance with FAA requirements, as well as the extraordinarily specific maintenance practices recommended by airframe and engine manufacturers.*** The following material presents pollution prevention/waste minimization opportunities for each type of waste.

Used Oil and Lubricants. Most airline maintenance facilities recycle used oil. Recycling used oil requires equipment like a drip table with a used oil collection bucket to collect oil dripping off parts. Drip pans can be placed under aviation-support vehicles awaiting repairs in case they are leaking fluids. Some facilities use absorbent materials (e.g., "pigs" or "quick dry") to catch drips or spills during activities where oil drips may occur. While absorbents prevent oil from impacting the environment, they actually create more solid and potentially hazardous waste in the form of contaminated absorbent materials. Preventing small spills in the first place, using drip pans, or cleaning spills with rags, soap and water can prevent the generation of additional waste. Recycling used oil by sending it to a commercial recycling facility saves money and protects the environment.

To encourage recycling, the publication *How To Set Up A Local Program To Recycle Used Oil* is available at no cost from the RCRA/Superfund Hotline at 1-800-424-9346 or (703) 412-9810.

Spent petroleum-based fluids and solids should be sent to a recycling center whenever possible. Solvents that are hazardous waste must not be mixed with used oil. If they are mixed, the entire mixture may be considered hazardous waste, and thus subject to more stringent regulation. Non-listed hazardous wastes will be mixed with waste oil, and as long as the resulting mixture is not hazardous, can be handled as waste oil. All used drip pans and containers should be labeled properly.

Fluids. Aircraft and aviation-support vehicles require regular changing of fluids, including oil, coolant, and others. To minimize releases to the environment, these fluids should be drained and replaced in areas where there are no connections to storm drains or municipal sewers. Minor spills should be cleaned prior to reaching drains. Used fluid should be collected and stored in separate containers. Fluids can often be recycled. For example, brake fluid, transmission gear, and gear oil are recyclable. Some liquids are able to be legally mixed with used motor oil which, in turn, can be reclaimed.

During the process of engine maintenance, spills of fluids are likely to occur. The "dry shop" principle encourages spills to be cleaned immediately, without waiting for the spilled fluids to evaporate into the air, to transmit to land, or to contaminate other surfaces. The following techniques help prevent spills:

✓ Collect leaking or dripping fluids in designated drip pans or containers. Keep all fluids separated so they may be properly recycled.

✓ Keep a designated drip pan under the vehicle while unclipping hoses, unscrewing filters, or removing other parts. The drip pan prevents splattering of fluids and keeps chemicals from penetrating the shop floor or outside area where the maintenance is occurring.

✓ Immediately transfer used fluids to proper containers. Never leave drip pans or other open containers unattended.

Radiator fluids from aviation-support vehicles are often acceptable to antifreeze recyclers. This includes fluids used to flush out radiators during cleaning. Reusing the flushing fluid minimizes waste discharges. If a licensed recycler does not accept the spent flushing fluids, consider changing to another brand of fluid that can be recycled. Many maintenance facilities have purchased antifreeze recycling systems that connect directly to a vehicle so

that the antifreeze is taken from the vehicle, cleaned, and then put back into the same vehicle.

If the maintenance facility services air conditioners in aviation-support vehicles, special equipment must be used to collect the freon or other refrigerant because it is not permissible to vent the refrigerant to the atmosphere. Air conditioner maintenance activities require employee training, specifically for handling refrigerants. Reusing refrigerants onsite is less costly than the only other legal alternative, sending the refrigerant to an offsite recycler.

Batteries. Facilities have many battery disposal options: recycling onsite, recycling through a supplier, or direct disposal. Facilities should explore all options to find one that is right for the facility. Many waste batteries must be handled as hazardous waste. Lead acid batteries are not considered hazardous waste as long as they are recycled. In general, recycling batteries may reduce the amount of hazardous waste stored at a facility, and thus the facility's responsibilities under RCRA. The following best management practices are recommended when sorting used batteries:

- ✓ Place on pallets in a contained area, and label by battery type (e.g., lead-acid, nickel, and cadmium).
- ✓ Protect them from the weather with a tarp, roof, or other means.
- ✓ Store them on an open rack or in a watertight, secondary containment unit to prevent leaks.
- ✓ Inspect them for cracks and leaks as they are removed from the vehicle or aircraft. If a battery is dropped, treat it as if it is cracked. Acid residue from cracked or leaking batteries is likely to be hazardous waste under RCRA because it is likely to exhibit the characteristic of corrosivity, and may contain lead and other metals.
- ✓ Avoid skin contact with leaking or damaged batteries.
- ✓ Neutralize acid spills and dispose of the resulting waste as hazardous if it still exhibits a characteristic of a hazardous waste.

Machine Shop Wastes. The major hazardous wastes from metal machining are waste cutting oils, spent machine coolant, and degreasing solvents. However, scrap metal also can be a component of hazardous waste produced at a machine shop. Material substitution and recycling are the two best means to reduce the volume of these wastes.

The preferred method of reducing the amount of waste cutting oils and degreasing solvents is to substitute them with water-soluble cutting oils. Recycling of waste cutting oils also is possible if nonwater-soluble oils must be used. Machine coolant can be recycled, and a number of proprietary systems are available to recycle the coolant. Coolant recycling is implemented most easily when a standardized type of coolant is used throughout the shop. Reuse and recycling of solvents also are achieved easily, as mentioned above. Most shops collect scrap metals from machining operations and sell these to metal recyclers. Metal chips which have been removed from the coolant by filtration should be drained and included in the scrap metal collection. Wastes should be segregated carefully to facilitate reuse and recycling.

Small Parts Cleaning. Solvents are commonly used for small parts cleaning. Spent solvents are often toxic and/or hazardous and should be disposed of in an environmentally safe manner. Spent solvent, if hazardous, must be treated and disposed of as hazardous waste, unless recycled properly. There are several options for reducing the amount and/or toxicity of spent solvents:

- ***Switch to non-hazardous substances.*** Switch from hazardous, organic-based to non-hazardous, aqueous-based solvents. In addition, certain aqueous parts washers can use detergents instead of solvents. While water-based parts washers may be more expensive than solvent-based parts washers (costs range from $1,000 to $3,000 for water-based washers capable of washing small parts), the cost of the parts washer can be quickly recovered as the cost of disposing or recycling of hazardous solvent as well as the cost of any required training for workers handling the solvent are eliminated. This will reduce the amount of hazardous waste generated from cleaning operations.

- ***Keep lids closed when not in use.*** For solvents that contain volatile organic compounds, keeping containers closed except when parts actually are being cleaned reduces solvent emissions to the atmosphere, improves worker safety, and allows the solvent to be used longer, rather than simply to evaporate.

- ***Reuse.*** Solvents can be reused if quality requirements are met and until their effectiveness is compromised, and then they can be recovered and recycled.
- ***Recycle.*** Solvent recycling also can decrease hazardous waste production from small parts cleaning. Spent solvents can be cleaned and recycled with a solvent still. Processes for recycling solvents are well established and widely used in many industrial sectors. Solvents should not be poured down sewer drains, mixed with used oil, or

stored in open containers to allow them to evaporate. Solvent stills (e.g., distillation units) may only be installed in appropriately fire rated areas.

- ***Use good housekeeping practices.*** To minimize solvent waste generation, facilities should use good housekeeping practices including labeling of all chemicals and wastes to avoid misuse and potential injury or contamination; keeping containers of hazardous solvents closed to prevent air emissions; providing storage area leak control and containment; and making improvements in drum location, product transfer leak collection, and drum transport procedures. If solvents are used, care should be taken to wear protective safety gear and follow good housekeeping practices.

Depainting

Chemical Stripping Wastes. Chemical stripping operations must be conducted according to the appropriate and relevant requirements associated with the original equipment manufacturers' specifications. Chemical stripping wastes consist primarily of stripping agent and paint sludges. Methylene chloride is the most commonly used paint stripping agent, although the industry increasingly is using less toxic agents such as dibasic esters, semi-aqueous, terpene-based products, aqueous solutions of caustic soda, and detergent-based strippers that currently are available on the market. In order to reduce compliance costs, many facilities are replacing methylene chloride with nonhalogenated strippers.

The Aerospace National Emission Standards for Hazardous Air Pollutants (NESHAP) (effective September 1998) places stringent limitations on the use of chemical strippers containing hazardous air pollutants. (See discussion in Section V.C Pending and Proposed Regulatory Requirements.)

Storing and reusing or recycling used strippers also are effective waste minimization techniques. Solvent strippers, particularly stripping baths, generally can be reused several times before their effectiveness is diminished. Both spent caustic and organic stripping solutions can be treated to remove contaminants. Segregating the spent stripping wastes from other waste streams will help facilitate cost-efficient reuse and recycling of contaminated strippers.

Abrasive Blasting and Surface Preparation Wastes. Abrasive blasting is being used as an alternative for chemical paint stripping. Although blasting does not require disposal of chemical strippers, it does create a large amount of water runoff and air pollution, and the presence of paint chips containing

hazardous metals and organometallic biocides can make abrasive blasting wastes potentially hazardous. Research and testing are underway on a number of innovative alternative paint removal and surface preparation techniques including: plastic media blasting, steel shot slingers, water jet stripping, thermal stripping, dry ice pellets, laser paint stripping, and cryogenic stripping. However, an alternative as economically viable and easy as chemical paint stripping has not been found.

- Plastic media blasting has had mixed results. The same types and quantities of solid wastes are generated as with grit blasting, but the plastic media tend to be more easily recyclable through the use of pneumatic media classifiers that are part of the stripping equipment. The abrasion eventually turns the plastic media to dust, making the waste paint the main waste to be disposed. However, it will not work on epoxy or urethane paints. In addition, the blasting equipment is more expensive and requires more highly trained operators.

- Cavitating water jet stripping systems remove most paints, separate the paint chips from the water, and treat the water to eliminate dissolved toxic materials. Although relatively little hazardous waste is generated by this process, it is not as efficient as grit blasting, and the equipment has higher capital and operating costs.

- The thermal stripping process softens the paint so it can be peeled relatively easily. Although it generates only one waste stream (waste paint), it is more labor-intensive than other stripping methods and can only be used on non-heat-sensitive surfaces.

- Carbon dioxide pellets can be used as a blast medium leaving only paint chips that can be swept up and placed in containers for disposal (the dry ice evaporates). However, the cost of the dry ice, storage, and handling equipment can be substantial.

- A pulsed carbon dioxide laser controlled by an industrial robot to remove paint produces no residue. However, the method is complex, capital intensive, and requires highly skilled operators.

- Cryogenic stripping using liquid nitrogen baths followed by gentle abrasion or plastic shot blasting is useful for small parts or objects, but requires special equipment for handling the liquid nitrogen.

Blasting cannot be used as a paint stripping method on certain substrate because the abrasive media will cause damage, especially to composite materials.

Painting and Painting Equipment Cleanup Wastes. Methods for minimizing paint and painting equipment cleanup wastes include tight inventory control, material substitution, and minimization of fugitive oversprays. Tight inventory control techniques such as monitoring employee operations or limiting access to raw materials storage areas force employees to stretch the use of the raw materials. Use of less toxic types of paints can reduce the amount of hazardous paint waste as well as painting equipment cleanup waste (i.e., solvent wastes). Also, the use of powder coatings based on finely pulverized plastics that are baked on at 400°F has been tried as a substitute for paint for some industrial applications.

Minimizing overspray has benefits in terms of both inventory control and elimination of surface water runoff. For inventory control, overspray can be minimized by using air-assisted, airless, high volume, low pressure turbine, air-atomized electrostatic, and airless electrostatic application techniques. In addition, overspray can be minimized by maintaining a fixed distance from the surface while triggering the paint gun, and releasing the trigger when the gun is not aimed at the target. Overspray control for minimizing runoff can be achieved by using plastic sheeting under and around the aircraft being painted, or using a paint booth for smaller parts.

To reduce the amount of wastes created by painting operations, all paint should be used until containers are completely empty. Containers that are considered empty under the Resource Conservation and Recovery Act (RCRA) may be disposed of as solid waste (40 CFR 265). However, they may face requirements under DOT regulations depending on the amount of hazardous waste remaining in the container. Used containers of paint may need to be disposed of as hazardous wastes if they are not completely empty. Also, paint may be purchased in recyclable and/or returnable containers to reduce disposal costs.

IV.A.2. Fueling

Pollution prevention opportunities for aircraft and vehicle refueling operations primarily focus on the prevention of fuel spillage and the associated air, water, and hazardous waste pollution. Fuel tank monitoring and automatic shutoff devices are key spill prevention measures. Although not permitted for jet fuel, using color-coded dyes to identify fuel grades of aviation fuel is commonly used to prevent mixtures of fuel and to find fuel leaks. One technique to prevent fuel spills is to install catchment basins, including containment at hydrant pits. All leaking pipe joints, nozzle connections, and any damage to the fueling hose (e.g., kinks, crushing, breaks in the carcass, bulges, blistering, soft spots at the coupling, deep cracks or cuts, spots wet with fuel, or excessive wear) should be reported immediately to reduce their potential

impact on the environment. Using dry cleanup methods for the fuel area reduces water runoff and associated contamination of groundwater and surface water supplies.

Pollution prevention techniques for aircraft fueling include:

- ✓ Inspect fueling equipment daily to ensure that all components are in satisfactory condition.
- ✓ Employ proper grounding and bonding techniques for a safe fueling operation.
- ✓ If fueling of an airplane occurs at night, assure it is carried out it in well lit areas.
- ✓ Where possible, avoid fueling an aircraft during aircraft maintenance activities that might provide a source of ignition to fuel vapors. Similarly, assure that all radio and radar equipment is off during the refueling process.
- ✓ While fueling, check for leaks and assuring that the fueling operator has a clear view of control panel.
- ✓ Never leave the nozzle unattended during overwing fueling, or wedge or tie the nozzle trigger in the open position.
- ✓ Discourage topping off of fuel tanks, except when required for compliance with FAA safety regulations.
- ✓ Sump of hydrant pits.

Vehicle fueling. Self-locking fueling nozzles minimize the risk of both fuel spillage and air pollution by ensuring a secure seal between the fuel source and tank.

Fuel in vehicle operations. Use of battery-operated or alternative fuel vehicles provides two ways to reduce emissions from aviation-support vehicles. Natural gas vehicles, for example, are a viable alternative to gasoline- and diesel-powered transportation. Almost any gasoline-powered vehicle can be converted to run on natural gas by installing a natural gas fuel system and storage tanks without removing any existing equipment. Diesel conversions are somewhat more complicated because they also involve reducing compression and adding a sparked-ignition system. Other fuels suitable for vehicles include methanol, ethanol, and propane.

In 1997, there were alternative fuel vehicle programs at virtually every major airport in the United States. The alternative vehicle usage at airports runs the gamut from taxis, shuttle buses, passenger busses, transport busses, minivans, trucks, cars, tugs, tractors, belt loaders, and ground power units, to catering vehicles. The use of natural gas vehicles is being driven by both cost effectiveness and regulation. Many states require companies with fleets of twenty or more vehicles to phase in alternative fuel vehicles. The 1990 Clean Air Act also contains incentives to encourage the use of alternative fuels. Federal (and in some areas, State) tax deductions for "alternative fuel vehicles" and related refueling equipment are available. The maximum tax deductions range from $2,000 to $50,000 for each alternative fuel vehicle and up to $100,000 on refueling stations.

IV.A.3. Aircraft and Vehicle Exterior Cleaning

Pollution prevention opportunities for aircraft and aviation-support vehicle cleaning focus on the reduction of wastewater discharges.

- ***Aircraft Cleaning.*** For washing aircraft, it is best to utilize a designated cleaning area, recycle washwater (if possible), and use phosphate-free detergents. Washwater should be contained and an oil/water separator should be used. Washwater can be captured, filtered, and reused in aircraft washing and other activities. If the washwater is reused for washing aircraft, ***it must meet the manufacturer's specifications for washwater***. Washwaters containing contaminants can result in corrosion of potentially critical aircraft parts.
  Another water reduction tool, a flow restrictor, can be used to control the amount of water being used to wash aircraft. A reduction in water usage will translate into a reduction in the volume of generated wastewaters. (Note that technologies for water reduction are only suggestions and should be evaluated individually to address the circumstances appropriate to each site.)

  Note: Air worthiness requirements may dictate the quantity of water used in certain

- ***Vehicle Washing.*** Vehicle washing has become a major environmental compliance issue for most companies that operate a fleet of vehicles. While pollutants from vehicle washing are generally controlled by routing the water through an oil and water separator, many techniques are available that prevent the water from being generated at all. The following pollution prevention activities will help ensure that a facility is addressing potential sources of pollution:

- ✓ Wastewater discharge can be prevented by dry washing vehicles using a chemical cleaning and waxing agent, rather than detergent and water. The dry washing chemical is sprayed on and wiped off with rags. No wastewater is generated. Dry washing is labor intensive and creates solid waste that must be disposed of properly.

- ✓ Wastewater can be contained by washing at a low point of the facility, blocking drains from the facility using a containment dike or blanket, or washing on a built-in or portable containment pad.

- ✓ Wastewater can be disposed of by evaporation from a containment area, or by discharging the wastewater to a sanitary sewer system. Permission must be obtained from the POTW before washwater can be drained, pumped, or vacuumed to a sanitary sewer connection.

IV.A.4. Aircraft Deicing

As noted earlier, FAA regulations and advisory circulars govern in detail virtually every aspect of airline and airport operations, particularly with respect to procedures and standards for aircraft maintenance and airworthiness, including aircraft deicing. Potential pollution prevention opportunities for aircraft deicing operations include (1) providing the appropriate training on the use of glycol products to ensure they are efficiently applied to reduce polluting airport runoff and (2) collecting deicing fluid to prevent direct discharges to surrounding surface water and groundwater along with facility storm water. Appropriate liquid aircraft deicers include ethylene glycol, propylene glycol, and di-ethylene glycol.

Recycling deicing fluid. In general, the reuse of deicier fluid *on aircraft* is problematic and usually prohibited due to quality control and the cost issues associated with storage and treatment. However, recycling deicing fluid is a method employed by some airports and airlines as recycled deicing fluid can be used for *nonaircraft applications*. There are two main processes used to recycle deicing fluid. The first process involves filtering collected fluid, demineralizing it, removing salts, and then evaporating the water to leave a higher glycol concentration.

The second process uses reverse osmosis membrane technology to recover glycol by preconcentrating dilute runoff prior to distillation. In order to make recycling practical and economically feasible, it is necessary to collect concentrations that contain more than 10% glycol. Traditionally to allow

recycling, only one type of chemical glycol (ethylene or propylene) could be used at an airport. However, newer methods are available to handle mixtures. The benefits of recycling fluids include recovery of the cost of glycol, recovery of the utility cost for water, and reduced disposal cost for spent glycol.

The most widespread collection method involves the collection of deicer through separate drainage areas around aircraft deicing operations, which minimizes the mixing of storm water and deicing fluid. The collection systems can be located either at the gate area or at a remote deicing area. Deicer fluid at gate area surfaces can be collected using vacuum sweeping machines, sponge rollers, and pumps.

Alternative deicing methods. Additional technology-based, alternative deicing methods currently are being developed by industry. While some of these have yet to be proven cost effective, they do present viable alternatives as technology is improved.

- FAA has approved site-specific procedures for infra-red equipment designed to de-ice aircraft.

- Deicing truck with a cab. This type of enclosure for the operator reduces overspray since the operator can get closer to the job. However, minimum safe distances must be maintained to avoid accidents and damage to aircraft or personnel. Customers of such a system have reported up to 30% reductions in consumption of glycol-based and other anti-deicing fluids.

- More advanced computerized ice detection protection systems. For example, a system that takes electronic measurements from a wing-mounted sensor disc to identify the type and thickness of ice contamination has been developed. The system also can tell when the deicing fluid is in a transition stage and about to fail as a protective coat. Such a mechanism would be useful in determining when and where the aircraft needs to be deiced.

Segregation of Wastestreams. Wastewater segregation can be an effective technique that often does not require significant process or equipment modifications. In some cases, wastewater streams can be treated more effectively and economically if they are segregated from other streams which do not require the same degree of treatment. Highly contaminated wastewater streams, oily wastewater streams, and wastewater streams containing contaminants requiring a specific treatment method (e.g., metals removal) can be segregated to reduce the volume of wastewater receiving

certain treatment steps. Wastewater treatment can also be improved by adding stages to existing wastewater treatment systems. Additional stages, such as biological treatment, chemical precipitation, filtration, ion exchange, and sludge dewatering, improve system effectiveness and treatment costs through reduced sludge generation, recovery of metals for resale, and replacement of more costly treatment stages. By segregating wastestreams, facilities can provide the appropriate treatment to each wastewater stream. (Note: Wastestream segregation should be considered as a preferred alternative at a new or existing facility when it can be accomplished at a reasonable cost.)

IV.A.5. General Aircraft Operations

Modifications. Pollution prevention opportunities for aircraft modification primarily focus on improving the efficiency of the engine. Engine manufacturers are being encouraged or required to research and develop cleaner, quieter, and more fuel-efficient aircraft. Air pollution is a function of both the type of aircraft engine and the mode of operation of the aircraft, which can be broken down into the following stages: idling at gate and runway; engine power up; taxiing; takeoff and climb out; and approach and landing. With respect to the type of engine, one mechanism that can improve air quality in and around airports is for airlines and associated personnel to encourage and support aviation research that would reduce aircraft emissions. In the meantime, airlines have the option of buying and leasing aircraft that meet or exceed the strictest requirements while retiring, replacing, or retrofitting older equipment as rapidly as possible to reduce both the amount of air and noise pollution.

Operations. Pollution prevention opportunities for aircraft operations at the airport include the following:

✓ Utilize more efficient aircraft. By operating more efficient aircraft, airlines have been able to reduce fuel consumption and decrease the cost of operations. Since 1976, the introduction of more fuel efficient aircraft has reduced fuel consumption per passenger mile by approximately 50%.[4]

✓ Retrofit gate facilities to centralized ground power in order to reduce aircraft engine running and prevent extraneous air emissions associated with engine and auxiliary power unit usage.

[4] *Airline Fuel Consumption*, The Boeing Company, 1997.

✓ Reduce holdover time from deicing to takeoff to eliminate the need for a plane to require deicing more than once.

✓ Checking cargo prior to loading for leaking or otherwise damaged shipments will prevent the leakage of wastes. This is of particular importance for loading dangerous goods, wet cargo, live animals, or other cargo prone to leakage. After unloading, it is useful to check the cargo compartments to ensure that all of the load for a given station has been removed. Inspecting any traces of leakage at once will enable the operator to establish the source of such leakage.

IV.B. Airport Operations

IV.B.1. Runway Deicing

In addition to collection and recycling of deicing fluids, pollution prevention opportunities include the use of alternative, less polluting deicers such as magnesium acetate and potassium acetate. These fluids have been approved by FAA on both safety and environmental grounds, and have no significant impact on water quality. It should be noted that although they have received FAA approval, magnesium acetate and potassium acetate have caused safety problems by damaging aircraft lighting systems. As in all cases where alternative technologies are used to minimize environmental impacts, aircraft safety is a major concern and must be addressed.

IV.B.2. General Airport Operations

Pollution prevention opportunities for airports focus primarily on alleviating air and noise pollution by implementing layout modifications and changes in airport operations. These improved practices can reduce the amount of air and noise pollution generated by aircraft and associated airport activities.

- For existing airports, engage in comprehensive noise mitigation planning and implement feasible measures to reduce noise impacts on densely populated regions. For new airports, if possible, choose an optimal site for the airport that is away from large communities.

- Use proper land use planning, which is a local government responsibility, for the areas affected by airport noise. For examples, airports may choose to purchase land surrounding the airport for airport use or acquire land as aviation easements. Airports may also work with local zoning boards and encourage them to zone land near airports for airport compatible uses. In particular, FAA is concerned about sanitary landfill locations near airports because landfills attract

certain bird species that are hazards to aviation due to their size and/or flocking behavior.

***Additional Airport Activities Impacting Air Quality*.** Air pollution resulting from airport operations is dependent on both mobile sources of pollution such as airplanes, ground-service vehicles, and automobiles accessing the airport as well as point sources of pollution such as power plants, fueling systems, fuel storage facilities, aircraft maintenance facilities, and deicing facilities.

***Airport Traffic*.** Air quality in and around the airport vicinity is related not only to aircraft using the airport but to travelers and employees accessing the airport and maintenance vehicles that service the airport. Automobiles and busses used by motorists that enter and leave airports create a large source of air pollution through automobile exhaust. To reduce emissions from private vehicles, airports can link or improve public transport access, provide express bus services, and institute bus/high occupancy vehicle lanes on access roads.

***Employee Programs*.** Initiating employee programs can reduce air pollution in and around the airport. For instance, modifying airport employee work weeks to a revised schedule that limits trips made by employees will decrease air emission (e.g., an airport may implement a 9 day/80 hour two-week schedule). Other options are voluntary employee Rideshare Programs or day care services to prevent employees from having to travel unnecessary miles, which in turn reduces the quantity of auto emissions associated with airport operations.

***Recycling solid waste*.** Recycling all paper, cardboard, plastics, metal, and airport-specific items such as wood and film plastic will prevent pollution. In addition, distributing recycling literature and educational materials to employees and travelers will encourage more recycling of these materials.

***Pest Management*.** Food waste from the large number of concessionaires at major airports create pest management problems at airports. Various pesticides, fumigants, and other pest management techniques are used at airports to control pests.

***Landscaping*.** Airport erosion control projects should use environmentally and economically beneficial landscaping methods. Any plantings near runways should avoid attracting hazardous wildlife (e.g., geese, gulls, large mammals, or prey species that attract large mammals). However, careful planting can reduce the use of pesticides, herbicides insecticides, and rodenticides; control erosion; reduce water usage; reduce energy usage;

reduce runoff and air emissions from mowers; and associated exposure to workers and the public.

V. SUMMARY OF FEDERAL STATUTES AND REGULATIONS

This section discusses the Federal regulations that may apply to this sector. The purpose of this section is to highlight and briefly describe the applicable Federal requirements, and to provide citations for more detailed information. The three following sections are included:

- Section V.A. contains a general overview of major statutes
- Section V.B. contains a list of regulations specific to this industry
- Section V.C. contains a list of pending and proposed regulations

The descriptions within Section V are intended solely for general information. Depending upon the nature or scope of the activities at a particular facility, these summaries may or may not necessarily describe all applicable environmental requirements. Moreover, they do not constitute formal interpretations or clarifications of the statutes and regulations. For further information, readers should consult the Code of Federal Regulations and other state or local regulatory agencies. EPA Hotline contacts are also provided for each major statute.

V.A. General Description of Major Statutes

Resource Conservation and Recovery Act

The Resource Conservation And Recovery Act (RCRA) of 1976 which amended the Solid Waste Disposal Act, addresses solid (Subtitle D) and hazardous (Subtitle C) waste management activities. The Hazardous and Solid Waste Amendments (HSWA) of 1984 strengthened RCRA's waste management provisions and added Subtitle I, which governs underground storage tanks (USTs).

Regulations promulgated pursuant to Subtitle C of RCRA (40 CFR Parts 260-299) establish a "cradle-to-grave" system governing hazardous waste from the point of generation to disposal. RCRA hazardous wastes include the specific materials listed in the regulations (commercial chemical products, designated with the code "P" or "U"; hazardous wastes from specific industries/sources, designated with the code "K"; or hazardous wastes from non-specific sources, designated with the code "F") or materials which exhibit a hazardous waste characteristic (ignitability, corrosivity, reactivity, or toxicity, and designated with the code "D").

Regulated entities that generate hazardous waste are subject to waste accumulation, manifesting, and recordkeeping standards. Facilities must generally obtain a permit either from EPA or from a State agency which EPA has authorized to implement the permitting program if they store hazardous

wastes for more than 90 days (or 180 or 270 days depending on the amount of waste generated and the distance the waste will be transported) before treatment or disposal. Facilities may treat hazardous wastes stored in less-than-ninety-day tanks or containers without a permit. Subtitle C permits contain general facility standards such as contingency plans, emergency procedures, recordkeeping and reporting requirements, financial assurance mechanisms, and unit-specific standards. RCRA also contains provisions (40 CFR Part 264 Subpart S and §264.101) for conducting corrective actions which govern the cleanup of releases of hazardous waste or constituents from solid waste management units at RCRA treatment, storage, and disposal facilities.

Although RCRA is a Federal statute, many States implement the RCRA program. Currently, EPA has delegated its authority to implement various provisions of RCRA to 47 of the 50 States and two U.S. territories. Delegation has not been given to Alaska, Hawaii, or Iowa.

Most RCRA requirements are not industry specific but apply to any company that generates, transports, treats, stores, or disposes of hazardous waste. Here are some important RCRA regulatory requirements:

- **Identification of Solid and Hazardous Wastes** (40 CFR Part 261 and 262) provides definitions and lays out the procedure every generator must follow to determine whether the material in question is considered a hazardous waste or solid waste, or is exempted from regulation.

- **Standards for Generators of Hazardous Waste** (40 CFR Part 262) establish the responsibilities of hazardous waste generators including obtaining an EPA ID number, preparing a manifest, ensuring proper packaging and labeling, meeting standards for waste accumulation units, and recordkeeping and reporting requirements. Providing they meet additional requirements described in 40 CFR 262.34, generators may accumulate hazardous waste for up to 90 days (or 180 or 270 days depending on the amount of waste generated and the distance the waste will be transported) without obtaining a permit.

- **Land Disposal Restrictions** (LDRs) (40 CFR Part 268) are regulations prohibiting the disposal of hazardous waste on land without prior treatment. Under the LDRs program, materials must meet LDR treatment standards prior to placement in a RCRA land disposal unit (landfill, land treatment unit, waste pile, or surface impoundment). Virtually all hazardous wastes are subject to LDR requirements. Generators of waste subject to the LDRs must provide

notification of such to the designated treatment, storage, and disposal facility to ensure proper treatment prior to disposal.

- **Used Oil Management Standards** (40 CFR Part 279) impose management requirements affecting the storage, transportation, burning, processing, and re-refining of the used oil. For parties that merely generate used oil, regulations establish storage standards. For a party considered a used oil processor, re-refiner, burner, or marketer (one who generates and sells off-specification used oil directly to a used oil burner), additional tracking and paperwork requirements must be satisfied.

- RCRA contains unit-specific standards for all units used to store, treat, or dispose of hazardous waste, including **Tanks and Containers**. Tanks and containers used to store hazardous waste with a high volatile organic concentration must meet emission standards under RCRA. Regulations (40 CFR Part 264-265, Subpart CC) require generators to test the waste to determine the concentration of the waste, to satisfy tank and container emissions standards, and to inspect and monitor regulated units. These regulations apply to all facilities that store such waste, including large quantity generators accumulating waste prior to shipment off-site.

- **Underground Storage Tanks** (USTs) containing petroleum and hazardous substances are regulated under Subtitle I of RCRA. Subtitle I regulations (40 CFR Part 280) contain tank design and release detection requirements, as well as financial responsibility and corrective action standards for USTs. The UST program also includes upgrade requirements for existing tanks that must be met by December 22, 1998.

- **Boilers and Industrial Furnaces** (BIFs) that use or burn fuel containing hazardous waste must comply with design and operating standards. BIF regulations (40 CFR Part 266, Subpart H) address unit design, provide performance standards, require emissions monitoring, and restrict the type of waste that may be burned.

EPA's RCRA, Superfund and EPCRA Hotline *at 1-800-424-9346 responds to questions and distributes guidance regarding all RCRA regulations. The RCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding Federal holidays.*

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a 1980 law known commonly as Superfund, authorizes EPA to respond to releases, or threatened releases, of hazardous substances that may endanger public health, welfare, or the environment. CERCLA also enables EPA to force parties responsible for environmental contamination to clean it up or to reimburse the Superfund for response costs (including remediation costs) incurred by EPA. The Superfund Amendments and Reauthorization Act (SARA) of 1986 revised various sections of CERCLA, extended the taxing authority for the Superfund, and created a free-standing law, SARA Title III, also known as the Emergency Planning and Community Right-to-Know Act (EPCRA).

The CERCLA hazardous substance release reporting regulations (40 CFR Part 302) direct the person in charge of a facility to report to the National Response Center (NRC) any environmental release of a hazardous substance which equals or exceeds a reportable quantity. Reportable quantities are listed in 40 CFR §302.4. A release report may trigger a response by EPA, or by one or more Federal or State emergency response authorities.

EPA implements hazardous substance responses according to procedures outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300). The NCP includes provisions for permanent cleanups, known as remedial actions, and other cleanups referred to as removals. EPA generally takes remedial actions only at sites on the National Priorities List (NPL), which currently includes approximately 1300 sites. Both EPA and states can act at sites; however, EPA provides responsible parties the opportunity to conduct removal and remedial actions and encourages community involvement throughout the Superfund response process.

EPA's RCRA, Superfund and EPCRA Hotline *at 1-800-424-9346 answers questions and references guidance pertaining to the Superfund program. The CERCLA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding Federal holidays.*

Emergency Planning And Community Right-To-Know Act

The Superfund Amendments and Reauthorization Act (SARA) of 1986 created the Emergency Planning and Community Right-to-Know Act (EPCRA, also known as SARA Title III), a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by State and local governments. EPCRA required the establishment of State emergency response commissions (SERCs), responsible for coordinating certain

emergency response activities and for appointing local emergency planning committees (LEPCs).

EPCRA and the EPCRA regulations (40 CFR Parts 350-372) establish four types of reporting obligations for facilities which store or manage specified chemicals:

- **EPCRA §302** requires facilities to notify the SERC and LEPC of the presence of any extremely hazardous substance (the list of such substances is in 40 CFR Part 355, Appendices A and B) if it has such substance in excess of the substance's threshold planning quantity, and directs the facility to appoint an emergency response coordinator.

- **EPCRA §304** requires the facility to notify the SERC and the LEPC in the event of a release equal to or exceeding the reportable quantity of a CERCLA hazardous substance or an EPCRA extremely hazardous substance.

- **EPCRA §311 and §312** require a facility at which a hazardous chemical, as defined by the Occupational Safety and Health Act, is present in an amount exceeding a specified threshold to submit to the SERC, LEPC and local fire department material safety data sheets (MSDSs) or lists of MSDSs and hazardous chemical inventory forms (also known as Tier I and II forms). This information helps the local government respond in the event of a spill or release of the chemical.

- **EPCRA §313** requires manufacturing facilities included in SIC codes 20 through 39, which have ten or more employees, and which manufacture, process, or use specified chemicals in amounts greater than threshold quantities, to submit an annual toxic chemical release report. This report, known commonly as the Form R, covers releases and transfers of toxic chemicals to various facilities and environmental media, and allows EPA to compile the national Toxic Release Inventory (TRI) database.

All information submitted pursuant to EPCRA regulations is publicly accessible, unless protected by a trade secret claim.

EPA's RCRA, Superfund and EPCRA Hotline *at 1-800-424-9346 answers questions and distributes guidance regarding the emergency planning and community right-to-know regulations. The EPCRA Hotline operates weekdays from 9:00 a.m. to 6:00 p.m., EST, excluding Federal holidays.*

Clean Water Act

The primary objective of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), is to restore and maintain the chemical, physical, and biological integrity of the nation's surface waters. Pollutants regulated under the CWA include "priority" pollutants, including various toxic pollutants; "conventional" pollutants, such as biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform, oil and grease, and pH; and "non-conventional" pollutants, including any pollutant not identified as either conventional or priority.

The CWA regulates both direct and indirect discharges. The National Pollutant Discharge Elimination System (NPDES) program (CWA §502) controls direct discharges into navigable waters. Direct discharges or "point source" discharges are from sources such as pipes and sewers. NPDES permits, issued by either EPA or an authorized State (EPA has authorized 42 States to administer the NPDES program), contain industry-specific, technology-based and/or water quality-based limits, and establish pollutant monitoring requirements. A facility that intends to discharge into the nation's waters must obtain a permit prior to initiating its discharge. A permit applicant must provide quantitative analytical data identifying the types of pollutants present in the facility's effluent. The permit will then set the conditions and effluent limitations on the facility discharges.

A NPDES permit may also include discharge limits based on Federal or State water quality criteria or standards, that were designed to protect designated uses of surface waters, such as supporting aquatic life or recreation. These standards, unlike the technological standards, generally do not take into account technological feasibility or costs. Water quality criteria and standards vary from State to State, and site to site, depending on the use classification of the receiving body of water. Most States follow EPA guidelines which propose aquatic life and human health criteria for many of the 126 priority pollutants.

Storm Water Discharges

In 1987 the CWA was amended to require EPA to establish a program to address storm water discharges. In response, EPA promulgated the NPDES storm water permit application regulations. These regulations require that facilities with the following storm water discharges apply for an NPDES permit: (1) a discharge associated with industrial activity; (2) a discharge from a large or medium municipal storm sewer system; or (3) a discharge which EPA or the State determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

The term "storm water discharge associated with industrial activity" means a storm water discharge from one of 11 categories of industrial activity defined at 40 CFR 122.26. Six of the categories are defined by SIC codes while the other five are identified through narrative descriptions of the regulated industrial activity. If the primary SIC code of the facility is one of those identified in the regulations, the facility is subject to the storm water permit application requirements. If any activity at a facility is covered by one of the five narrative categories, storm water discharges from those areas where the activities occur are subject to storm water discharge permit application requirements.

Those facilities/activities that are subject to storm water discharge permit application requirements are identified below. To determine whether a particular facility falls within one of these categories, consult the regulation.

Category I: Facilities subject to storm water effluent guidelines, new source performance standards, or toxic pollutant effluent standards.

Category ii: Facilities classified as SIC 24-lumber and wood products (except wood kitchen cabinets); SIC 26-paper and allied products (except paperboard containers and products); SIC 28-chemicals and allied products (except drugs and paints); SIC 291-petroleum refining; SIC 311-leather tanning and finishing; SIC 32 (except 323)-stone, clay, glass and concrete; SIC 33-primary metals; SIC 3441-fabricated structural metal; and SIC 373-ship and boat building and repairing.

Category iii: Facilities classified as SIC 10-metal mining; SIC 12-coal mining; SIC 13-oil and gas extraction; and SIC 14-nonmetallic mineral mining.

Category iv: Hazardous waste treatment, storage, or disposal facilities.

Category v: Landfills, land application sites, and open dumps that receive or have received industrial wastes.

Category vi: Facilities classified as SIC 5015-used motor vehicle parts; and SIC 5093-automotive scrap and waste material recycling facilities.

Category vii: Steam electric power generating facilities.

Category viii: Facilities classified as SIC 40-railroad transportation; SIC 41-local passenger transportation; SIC 42-trucking and warehousing (except public warehousing and storage); SIC 43-U.S. Postal Service; SIC 44-water transportation; SIC 45-transportation by air; and SIC 5171-petroleum bulk storage stations and terminals.

Category ix: Sewage treatment works.

Category x: Construction activities except operations that result in the disturbance of less than five acres of total land area.

Category xi: Facilities classified as SIC 20-food and kindred products; SIC 21-tobacco products; SIC 22-textile mill products; SIC 23-apparel related products; SIC 2434-wood kitchen cabinets manufacturing; SIC 25-furniture and fixtures; SIC 265-paperboard containers and boxes; SIC 267-converted paper and paperboard products; SIC 27-printing, publishing, and allied industries; SIC 283-drugs; SIC 285-paints, varnishes, lacquer, enamels, and allied products; SIC 30-rubber and plastics; SIC 31-leather and leather products (except leather tanning and finishing); SIC 323-glass products; SIC 34-fabricated metal products (except fabricated structural metal); SIC 35-industrial and commercial machinery and computer equipment; SIC 36-electronic and other electrical equipment and components; SIC 37-transportation equipment (except ship and boat building and repairing); SIC 38-measuring, analyzing, and controlling instruments; SIC 39-miscellaneous manufacturing industries; and SIC 4221-4225-public warehousing and storage.

Pretreatment Program

Another type of discharge that is regulated by the CWA is one that goes to a publicly owned treatment works (POTWs). The national pretreatment program (CWA §307(b)) controls the indirect discharge of pollutants to POTWs by "industrial users." Facilities regulated under §307(b) must meet certain pretreatment standards. The goal of the pretreatment program is to protect municipal wastewater treatment plants from damage that may occur when hazardous, toxic, or other wastes are discharged into a sewer system and to protect the quality of sludge generated by these plants. Discharges to a POTW are regulated primarily by the POTW itself, rather than the State or EPA.

EPA has developed technology-based standards for industrial users of POTWs. Different standards apply to existing and new sources within each category. "Categorical" pretreatment standards applicable to an industry on a nationwide basis are developed by EPA. In addition, another kind of pretreatment standard, "local limits," are developed by the POTW in order to assist the POTW in achieving the effluent limitations in its NPDES permit.

Regardless of whether a State is authorized to implement either the NPDES or the pretreatment program, if the State develops its own program, it may enforce requirements more stringent than Federal standards.

Spill Prevention Control and Countermeasure Plans

The 1990 Oil Pollution Act requires that facilities that could reasonably be expected to discharge oil in harmful quantities prepare and implement more rigorous Spill Prevention Control and Countermeasure (SPCC) Plan required under the CWA (40 CFR §112.7). There are also criminal and civil penalties for deliberate or negligent spills of oil. Regulations covering response to oil discharges and contingency plans (40 CFR Part 300), and Facility Response Plans to oil discharges (40 CFR §112.20) and for polychlorinated biphenyl (PCB) transformers and PCB-containing items were revised and finalized in 1995.

EPA's Office of Water, at (202) 260-5700, will direct callers with questions about the CWA to the appropriate EPA office. EPA also maintains a bibliographic database of Office of Water publications which can be accessed through the Groundwater and Drinking Water Resource Center, at (202) 260-7786.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) mandates that EPA establish regulations to protect human health from contaminants in drinking water. The law authorizes EPA to develop national drinking water standards and to create a joint Federal-State system to ensure compliance with these standards. The SDWA also directs EPA to protect underground sources of drinking water through the control of underground injection of liquid wastes.

EPA has developed primary and secondary drinking water standards under its SDWA authority. EPA and authorized States enforce the primary drinking water standards, which are, contaminant-specific concentration limits that apply to certain public drinking water supplies. Primary drinking water standards consist of maximum contaminant level goals (MCLGs), which are non-enforceable, health-based goals, and maximum contaminant levels (MCLs), which are enforceable limits set as close to MCLGs as possible, considering cost and feasibility of attainment.

The SDWA Underground Injection Control (UIC) program (40 CFR Parts 144-148) is a permit program which protects underground sources of drinking water by regulating five classes of injection wells. UIC permits include design, operating, inspection, and monitoring requirements. Wells used to inject hazardous wastes must also comply with RCRA corrective action standards in order to be granted a RCRA permit, and must meet applicable RCRA land disposal restrictions standards. The UIC permit program is primarily State-enforced, since EPA has authorized all but a few States to administer the program.

The SDWA also provides for a Federally-implemented Sole Source Aquifer program, which prohibits Federal funds from being expended on projects that may contaminate the sole or principal source of drinking water for a given area, and for a State-implemented Wellhead Protection program, designed to protect drinking water wells and drinking water recharge areas.

EPA's Safe Drinking Water Hotline, at 1-800-426-4791, answers questions and distributes guidance pertaining to SDWA standards. The Hotline operates from 9:00 a.m. through 5:30 p.m., EST, excluding Federal holidays.

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) granted EPA authority to create a regulatory framework to collect data on chemicals in order to evaluate, assess, mitigate, and control risks which may be posed by their manufacture, processing, and use. TSCA provides a variety of control methods to prevent chemicals from posing unreasonable risk.

TSCA standards may apply at any point during a chemical's life cycle. Under TSCA §5, EPA has established an inventory of chemical substances. If a chemical is not already on the inventory, and has not been excluded by TSCA, a premanufacture notice (PMN) must be submitted to EPA prior to manufacture or import. The PMN must identify the chemical and provide available information on health and environmental effects. If available data are not sufficient to evaluate the chemicals effects, EPA can impose restrictions pending the development of information on its health and environmental effects. EPA can also restrict significant new uses of chemicals based upon factors such as the projected volume and use of the chemical.

Under TSCA §6, EPA can ban the manufacture or distribution in commerce, limit the use, require labeling, or place other restrictions on chemicals that pose unreasonable risks. Among the chemicals EPA regulates under §6 authority are asbestos, chlorofluorocarbons (CFCs), and PCBs.

EPA's TSCA Assistance Information Service, at (202) 554-1404, answers questions and distributes guidance pertaining to Toxic Substances Control Act standards. The Service operates from 8:30 a.m. through 4:30 p.m., EST, excluding Federal holidays.

Clean Air Act

The Clean Air Act (CAA) and its amendments, including the Clean Air Act Amendments (CAAA) of 1990, are designed to "protect and enhance the nation's air resources so as to promote the public health and welfare and the productive capacity of the population." The CAA consists of six sections,

known as Titles, which direct EPA to establish national standards for ambient air quality and for EPA and the States to implement, maintain, and enforce these standards through a variety of mechanisms.

Under the CAAA, many facilities will be required to obtain permits for the first time. State and local governments oversee, manage, and enforce many of the requirements of the CAAA. CAA regulations appear at 40 CFR Parts 50-99.

Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of "criteria pollutants," including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, sulfur dioxide, and volatile organic compounds (VOCs). Geographic areas that meet NAAQSs for a given pollutant are classified as attainment areas; those that do not meet NAAQSs are classified as non-attainment areas. Under Section 110 of the CAA, each State must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what reductions are required to meet Federal air quality standards. Revised NAAQSs for particulates and ozone were proposed in 1996 and may go into effect as early as late 1997.

Title I also authorizes EPA to establish New Source Performance Standards (NSPSs), which are nationally uniform emission standards for new stationary sources falling within particular industrial categories. NSPSs are based on the pollution control technology available to that category of industrial source.

Under Title III, EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants (NESHAPs), nationally uniform standards oriented towards controlling particular hazardous air pollutants (HAPs). Title I, section 112(c) of the CAA further directed EPA to develop a list of sources that emit any of 189 HAPs, and to develop regulations for these categories of sources. To date EPA has listed 174 categories and developed a schedule for the establishment of emission standards. The emission standards will be developed for both new and existing sources based on "maximum achievable control technology" (MACT). The MACT is defined as the control technology achieving the maximum degree of reduction in the emission of the HAPs, taking into account cost and other factors.

Title II of the CAA pertains to mobile sources, such as cars, trucks, buses, and planes. Reformulated gasoline, automobile pollution control devices, and vapor recovery nozzles on gas pumps are a few of the mechanisms EPA uses to regulate mobile air emission sources.

Title IV of the CAA establishes a sulfur dioxide and nitrogen oxide emissions program designed to reduce the formation of acid rain. Reduction of sulfur

dioxide releases will be obtained by granting to certain sources limited emissions allowances, which, beginning in 1995, will be set below previous levels of sulfur dioxide releases.

Title V of the CAA of 1990 created a permit program for all "major sources" (and certain other sources) regulated under the CAA. One purpose of the operating permit is to include in a single document all air emissions requirements that apply to a given facility. States are developing the permit programs in accordance with guidance and regulations from EPA. Once a State program is approved by EPA, permits will be issued and monitored by that State.

Title VI of the CAA is intended to protect stratospheric ozone by phasing out the manufacture of ozone-depleting chemicals and restrict their use and distribution. Production of Class I substances, including 15 kinds of chlorofluorocarbons (CFCs) and chloroform, were phased out (except for essential uses) in 1996.

EPA's Clean Air Technology Center, at (919) 541-0800, provides general assistance and information on CAA standards. The Stratospheric Ozone Information Hotline, at 1-800-296-1996, provides general information about regulations promulgated under Title VI of the CAA, and EPA's EPCRA Hotline, at 1-800-535-0202, answers questions about accidental release prevention under CAA §112(r). In addition, the Clean Air Technology Center' s website includes recent CAA rules, EPA guidance documents, and updates of EPA activities (www.epa.gov/ttn then select Directory and then CATC).

V.B. Industry Specific Requirements

As noted earlier, several government entities regulate specific transportation sectors. The air transportation industry is regulated by several different Federal, State, and local agencies. The air transportation industry is regulated by DOT's largest agency—the Federal Aviation Administration (FAA). The DOT has traditionally established national standards that are not affected by local or State laws.

EPA has traditionally relied on delegation to States to meet environmental standards, in many cases without regard to the methods used to achieve certain performance standards. This has resulted in States with more stringent air, water, and hazardous waste requirements than the Federal minimum requirements. This document does not attempt to discuss State standards, but rather highlights relevant Federal laws and proposals that affect the air transportation industry.

Clean Water Act

NPDES Requirements. Wastewater from air transportation facilities discharging to surface waters is regulated under the Federal Water Pollution Control Act (FWPCA). National Pollutant Discharge Elimination System (NPDES) permits must be obtained to discharge wastewater into navigable waters. The airport is usually considered the "discharger" for regulatory control and permitting purposes, and the individual tenants may not hold specific discharge permits. However, in some cases, the airport is the permittee and the tenants are the co-permittees. In the event of a discharge problem, a tenant who is a co-permittee contributing wastewater to an airport's discharge may be subject to action on the part of the airport or regulators (EEA, 1996).

As mandated by Section 304(m) of CWA, EPA is developing effluent limitation guidelines for certain industrial wastewater discharges from operations. At this time, there are no effluent limitation guidelines established specifically for aviation operations, however, other wastewater discharge restrictions may apply. For example, existing categorical guidelines for metal finishing currently apply to certain discharges from this industry sector. In addition, EPA is in the process of establishing effluent limitation guidelines for the transportation equipment cleaning, which will include operations such as exterior cleaning. These guidelines are scheduled to be promulgated in 2000. (Contact: Gina Matthews or Jan Goodwin, Office of Water, (202) 260-6036 and (202) 260-7152, respectively).

Storm Water Requirements. As discussed under the general description of the Clean Water Act, EPA published storm water regulations on November 16, 1990, which require certain dischargers of storm water to waters of the U.S. to apply for NPDES permits. According to the final rule, facilities with a "storm water discharge associated with industrial activities" are required to apply for a storm water permit. The rule states that transportation facilities classified in SIC 40 through 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations are considered to have a storm water discharge associated with industrial activity. However, only those portions of the facility that are either involved in vehicle maintenance (including vehicle refurbishing, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or which are otherwise identified under paragraphs (b)(14)(I)-(xi) of Section 122.26 are considered to be associated with industrial activity. It is also important to that co-permittee permitting is available if appropriate to a specific tenant/airport relationship for covering storm water run off.

Facilities covered by this rule must submit one of the following permit applications:

- Individual permit application.
- Group permit application. A group permit application can be filed by facilities with like operations and discharges. In 1991, a group storm water permit application that covered airports was filed by the American Association of Airport Executives and the Airport Research and Development Foundation. On the application, airports were identified as the permittee and all tenants as co-permittees (EEA, 1996).
- Notice of Intent for general permit coverage.

SPCC. The CWA requires facilities to develop Spill Prevention Control and Countermeasure (SPCC) plans for petroleum products, such as oil or any substance, that cause a sheen on water, if they are stored in large quantities at a particular site. The SPCC program requires reporting spills to navigable waters and the development of contingency plans that must be kept onsite. SPCC plans document the location of storage vessels, types of containment, dangers associated with a major release of material from the tanks, types of emergency equipment available at each site, and procedures for notifying the appropriate regulatory and emergency agencies. No SPCC plan is considered complete until it has been reviewed and certified by a registered Professional Engineer.

Resource Conservation and Recovery Act

Air transportation facilities generate a variety of RCRA-regulated wastes in the course of normal operations and utilize underground storage tanks for fuel storage. However, underground airport hydrant fuel systems have been deferred from the bulk of federal UST requirements pursuant to an exclusion set forth in 40 CFR §280.10. Aircraft refurbishing and maintenance operations generate hazardous wastes such as certain spent solvents and caustics, and paints and paint sludges. Additional common materials from aviation maintenance facilities that may be hazardous include:

- Rechargeable nickel-cadmium batteries and lead-acid motor vehicle batteries
- Vehicle maintenance fluids
- Fluorescent light bulbs
- Scraps of metals (cadmium, chromium, lead, mercury, selenium, and silver) and materials containing these metals (e.g., high-grade stainless steel or paint waste) (exempt if recycled)
- Waste solvents

- Near-empty paint cans and spray cans
- Paint stripping residue.

Note that petroleum products and petroleum-containing wastes (e.g., waste oil, contaminated fuel, or fuel spill clean-up wastes) are specifically exempted from RCRA regulations, unless they exhibit any of the hazardous waste characteristics (EEA, 1996). Many air transportation facilities qualify as hazardous waste generators under RCRA law. Under RCRA, it is the facility's responsibility to determine whether a waste is hazardous. A list of EPA hazardous wastes can be found in 40 CFR §§261.31-261.33. Wastes are also hazardous if they exhibit a characteristic described in 40 CFR §§261.21-261.24. RCRA wastes are subject to the hazardous waste regulations of 40 CFR Parts 124, 261-266, 270-273, and 302. Used oil and USTs are subject to different rules.

Oil Pollution Act

The 1990 Oil Pollution Act (OPA) establishes strict, joint and several liability against facilities that discharge oil or which pose a substantial threat of discharging oil to navigable waterways. OPA imposes contingency planning and readiness requirements on certain facilities that may include vehicle maintenance shops. These requirements may affect some air transportation maintenance establishments. Regulations covering response to oil discharges and contingency plans (40 CFR Part 300), and facility response plans to oil discharges (40 CFR Part 112) were revised and finalized in 1994.

Comprehensive Environmental Response, Compensation, and Liability Act

A number of wastes generated from the air transportation refurbishing and maintenance processes contain CERCLA hazardous substances. Therefore, past spills and on-site releases of such substances may require remedial clean-up actions under Superfund.

Emergency Planning and Community Right-to-Know Act

CERCLA/EPCRA Emergency Release Notification. Any person in charge of a facility is required to immediately notify the LEPCs and SERCs likely to be affected if there is a release into the environment f a hazardous substance that exceeds the reportable quantity for that substance. Substances subject to this requirement include those on the list of "extremely hazardous substances" (40 CFR Part 355) as well as more than 700 hazardous substances subject to the emergency notification requirements under CERCLA Section 103(a) (40 CFR Section 302.4).

Many materials commonly used in the aviation industry fall into this category of CERCLA hazardous substances, including many solvents, ethylene glycol, methanol, methylene chloride, and 1,1,1-trichloroethane. With regard to the obligation to report releases of ethylene glycol being used for aircraft deicing at airports, the "facility" may include the truck applying the deicer, the aircraft to which the deicer is applied, or the entire airport. The person in charge of the "facility" must report a release into the environment of 5,000 pounds or more of ethylene glycol in any 24-hour period (EPA, 1996).

Federally Permitted Release Exemption. CERCLA Section 103(a) exempts those persons in charge of facilities from reporting releases that are federally permitted. On February 4, 1992, EPA issued OSWER Directive 9360.4-12 regarding *CERCLA Reporting Requirements for Releases of Ethylene Glycol From Airplane Deicing Operations*. This Interpretative Memorandum and OSWER Directive allows the airline industry to classify releases of the ethylene glycol as nonreportable (or exempt) discharges if a facility (1) has an NPDES permit covering ethylene glycol, (2) has applied for an NPDES permit, or (3) discharges to a publicly-owned treatment works (POTW) meeting the applicable pretreatment standards. Since most if not all fluid discharges resulting from aircraft deicing operations usually fit into one of the permitted release exemptions found in CERCLA Section 101(10), most water discharges of ethylene glycol-based deicing fluids will not result in a reporting requirement. (EPA, 1992)

Emergency Planning. Under EPCRA, a facility must notify authorities if it has onsite at any time a listed hazardous substance in an amount over the substance's threshold planning quantity. Extremely hazardous substances that may be present in aviation-related facilities include nitric acid, sulfuric acid, phenol and ammonia (EEA, 1996).

Clean Air Act

Sections 231-234 of the Clean Air Act gives exclusive jurisdiction to the federal government and preempts any state or local regulation with respect to emissions of any air pollutant from any aircraft or engine.

Air Quality Standards - Ozone Non-Attainment Areas. The most important pollutant affected by air quality standards is ozone. In attainment areas, a major source emits or has the potential to emit more than 100 tons per year of any criteria pollutant or 10 tons per year of any hazardous air pollutant or 25 tons per year of any combination of hazardous air pollutants (emission thresholds differ for various categories of nonattainment areas). Large aircraft maintenance facilities performing aircraft painting or using large amounts of solvents may exceed these limits. Emission rates are dependent

on the types of chemicals and methods used and the types of air emission control equipment used. Some regulations apply to substances (e.g., solvent degreasers) regardless of the size of the source. These regulations are designed to reduce emissions from solvent evaporation (EEA, 1996).

To assist State and local agencies in establishing regulations that reduce VOC emissions from the air transportation industry, EPA developed a control technique guideline. This guideline offers an incentive of reduced recordkeeping requirements for facilities that use only approved cleaning agents, and requires vapor pressure limits for non-listed cleaning agents. Additionally, the guideline requires unused cleaning agent and solvent-laden rags to be stored in containers to prevent evaporation. (EEA, 1996) Airports located in ozone non-attainment areas may be subject to restrictions applicable to motor vehicles. These restrictions may affect the type and use of both airside and landside vehicles.

NESHAPs/MACT Standard. National emission standards for hazardous air pollutants (NESHAP) attempt to control several hundred compounds, the most notable for airports being asbestos. Airports must comply with the NESHAP requirements for asbestos when demolishing, or significantly remodeling, a building containing asbestos. Asbestos is commonly found in ceiling tile, floor tile, boiler room insulation, and sprayed-on insulation installed more than 20 years ago.

As stated earlier, MACT is the control technology achieving the maximum reduction in the emission of the hazardous air pollutants, taking into account cost and other factors. A MACT standard for coating operations conducted by aerospace manufacturing and reworking facilities was finalized by EPA in 1996. The emission limit from primers is 2.9 pounds per gallon and the topcoat emission limit is 3.5 pounds per gallon. Generally, HAP emissions are not permitted during paint removal operations (except during spot stripping and decal removal) (EEA, 1996). However, a number of exceptions may apply which permit such emissions under circumstances addressed in the NESHAP. According to the aerospace NESHAP, the provisions restricting HAP emissions during paint removal do not apply to the removal of paint from parts or units normally removed from the plane.

New Source Performance Standards (NSPS). Some facilities subject to NSPS may be found at airports, including industrial and utility boilers, vehicle maintenance facilities, and fuel storage and delivery facilities.

State Implementation Plans (SIPs). SIPs regulate stationary sources, such as buildings and other permanent installations, and mobile sources, such as automobiles. Typical airport facilities and activities which may be subject to stationary source regulations include heating and refrigeration plants; fueling

systems; fuel storage facilities; aircraft maintenance facilities; deicing; roadways, garages, and parking lots; landside development; building demolition; and building construction. SIPs may also control mobile sources such as fleet vehicles and other vehicles using the airport. Airports are large parking areas for automobiles, trucks, and aircraft. SIPs may have to limit motor vehicle emissions through "transportation control measures." These measures are designed to reduce congestion and the number of vehicle miles traveled in a region. Measures which affect airports include improved public transit, measures to encourage uses of buses and other high occupancy vehicles, mandatory trip reduction, and traffic flow improvements.

Where applicable, SIPs must address the requirements of general air conformity (40 CFR Part 93). In addition, FAA is required to ensure compliance with general air conformity requirements for federal airport actions planned for nonattainment or maintenance areas.

Ozone-Depleting Substances. The amended CAA is phasing out the production and restricting the use and distribution of ozone-depleting chemicals. One ozone-depleting chemical widely used in the air transportation industry for fire suppression is halon. Halon production has ceased and future purchases must be from recycled stock. For consistency with these regulations, FAA has revised its policy and no longer requires halon use during firefighting drills conducted under FAR 121.417 and FAR 135.331 (EEA, 1996).

Additionally, EPA has established requirements for servicing and disposal of air conditioning and refrigeration equipment containing regulated ozone-depleting refrigerants. Certified, self-contained recovery equipment must be available during refrigeration equipment servicing. Additional recordkeeping and reporting requirements apply for appliance owners/operators and technicians. Facilities with refrigeration equipment containing ozone-depleting chemicals must comply with 40 CFR Part 82 (EEA, 1996).

Federal Insecticide, Fungicide, and Rodenticide Act

FIFRA regulations are applicable to air transportation facilities and operations where herbicides are used to control weeds and brush, or when pesticides and rodenticides are used for pest control in buildings. Air transportation operations should only apply herbicides, both general and restricted use, according to label instructions. Certification is required for use of restricted use herbicides.

V.C. Pending and Proposed Regulatory Requirements

Clean Water Act

Presently, there are no effluent limitations guidelines specific to the air transportation industry. Effluent guidelines are currently being developed for tank interior cleaning, including aircraft cleaning, by the Office of Water. These guidelines are to be proposed in January 1998 and issued in final by February 2000 (Contact: Gina Matthews or Jan Goodwin, Office of Water, (202) 260-6036 and (202) 260-7152, respectively).

On January 31, 1997, EPA proposed a package of negotiated amendments, including deadline extensions, to the effluent guidelines plan set forth in a 1992 Consent Decree. For metal products and machinery industry guidelines, which are applicable to certain maintenance and refurbishing activities, the proposed modifications would allow EPA to combine the current two-phase guideline development process into one streamlined effluent guideline procedure. The new combined rule is scheduled to be finalized by December 2002.

The modified consent decree also targets airport deicing operations. The consent decree allowed EPA to remove deicing discharges from the scope of the categorical rulemaking, and instead initiate a study of water pollution problems associated with airport deicing operations and storm water runoff. Recently issued FAA guidelines on aircraft deicing and the recent EPA storm water rules are likely to have a significant effect on airport deicing operations.

In addition, the EPA Office of Water will also work with the Department of Defense to study deicing operations at military installations. Depending on the results of this study, guidelines specific to deicing at military installations may be developed.

EPA's five-year-old baseline general permit for industrial storm water dischargers expired on September 30, 1997. EPA suggests that industries covered by the baseline permit should explore their permit options. Most State five-year industrial permits expired along with the EPA Baseline General Permit on September 30, 1997. Most permits contain a provision stating that the expired permit remains effective and enforceable until replaced. However, the permits also contain a provision requiring permittees to submit a new Notice of Intent (NOI) prior to permit expiration to remain covered. Once an airport is without a permit, it generally cannot reapply for coverage under the expired permit.

Emergency Planning and Community Right-to-Know Act

Under EPCRA 313, Toxic Release Inventory (TRI) reporting is required by manufacturing and certain other facilities. Air transportation facilities are

currently not subject to TRI reporting requirements. EPA recently expanded the TRI program and did not include airports (62 FR 23834), however, they may be added in the future.

Clean Air Act

EPA has completed its final amendments to the Aerospace NESHAP under the CAA which will be implemented September 1, 1998. The Aerospace NESHAP establishes work practice, equipment, and pollution control standards for maintenance procedures.

EPA will issue its final Control Techniques Guidelines document for the aerospace industry addressing reasonably available control technology (RACT) for volatile organic compounds (VOC) emissions, which will address the maintenance issues discussed in the document.

EPA's Clean Air Technology Center, at (919) 541-0800, provides general assistance and information on CAA standards. In addition, the Clean Air Technology Center's website includes recent CAA rules and EPA guidance documents (www.epa.gov/ttn then select Directory and then CATC).

VI. COMPLIANCE AND ENFORCEMENT HISTORY

Background

Until recently, EPA has focused much of its attention on measuring compliance with specific environmental statutes. This approach allows the Agency to track compliance with the Clean Air Act, the Resource Conservation and Recovery Act, the Clean Water Act, and other environmental statutes. Within the last several years, the Agency has begun to supplement single-media compliance indicators with facility-specific, multimedia indicators of compliance. In doing so, EPA is in a better position to track compliance with all statutes at the facility level, and within specific industrial sectors.

A major step in building the capacity to compile multimedia data for industrial sectors was the creation of EPA's Integrated Data for Enforcement Analysis (IDEA) system. IDEA has the capacity to "read into" the Agency's single-media databases, extract compliance records, and match the records to individual facilities. The IDEA system can match Air, Water, Waste, Toxics/Pesticides/EPCRA, TRI, and Enforcement Docket records for a given facility, and generate a list of historical permit, inspection, and enforcement activity. IDEA also has the capability to analyze data by geographic area and corporate holder. As the capacity to generate multimedia compliance data improves, EPA will make available more in-depth compliance and enforcement information. Additionally, sector-specific measures of success for compliance assistance efforts are under development.

Compliance and Enforcement Profile Description

Using inspection, violation and enforcement data from the IDEA system, this section provides information regarding the historical compliance and enforcement activity of this sector. With this decision, the selection criteria are consistent across sectors with certain exceptions. For the sectors that do not normally report to the TRI program, data have been provided from EPA's Facility Indexing System (FINDS) which tracks facilities in all media databases. Please note, in this section, EPA does not attempt to define the actual number of facilities that fall within each sector. Instead, the section portrays the records of a subset of facilities within the sector that are well defined within EPA databases.

As a check on the relative size of the full sector universe, most notebooks contain an estimated number of facilities within the sector according to the Bureau of Census (see Section II). With sectors dominated by small businesses, such as metal finishers and printers, the reporting universe within the EPA databases may be small in comparison to Census data. However,

the group selected for inclusion in this data analysis section should be consistent with this sector's general make-up.

Following this introduction is a list defining each data column presented within this section. These values represent a retrospective summary of inspections and enforcement actions, and reflect solely EPA, State, and local compliance assurance activities that have been entered into EPA databases. To identify any changes in trends, the EPA ran two data queries, one for the past five calendar years (April 1, 1992 to March 31, 1997) and the other for the most recent twelve-month period (April 1, 1996 to March 31, 1997). The five-year analysis gives an average level of activity for that period for comparison to the more recent activity.

Because most inspections focus on single-media requirements, the data queries presented in this section are taken from single media databases. These databases do not provide data on whether inspections are state/local or EPA-led. However, the table breaking down the universe of violations does give the reader a crude measurement of the EPA's and States' efforts within each media program. The presented data illustrate the variations across EPA Regions for certain sectors.[5] This variation may be attributable to state/local data entry variations, specific geographic concentrations, proximity to population centers, sensitive ecosystems, highly toxic chemicals used in production, or historical noncompliance. Hence, the exhibited data do not rank regional performance or necessarily reflect which regions may have the most compliance problems.

Compliance and Enforcement Data Definitions

General Definitions

Facility Indexing System (FINDS) -- this system assigns a common facility number to EPA single-media permit records. The FINDS identification number allows EPA to compile and review all permit, compliance, enforcement and pollutant release data for any given regulated facility.

Integrated Data for Enforcement Analysis (IDEA) -- is a data integration system that can retrieve information from the major EPA program office databases. IDEA uses the FINDS identification number to link separate data records from EPA's databases. This allows retrieval of records from across media or statutes for any given facility, thus creating a "master list" of

[5] EPA Regions include the following states: I (CT, MA, ME, RI, NH, VT); II (NJ, NY, PR, VI); III (DC, DE, MD, PA, VA, WV); IV (AL, FL, GA, KY, MS, NC, SC, TN); V (IL, IN, MI, MN, OH, WI); VI (AR, LA, NM, OK, TX); VII (IA, KS, MO, NE); VIII (CO, MT, ND, SD, UT, WY); IX (AZ, CA, HI, NV, Pacific Trust Territories); X (AK, ID, OR, WA).

records for that facility. Some of the data systems accessible through IDEA are: AIRS (Air Facility Indexing and Retrieval System, Office of Air and Radiation), PCS (Permit Compliance System, Office of Water), RCRIS (Resource Conservation and Recovery Information System, Office of Solid Waste), NCDB (National Compliance Data Base, Office of Prevention, Pesticides, and Toxic Substances), CERCLIS (Comprehensive Environmental and Liability Information System, Superfund), and TRIS (Toxic Release Inventory System). IDEA also contains information from outside sources such as Dun and Bradstreet and the Occupational Safety and Health Administration (OSHA). Most data queries displayed in notebook sections IV and VII were conducted using IDEA.

Data Table Column Heading Definitions

Facilities in Search -- are based on the universe of TRI reporters within the listed SIC code range. For industries not covered under TRI reporting requirements (metal mining, nonmetallic mineral mining, electric power generation, ground transportation, water transportation, and dry cleaning), or industries in which only a very small fraction of facilities report to TRI (e.g., printing), the notebook uses the FINDS universe for executing data queries. The SIC code range selected for each search is defined by each notebook's selected SIC code coverage described in Section II.

Facilities Inspected -- indicates the level of EPA and state agency inspections for the facilities in this data search. These values show what percentage of the facility universe is inspected in a one-year or five-year period.

Number of Inspections -- measures the total number of inspections conducted in this sector. An inspection event is counted each time it is entered into a single media database.

Average Time Between Inspections -- provides an average length of time, expressed in months, between compliance inspections at a facility within the defined universe.

Facilities with One or More Enforcement Actions -- expresses the number of facilities that were the subject of at least one enforcement action within the defined time period. This category is broken down further into federal and state actions. Data are obtained for administrative, civil/judicial, and criminal enforcement actions. Administrative actions include Notices of Violation (NOVs). A facility with multiple enforcement actions is only counted once in this column, e.g., a facility with 3 enforcement actions counts as 1 facility.

Total Enforcement Actions -- describes the total number of enforcement actions identified for an industrial sector across all environmental statutes. A facility with multiple enforcement actions is counted multiple times, e.g., a facility with 3 enforcement actions counts as 3.

State Lead Actions -- shows what percentage of the total enforcement actions are taken by state and local environmental agencies. Varying levels of use by states of EPA data systems may limit the volume of actions recorded as state enforcement activity. Some states extensively report enforcement activities into EPA data systems, while other states may use their own data systems.

Federal Lead Actions -- shows what percentage of the total enforcement actions are taken by the United States Environmental Protection Agency. This value includes referrals from state agencies. Many of these actions result from coordinated or joint state/federal efforts.

Enforcement to Inspection Rate -- is a ratio of enforcement actions to inspections, and is presented for comparative purposes only. This ratio is a rough indicator of the relationship between inspections and enforcement. It relates the number of enforcement actions and the number of inspections that occurred within the one-year or five-year period. This ratio includes the inspections and enforcement actions reported under the Clean Water Act (CWA), the Clean Air Act (CAA) and the Resource Conservation and Recovery Act (RCRA). Inspections and actions from the TSCA/FIFRA/ EPCRA database are not factored into this ratio because most of the actions taken under these programs are not the result of facility inspections. Also, this ratio does not account for enforcement actions arising from non-inspection compliance monitoring activities (e.g., self-reported water discharges) that can result in enforcement action within the CAA, CWA, and RCRA.

Facilities with One or More Violations Identified -- indicates the percentage of inspected facilities having a violation identified in one of the following data categories: In Violation or Significant Violation Status (CAA); Reportable Noncompliance, Current Year Noncompliance, Significant Noncompliance (CWA); Noncompliance and Significant Noncompliance (FIFRA, TSCA, and EPCRA); and Unresolved Violation and Unresolved High Priority Violation (RCRA). The values presented for this column reflect the extent of noncompliance within the measured time frame, but do not distinguish between the severity of the noncompliance.
Violation status may be a precursor to an enforcement action, but does not necessarily indicate that an enforcement action will occur.

Media Breakdown of Enforcement Actions and Inspections -- four columns identify the proportion of total inspections and enforcement actions within EPA Air, Water, Waste, and TSCA/FIFRA/EPCRA databases. Each column is a percentage of either the "Total Inspections" or the "Total Actions" column.

VI.A. Air Transportation Industry Compliance History

Exhibit 13 provides an overview of the reported compliance and enforcement data for the air transportation industry over the past five years (April 1992 to April 1997). These data are also broken out by EPA Regions thereby permitting geographical comparisons. A few points evident from the data are listed below.

As shown, there were 444 facilities identified through IDEA with air transportation SIC codes. Of these, 52 percent (231) were inspected in the last 5 years.

- Over the 5 years, 973 inspections were conducted at those 231 facilities. On average, each facility was inspected between 4 and 5 times, or about once a year.

- The 973 inspections resulted in 48 facilities having enforcement actions taken against them. At those 48 facilities, there were a total of 97 enforcement actions, meaning each facility averaged approximately 2 enforcement actions over the past 5 years.

- The average enforcement to inspection rate is 0.10. This average rate means that for every 10 inspections conducted, there is 1 resulting enforcement action taken. Across the regions, this rate ranged from 0.03 to 0.30.

VI.B. Comparison of Enforcement Activity Between Selected Industries

Exhibits 14 and 15 allow the compliance history of the air transportation sector to be compared to the other industries covered by the industry sector notebooks. Comparisons between Exhibits 14 and 15 permit the identification of trends in compliance and enforcement records of the various industries by comparing data covering the last five years (April 1992 to April 1997) to that of the past year (April 1996 to April 1997). Some points evident from the data are listed below.

- Overall, the air transportation sector enforcement

Exhibit 13. Five-Year Enforcement and Compliance Summary for the Air Transportation Industry

A	B	C	D	E	F	G	H	I	J
Region	**Facilities in Search**	**Facilities Inspected**	**Number of Inspections**	**Average Months Between Inspections**	**Facilities with 1 or More Enforcement Actions**	**Total Enforcement Actions**	**Percent State Lead Actions**	**Percent Federal Lead Actions**	**Enforcement to Inspection Rate**
I	23	4	18	77	3	4	50%	50%	0.22
II	19	13	56	20	5	17	88%	12%	0.30
III	46	25	137	20	3	4	100%	0%	0.03
IV	132	95	402	20	16	37	100%	0%	0.09
V	23	15	89	16	4	8	50%	50%	0.09
VI	37	17	53	42	5	6	100%	0%	0.11
VII	31	13	58	32	1	2	0%	100%	0.03
VIII	21	9	14	90	2	4	100%	0%	0.29
IX	27	14	82	20	5	8	100%	0%	0.10
X	85	26	64	80	4	7	71%	29%	0.11
TOTAL	444	231	973	27	48	97	88%	12%	0.10

numbers are mostly consistent, on a percentage basis, with the other sectors.

- As shown in Exhibit 14, the air transportation enforcement-to-inspection rate is 0.10 over the past 5 years. Over the last year, as shown in Exhibit 15, the air transportation enforcement-to-inspection rate is 0.08.

Exhibits 16 and 17 provide a more in-depth comparison between the air transportation industry and other sectors by breaking out the compliance and enforcement data by environmental statute. As in the previous exhibits, the data cover the last five years (Exhibit 16) and the last year (Exhibit 17) to facilitate the identification of recent trends. A few points evident from the data are listed below.

- As shown, over the past 5 years, nearly half of all inspections conducted and resulting in enforcement actions at air transportation facilities have been under RCRA.

- Over the past year, while RCRA accounted for more than half of all inspections, only 25 percent of the enforcement actions were under RCRA.

Exhibit 14: Five-Year Enforcement and Compliance Summary for Selected Industries

A	B	C	D	E	F	G	H	I	J
Industry Sector	Facilities in Search	Facilities Inspected	Number of Inspections	Average Number Months Between Inspections	Facilities with 1 or more Enforcement Actions	Total Enforcement Actions	Percent State Lead Actions	Percent Federal Lead Actions	Enforcement to Inspection Rate
Metal Mining	1,232	378	1,600	46	63	111	53%	47%	0.07
Coal Mining	3,256	741	3,748	52	88	132	89%	11%	0.04
Oil and Gas Extraction	4,676	1,902	6,071	46	149	309	79%	21%	0.05
Non-Metallic Mineral Mining	5,256	2,803	12,826	25	385	622	77%	23%	0.05
Textiles	355	267	1,465	15	53	83	90%	10%	0.06
Lumber and Wood	712	473	2,767	15	134	265	70%	30%	0.10
Furniture	499	386	2,379	13	65	91	81%	19%	0.04
Pulp and Paper	484	430	4,630	6	150	478	80%	20%	0.10
Printing	5,862	2,092	7,691	46	238	428	88%	12%	0.06
Inorganic Chemicals	441	286	3,087	9	89	235	74%	26%	0.08
Resins and Manmade Fibers	329	263	2,430	8	93	219	76%	24%	0.09
Pharmaceuticals	164	129	1,201	8	35	122	80%	20%	0.10
Organic Chemicals	425	355	4,294	6	153	468	65%	35%	0.11
Agricultural Chemicals	263	164	1,293	12	47	102	74%	26%	0.08
Petroleum Refining	156	148	3,081	3	124	763	68%	32%	0.25
Rubber and Plastic	1,818	981	4,383	25	178	276	82%	18%	0.06
Stone, Clay, Glass and Concrete	615	388	3,474	11	97	277	75%	25%	0.08
Iron and Steel	349	275	4,476	5	121	305	71%	29%	0.07
Metal Castings	669	424	2,535	16	113	191	71%	29%	0.08
Nonferrous Metals	203	161	1,640	7	68	174	78%	22%	0.11
Fabricated Metal Products	2,906	1,858	7,914	22	365	600	75%	25%	0.08
Electronics	1,250	863	4,500	17	150	251	80%	20%	0.06
Automobile Assembly	1,260	927	5,912	13	253	413	82%	18%	0.07
Shipbuilding and Repair	44	37	243	9	20	32	84%	16%	0.13
Ground Transportation	7,786	3,263	12,904	36	375	774	84%	16%	0.06
Water Transportation	514	192	816	38	36	70	61%	39%	0.09
Air Transportation	444	231	973	27	48	97	88%	12%	0.10
Fossil Fuel Electric Power	3,270	2,166	14,210	14	403	789	76%	24%	0.06
Dry Cleaning	6,063	2,360	3,813	95	55	66	95%	5%	0.02

Exhibit 15: One-Year Enforcement and Compliance Summary for Selected Industries

A	B	C	D	E		F		G	H
Industry Sector	Facilities in Search	Facilities Inspected	Number of Inspections	Facilities with 1 or More Violations		Facilities with 1 or more Enforcement Actions		Total Enforcement Actions	Enforcement to Inspection Rate
				Number	Percent*	Number	Percent*		
Metal Mining	1,232	142	211	102	72%	9	6%	10	0.05
Coal Mining	3,256	362	765	90	25%	20	6%	22	0.03
Oil and Gas Extraction	4,676	874	1,173	127	15%	26	3%	34	0.03
Non-Metallic Mineral Mining	5,256	1,481	2,451	384	26%	73	5%	91	0.04
Textiles	355	172	295	96	56%	10	6%	12	0.04
Lumber and Wood	712	279	507	192	69%	44	16%	52	0.10
Furniture	499	254	459	136	54%	9	4%	11	0.02
Pulp and Paper	484	317	788	248	78%	43	14%	74	0.09
Printing	5,862	892	1,363	577	65%	28	3%	53	0.04
Inorganic Chemicals	441	200	548	155	78%	19	10%	31	0.06
Resins and Madmade Fibers	329	173	419	152	88%	26	15%	36	0.09
Pharmaceuticals	164	80	209	84	105%	8	10%	14	0.07
Organic Chemicals	425	259	837	243	94%	42	16%	56	0.07
Agricultural Chemicals	263	105	206	102	97%	5	5%	11	0.05
Petroleum Refining	156	132	565	129	98%	58	44%	132	0.23
Rubber and Plastic	1,818	466	791	389	83%	33	7%	41	0.05
Stone, Clay, Glass and Concrete	615	255	678	151	59%	19	7%	27	0.04
Iron and Steel	349	197	866	174	88%	22	11%	34	0.04
Metal Castings	669	234	433	240	103%	24	10%	26	0.06
Nonferrous Metals	203	108	310	98	91%	17	16%	28	0.09
Fabricated Metal	2,906	849	1,377	796	94%	63	7%	83	0.06
Electronics	1,250	420	780	402	96%	27	6%	43	0.06
Automobile Assembly	1,260	507	1,058	431	85%	35	7%	47	0.04
Shipbuilding and Repair	44	22	51	19	86%	3	14%	4	0.08
Ground Transportation	7,786	1,585	2,499	681	43%	85	5%	103	0.04
Water Transportation	514	84	141	53	63%	10	12%	11	0.08
Air Transportation	444	96	151	69	72%	8	8%	12	0.08
Fossil Fuel Electric Power	3,270	1,318	2,430	804	61%	100	8%	135	0.06
Dry Cleaning	6,063	1,234	1,436	314	25%	12	1%	16	0.01

Exhibit 16: Five-Year Inspection and Enforcement Summary by Statute for Selected Industries

Industry Sector	Facilities Inspected	Total Inspections	Total Enforcement Actions	Clean Air Act		Clean Water Act		RCRA		FIFRA/TSCA/ EPCRA/Other	
				% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions
Metal Mining	378	1,600	111	39%	19%	52%	52%	8%	12%	1%	17%
Coal Mining	741	3,748	132	57%	64%	38%	28%	4%	8%	1%	1%
Oil and Gas Extraction	1,902	6,071	309	75%	65%	16%	14%	8%	18%	0%	3%
Non-Metallic Mineral Mining	2,803	12,826	622	83%	81%	14%	13%	3%	4%	0%	3%
Textiles	267	1,465	83	58%	54%	22%	25%	18%	14%	2%	6%
Lumber and Wood	473	2,767	265	49%	47%	6%	6%	44%	31%	1%	16%
Furniture	386	2,379	91	62%	42%	3%	0%	34%	43%	1%	14%
Pulp and Paper	430	4,630	478	51%	59%	32%	28%	15%	10%	2%	4%
Printing	2,092	7,691	428	60%	64%	5%	3%	35%	29%	1%	4%
Inorganic Chemicals	286	3,087	235	38%	44%	27%	21%	34%	30%	1%	5%
Resins and Manmade Fibers	263	2,430	219	35%	43%	23%	28%	38%	23%	4%	6%
Pharmaceuticals	129	1,201	122	35%	49%	15%	25%	45%	20%	5%	5%
Organic Chemicals	355	4,294	468	37%	42%	16%	25%	44%	28%	4%	6%
Agricultural Chemicals	164	1,293	102	43%	39%	24%	20%	28%	30%	5%	11%
Petroleum Refining	148	3,081	763	42%	59%	20%	13%	36%	21%	2%	7%
Rubber and Plastic	981	4,383	276	51%	44%	12%	11%	35%	34%	2%	11%
Stone, Clay, Glass and Concrete	388	3,474	277	56%	57%	13%	9%	31%	30%	1%	4%
Iron and Steel	275	4,476	305	45%	35%	26%	26%	28%	31%	1%	8%
Metal Castings	424	2,535	191	55%	44%	11%	10%	32%	31%	2%	14%
Nonferrous Metals	161	1,640	174	48%	43%	18%	17%	33%	31%	1%	10%
Fabricated Metal	1,858	7,914	600	40%	33%	12%	11%	45%	43%	2%	13%
Electronics	863	4,500	251	38%	32%	13%	11%	47%	50%	2%	7%
Automobile Assembly	927	5,912	413	47%	39%	8%	9%	43%	43%	2%	9%
Shipbuilding and Repair	37	243	32	39%	25%	14%	25%	42%	47%	5%	3%
Ground Transportation	3,263	12,904	774	59%	41%	12%	11%	29%	45%	1%	3%
Water Transportation	192	816	70	39%	29%	23%	34%	37%	33%	1%	4%
Air Transportation	231	973	97	25%	32%	27%	20%	48%	48%	0%	0%
Fossil Fuel Electric Power	2,166	14,210	789	57%	59%	32%	26%	11%	10%	1%	5%
Dry Cleaning	2,360	3,813	66	56%	23%	3%	6%	41%	71%	0%	0%

Exhibit 17: One-Year Inspection and Enforcement Summary by Statute for Selected Industries

Industry Sector	Facilities Inspected	Total Inspections	Total Enforcement Actions	Clean Air Act		Clean Water Act		RCRA		FIFRA/TSCA/ EPCRA/Other	
				% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions	% of Total Inspections	% of Total Actions
Metal Mining	142	211	10	52%	0%	40%	40%	8%	30%	0%	30%
Coal Mining	362	765	22	56%	82%	40%	14%	4%	5%	0%	0%
Oil and Gas Extraction	874	1,173	34	82%	68%	10%	9%	9%	24%	0%	0%
Non-Metallic Mineral Mining	1,481	2,451	91	87%	89%	10%	9%	3%	2%	0%	0%
Textiles	172	295	12	66%	75%	17%	17%	17%	8%	0%	0%
Lumber and Wood	279	507	52	51%	30%	6%	5%	44%	25%	0%	40%
Furniture	254	459	11	66%	45%	2%	0%	32%	45%	0%	9%
Pulp and Paper	317	788	74	54%	73%	32%	19%	14%	7%	0%	1%
Printing	892	1,363	53	63%	77%	4%	0%	33%	23%	0%	0%
Inorganic Chemicals	200	548	31	35%	59%	26%	9%	39%	25%	0%	6%
Resins and Manmade Fibers	173	419	36	38%	51%	24%	38%	38%	5%	0%	5%
Pharmaceuticals	80	209	14	43%	71%	11%	14%	45%	14%	0%	0%
Organic Chemicals	259	837	56	40%	54%	13%	13%	47%	34%	0%	0%
Agricultural Chemicals	105	206	11	48%	55%	22%	0%	30%	36%	0%	9%
Petroleum Refining	132	565	132	49%	67%	17%	8%	34%	15%	0%	10%
Rubber and Plastic	466	791	41	55%	64%	10%	13%	35%	23%	0%	0%
Stone, Clay, Glass and Concrete	255	678	27	62%	63%	10%	7%	28%	30%	0%	0%
Iron and Steel	197	866	34	52%	47%	23%	29%	26%	24%	0%	0%
Metal Castings	234	433	26	60%	58%	10%	8%	30%	35%	0%	0%
Nonferrous Metals	108	310	28	44%	43%	15%	20%	41%	30%	0%	7%
Fabricated Metal	849	1,377	83	46%	41%	11%	2%	43%	57%	0%	0%
Electronics	420	780	43	44%	37%	14%	5%	43%	53%	0%	5%
Automobile Assembly	507	1,058	47	53%	47%	7%	6%	41%	47%	0%	0%
Shipbuilding and Repair	22	51	4	54%	0%	11%	50%	35%	50%	0%	0%
Ground Transportation	1,585	2,499	103	64%	46%	11%	10%	26%	44%	0%	1%
Water Transportation	84	141	11	38%	9%	24%	36%	38%	45%	0%	9%
Air Transportation	96	151	12	28%	33%	15%	42%	57%	25%	0%	0%
Fossil Fuel Electric Power	1,318	2,430	135	59%	73%	32%	21%	9%	5%	0%	0%
Dry Cleaning	1,234	1,436	16	69%	56%	1%	6%	30%	38%	0%	0%

VI.C. Review of Major Cases/Supplemental Environmental Projects

This section provides summary information about major cases that have affected this sector, and a list of Supplemental Environmental Projects (SEPs).

VI.C.1. Review of Major Cases

As shown in the previous tables, there have been only 97 enforcement actions taken against air transportation industries over the past 5 years. Stemming from those 97 actions are at least 34 cases, some of which are discussed in more detail below. The 34 cases can be categorized as follows:

- 1 Clean Air Act case (new source performance standards)
- 2 Clean Water Act cases (pretreatment and NPDES permit violations)
- 21 RCRA (USTs, unpermitted storage units, etc.)
- 5 CERCLA
- 4 TSCA (PCBs)
- 1 EPCRA (release reporting).

Of these 34 cases, 16 were against federal facilities and 2 were criminal cases. Supplemental environmental projects were negotiated in 3 of the cases. (These are discussed in more detail in the following section.) The following cases are examples of EPA's enforcement against air transportation industries.

- Pacific Southwest Airmotive, Inc. (PSA) owned and operated a jet engine overhaul facility in San Diego, California. EPA brought an enforcement action against PSA (and ultimately its new owner U.S. Air) under the Clean Water Act for violations of the pretreatment standard for metal finishing operations. During operations, PSA discharged an average of 73,000 gallons per day of regulated industrial wastewater through the sewers to San Diego's Point Loma wastewater treatment plant. The court entered a civil consent decree in which U.S. Air agreed to pay $335,000 in civil penalties.

- Grumman St. Augustine Corporation strips, paints, and refurbishes aircraft at its St. Augustine, Florida, facility. EPA brought an enforcement action against Grumman in 1991 as part of the RCRA Land Disposal Restrictions Initiative. A consent decree in 1993 settled the enforcement action. The decree calls for a civil penalty of $2.5 million, of which Grumman will initially pay $1.5 million in cash. The penalty would be reduced by $1 million if Grumman completed several innovative pollution prevention projects.

The pollution prevention provisions would substantially reduce or eliminate several highly toxic waste streams, including a paint stripper, methylene chloride, and ozone-depleting chemicals (e.g., CFCs). EPA estimated that up to 240,000 pounds of hazardous emissions per year will be eliminated and toxic sludge will be reduced if Grumman complied with RCRA. Furthermore, if compliance with RCRA is achieved, approximately 2.4 million gallons of potable water will be conserved.

- As a result of an imminent and substantial endangerment situation, EPA issued Reese Air Force Base in Lubbock, Texas, an administrative order under RCRA Section 7003. In March 1993, EPA learned that Reese had detected trichloroethylene above safe drinking water standards in some privately-owned drinking water wells near the base. After confirming the data, EPA issued the administrative order. The order requires the base to conduct the following activities:

  (1) Collect samples from wells in a 36-square-mile area (within a 2-mile perimeter of the base) to determine the extent of the contamination
  (2) Notify the owners of any contamination
  (3) Supply an alternate source of drinking water to the residents with contaminated wells
  (4) Monitor the ground water in and adjacent to the plume.

  Reese has completed the initial sampling of about 950 wells, provided carbon filters for all the impacted water wells, and connected some of the users to the City of Lubbock's water system. The city is in the process of connecting its water lines to the residents that live within the city limits. The residents living outside the city limits may use the water from the wells after it has been carbon filtered.

- Region II conducted a major consolidated multimedia inspection of Kennedy International Airport in New York City, which is operated by the Port Authority of New York and New Jersey. A number of violations were documented, both at facilities operated by the Port Authority itself, as well as at some facilities operated by airline or service companies. In 1993 a complaint was issued to the Port Authority citing it for TSCA violations and proposing a penalty of $289,000. On June 28, 1994, Region II issued three additional administrative complaints to Ogden Aviation Services, Inc., citing that company for violations of the federal underground storage tank regulations, and proposing penalties totaling $109,125.

VI.C.2. Supplementary Environmental Projects (SEPs)

SEPs are compliance agreements that reduce a facility's non-compliance penalty in return for an environmental project that exceeds the value of the reduction. Often, these projects fund pollution prevention activities that can reduce the future pollutant loadings of a facility. Information on SEP cases can be accessed via the Internet at EPA's Enviroene website: http://es.inel.gov/sep.

The following are examples of three SEPs negotiated with air transportation facilities.

- In response to violations of EPCRA Section 304 and CERCLA Section 103 at the Memphis/Shelby County Airport (Tennessee), the County Airport Authority agreed to implement a $475,000 pollution prevention SEP. The SEP involves the purchase of equipment that will assist in the deicing of runways. The use of this equipment will reduce the amount of deicing fluid required, which results in a substantial reduction in the use of ethylene glycol. In addition, the Authority agreed to pay a $9,000 penalty to resolve its past violations.

- EPA achieved a comprehensive settlement of a TSCA administrative complaint against the Port Authority of New York and New Jersey, which is a joint State agency that operates Kennedy and LaGuardia Airports in New York City. The Region had cited the Authority for multiple violations of PCB regulations at the airports. The settlement provides that the port authority will pay a civil penalty of $19,500 and conduct two SEPs. One SEP consists of a 3-year fluorescent bulb recycling program for all Port Authority facilities in the New York metropolitan area. The total cost to implement the SEP is $130,000. The second SEP is a storm water management training program that will be conducted at the airports over a 2-year period. This SEP will cost $90,000.

- American Airlines, Inc. was charged with violations of the RCRA land disposal restrictions for discharging degreasing solvents, which are hazardous waste, into their onsite injection wells. A consent order was filed against American Airlines, in which it agreed to pay a cash penalty of $20,000, take affirmative actions to prevent further injection of restricted wastes, and conduct a SEP in the amount of $385,235. The SEP reduces chrome wastes by subjecting them to a chrome waste recovery system. The system reduces the waste by 98 percent or, in this case, 6,969 pounds per year. In addition, this system results in the elimination of 26 million gallons of wastewater annually into injection wells.

VII. COMPLIANCE ASSURANCE ACTIVITIES AND INITIATIVES

This section highlights the activities undertaken by this industry sector and public agencies to voluntarily improve the sector's environmental performance. These activities include those initiated independently by industrial trade associations. In this section, the notebook also contains a listing and description of national and regional trade associations.

VII.A. Sector-Related Environmental Programs and Activities

VII.A.1. EPA Voluntary Programs

Environmental Leadership Program

The Environmental Leadership Program (ELP) is a national initiative developed by EPA that focuses on improving environmental performance, encouraging voluntary compliance, and building working relationships with stakeholders. EPA initiated a one year pilot program in 1995 by selecting 12 projects at industrial facilities and federal installations that demonstrate the principles of the ELP program. These principles include: environmental management systems, multimedia compliance assurance, third-party verification of compliance, public measures of accountability, pollution prevention, community involvement, and mentor programs. In return for participating, pilot participants received public recognition and were given a period of time to correct any violations discovered during these experimental projects.

EPA is making plans to launch its full-scale Environmental Leadership Program in 1998. The full-scale program will be facility-based with a 6-year participation cycle. Facilities that meet certain requirements will be eligible to participate, such as having a community outreach/employee involvement programs and an environmental management system (EMS) in place for 2 years. (Contact: http://es.inel.gov/elp or Debby Thomas, ELP Deputy Director, at (202) 564-5041)

Project XL

Project XL was initiated in March 1995 as a part of President Clinton's *Reinventing Environmental Regulation* initiative. The projects seek to achieve cost effective environmental benefits by providing participants regulatory flexibility on the condition that they produce greater environmental benefits. EPA and program participants will negotiate and sign a Final Project Agreement, detailing specific environmental objectives that the regulated entity shall satisfy. EPA will provide regulatory flexibility as an incentive for the participants' superior environmental performance. Participants are encouraged to seek stakeholder support from local governments, businesses, and environmental groups. EPA hopes to implement fifty pilot projects in four categories, including industrial facilities, communities, and government

facilities regulated by EPA. Applications will be accepted on a rolling basis. For additional information regarding XL projects, including application procedures and criteria, see the April 23, 1997 Federal Register Notice. (Contact: Fax-on-Demand Hotline (202) 260-8590, Web: http://www.epa.gov/ProjectXL, or Christopher Knopes at EPA's Office of Policy, Planning and Evaluation at (202) 260-9298.)

Climate Wise Program

EPA's ENERGY STAR Buildings Program is a voluntary, profit-based program designed to improve the energy-efficiency in commercial and industrial buildings. Expanding the successful Green Lights Program, ENERGY STAR Buildings was launched in 1995. This program relies on a 5-stage strategy designed to maximize energy savings thereby lowering energy bills, improving occupant comfort, and preventing pollution—all at the same time. If implemented in every commercial and industrial building in the United States, ENERGY STAR Buildings could cut the nation's energy bill by up to $25 billion and prevent up to 35% of carbon dioxide emissions. (This is equivalent to taking 60 million cars of the road). ENERGY STAR Buildings participants include corporations; small and medium sized businesses; local, federal and state governments; non-profit groups; schools; universities; and health care facilities. EPA provides technical and non-technical support including software, workshops, manuals, communication tools, and an information hotline. EPA's Office of Air and Radiation manages the operation of the ENERGY STAR Buildings Program. (Contact: Green Light/Energy Star Hotline at 1-888-STAR-YES or Maria Tikoff Vargas, EPA Program Director at (202) 233-9178 or visit the ENERGY STAR Buildings Program website at http://www.epa.gov/appdstar/buildings/)

Green Lights Program

EPA's Green Lights program was initiated in 1991 and has the goal of preventing pollution by encouraging U.S. institutions to use energy-efficient lighting technologies. The program saves money for businesses and organizations and creates a cleaner environment by reducing pollutants released into the atmosphere. The program has over 2,345 participants which include major corporations, small and medium sized businesses, federal, state and local governments, non-profit groups, schools, universities, and health care facilities. Each participant is required to survey their facilities and upgrade lighting wherever it is profitable. As of March 1997, participants had lowered their electric bills by $289 million annually. EPA provides technical assistance to the participants through a decision support software package, workshops and manuals, and an information hotline. EPA's Office of Air and Radiation is responsible for operating the Green Lights Program. (Contact: Green Light/Energy Star Hotline at 1-888-STAR-YES or Maria Tikoff Vargar, EPA Program Director, at (202) 233-9178.)

WasteWi$e Program

The WasteWi$e Program was started in 1994 by EPA's Office of Solid Waste and Emergency Response. The program is aimed at reducing municipal solid wastes by promoting waste prevention, recycling collection and the manufacturing and purchase of recycled products. As of 1997, the program had about 500 companies as members, one third of whom are Fortune 1000 corporations. Members agree to identify and implement actions to reduce their solid wastes setting waste reduction goals and providing EPA with yearly progress reports. To member companies, EPA, in turn, provides technical assistance, publications, networking opportunities, and national and regional recognition. (Contact: WasteWi$e Hotline at 1-800-372-9473 or Joanne Oxley, EPA Program Manager, (703) 308-0199.)

NICE^3

The U.S. Department of Energy is administering a grant program called The National Industrial Competitiveness through Energy, Environment, and Economics (NICE^3). By providing grants of up to 45 percent of the total project cost, the program encourages industry to reduce industrial waste at its source and become more energy-efficient and cost-competitive through waste minimization efforts. Grants are used by industry to design, test, and demonstrate new processes and/or equipment with the potential to reduce pollution and increase energy efficiency. The program is open to all industries; however, priority is given to proposals from participants in the forest products, chemicals, petroleum refining, steel, aluminum, metal casting and glass manufacturing sectors. (Contact: Chris Sifri, DOE at (303) 275-4723 or Eric Hass, DOE at (303) 275-4728 or http//www.oit.doe.gov/access/nice3.)

Design for the Environment (DfE)

DfE is working with several industries to identify cost-effective pollution prevention strategies that reduce risks to workers and the environment. DfE helps businesses compare and evaluate the performance, cost, pollution prevention benefits, and human health and environmental risks associated with existing and alternative technologies. The goal of these projects is to encourage businesses to consider and use cleaner products, processes, and technologies. For more information about the DfE Program, call (202) 260-1678. To obtain copies of DfE materials or for general information about DfE, contact EPA's Pollution Prevention Information Clearinghouse at (202) 260-1023 or visit the DfE Website at http://es.inel.gov/dfe.

VII.A.2. Trade Association/Industry Sponsored Activity

Industry Working Group on Deicing

A deicing working group was formed by the American Association of Airport Executives and the Airports Council International - North America to (1) study the use of deicing chemicals on aircraft; (2) study the feasibility of locating deicing facilities away from airport gates; and (3) provide information to both industry members and the federal government on ways in which deicing operations can be improved upon. As part of their investigation, the working group sent out surveys to the major airports to determine which deicing procedures and chemicals are being used by the industry. Some of the survey questions relate to environmental effects of deicing and recovery, reuse, and recycling of waste deicer. The results of the survey indicated that a number of air carriers are using alternative chemicals, and have constructed remote deicing facilities with deicer recovery systems. (Contact: Carter Morris, American Association of Airport Executives, (703) 824-0500.)

ISO 14000

ISO 14000 is a series of internationally-accepted standards for environmental management. The series includes standards for environmental management systems (EMS), guidelines on conducting EMS audits, standards for auditor qualifications, and standards and guidance for conducting product lifecycle analysis. Standards for auditing and EMS were adopted in September 1996, while other elements of the ISO 14000 series are currently in draft form. While regulations and levels of environmental control vary from country to country, ISO 14000 attempts to provide a common standard for environmental management. The governing body for ISO 14000 is the International Organization for Standardization (ISO), a worldwide federation of 110+ country members based in Geneva, Switzerland. The American National Standards Institute (ANSI) is the United States representative to ISO.

VII.B. Summary of Trade Associations

American Association of Airport Executives
4212 King Street
Alexandria, VA 22302
Phone: (703) 824-0500
Fax: (703) 820-1395

The American Association of Airport Executives (AAAE) is comprised of airport management personnel and representatives of companies serving the civil airport industry. The AAAE sponsors educational seminars, conducts examinations, and maintains a speakers' bureau. AAAE has an Environmental Service/Environmental Affairs Committee that provides assistance on complying with environmental regulations (e.g., regulation interpretations, training seminars, and manuals). Environmental compliance assistance is focused on the storm water rules. Publications are the bimonthly *Airport*

Executive Magazine and the *Airport Report Newsletter*. Separate yearly conferences are held on topics such as national airports, legislative issues (semiannual), international facilities, and general annual issues.

Airports Association Council International
1220 19th Street NW, Suite 200
Washington, D.C. 20036
Phone: (202) 293-8500
Fax: (202) 331-1362

The Airports Association Council International (AACI) is comprised of operators of public airport facilities. The group also includes government bodies that own and operate major airports. The association provides compliance assistance to members through seminars, meetings, conferences, regulation interpretations, and manuals. One day conferences are frequently held on environmental management and auditing techniques. Committees include planning and environmental, safety and security, and U.S. government affairs. Publications are the weekly *Airport Highlights*, the annual *Worldwide Airport Traffic Report*, and the *Airport Environmental Management Handbook*. The AACI holds an annual meeting in September or October.

National Air Transportation Association
4226 King Street
Alexandria, VA 22302
Phone: (703) 845-9000
Fax: (703) 845-8176

The National Air Transportation Association (NATA) represents the interests of aviation services companies such as fixed-based operators and on-demand air taxis. NATA provides compliance assistance to members in the form of guidelines, explanations of regulations, and seminars. Most of NATA's work relates to Federal Aviation Administration regulations; however, environmental services are also provided. Environmental aspects of deicing and aircraft cleaning are not a major focus, because the membership does not include the carrier companies, however, some fixed-based operators carry out deicing operations. Publications include an annual membership directory, an annual report, and the monthly *ATAnews*.

Airports Council International - North America
1775 K Street, NW Suite 500
Washington, D.C. 20006
Phone: (202) 293-8500
Fax: (202) 331-1362

Airports Council International - North America (ACI-NA) is the "voice of airports" representing local, regional, state, and national governing bodies that own and operate commercial airports in the U.S. ACI-NA member airports enplane more the 90 percent of the domestic and virtually all of the international airliner passenger and cargo traffic in North America.

Aerospace Industries Association
1250 Eye Street, NW
Washington, D.C. 20005
Phone: (202) 371-8400

Member companies of Aerospace Industries Association (AIA) represent the primary manufacturers of military and large commercial aircraft, engines, accessories, rockets, spacecraft, and related items.

General Aviation Manufacturers Association
1400 K Street, NW Suite 801
Washington, D.C. 20005
Phone: (202) 393-1500

The General Aviation Manufacturers Association (GAMA) is a national trade association, headquartered in Washington, D.C., representing 53 manufacturers of fixed-wing aircraft, engines, avionics, and components. In addition to building nearly all U.S. general aviation aircraft, GAMA member companies also operate aircraft fleets, airport fixed-based operations, pilot schools, and training facilities.

Air Transport Association of America
1709 New York Ave., NW
Washington, D.C. 20006
Phone: (202) 626-4000
Fax: (202) 626-4181

The Air Transport Association of America (ATA) represents 22 major scheduled airlines in the U.S. engaged in transporting persons, goods, or mail by aircraft. ATA serves its membership by providing aviation safety, advocating industry positions, conducting designated industry-wide programs and monitoring public understanding. ATA publishes annually *Air Transport* as well as fact sheets, press releases, studies, speeches, and references pertaining to air transport. The ATA holds quarterly meetings.

Air Line Pilots Association
535 Herndon Parkway
P.O. Box 1169
Herndon, VA 20170
Phone: (703) 689-2270
Fax: (703) 689-4370

The Air Line Pilots Association (ALPA) is a union representing 46,000 airline pilots at 45 U.S. airlines. ALPA provides lobbying of airline pilot views to Congress and government agencies, and devotes approximately 20 percent of its dues income to support aviation safety.

Regional Airline Association
1200 19th Street, N.W. Suite 300
Washington, D.C. 20036
Phone: (202) 857-1170
Fax: (202) 429-5113

The Regional Airline Association (RAA) represents regional air carriers and suppliers of products and services that support the industry before the Congress, Federal Aviation Administration, Department of Transportation and other federal and state agencies. RAA member airlines transport between 90-95 percent of all regional airline passengers. RAA developed an *Environmental Compliance Handbook* addressing compliance issues.

Aircraft Owners & Pilots Association
421 Aviation Way
Frederick, MD 21701
Phone: (301) 695-2000

With over 270,000 members, the Aircraft Owners & Pilots Association (AOPA) represents the interests of general aviation pilots. It provides insurance plans, flight planning, and other services, and sponsors large fly-in meetings.

Helicopter Association International
1619 Duke Street
Alexandria, VA 22314
Phone: (703) 683-4646
Fax: (703) 683-4745

The members of Helicopter Association International (HAI) represent rotocraft operators and manufacturers.

National Association of State Aviation Officials
8401 Colesville Road, Suite 505
Silver Spring, MD 20910
Phone: (301) 588-0587
Fax: (301) 585-1803

The National Association of State Aviation Officials (NASAO) represents departments of transportation and state aviation departments and commissions from 49 states, Puerto Rico, and Guam.

National Business Aircraft Association
1200 18th Street, NW, Room 200
Washington, D.C. 20036
Phone: (202) 783-9000

The National Business Aircraft Association (NBAA) represents 361 companies that own and operate aircraft flown for corporate purposes. NBAA is affiliated with the International Business Aircraft Council.

Flight Safety Foundation
2200 Wilson Boulevard
Arlington, VA 22201
Phone: (703) 739-6700
Fax: (703) 739-6708

The Flight Safety Foundation (FSF) promotes air transport safety. Its members include airport and airline executives and consultants.

Experimental Aircraft Association
EAA Aviation Center
Oshkosh, WI 54903
Phone: (414) 426-4800

The Experimental Aircraft Association (EAA), with over 700 local chapters, promotes the interests of home-built and sport aircraft owners.

Aviation Distributors & Manufacturers Association
1900 Arch Street
Philadelphia, PA 19103
Phone: (215) 564-3484
Fax: (215) 564-3484

The Aviation Distributors & Manufacturers Association (ADMA) represents the interests of a wide variety of aviation firms including FBOs and component parts manufacturers.

International Air Transport Association
2000 Peel Street
Montreal, PQ, Canada H3A2R4
Phone: (514) 844-6311
Fax: (514) 844-5286

The International Air Transport Association (IATA) is an association of 105 international air carriers whose main functions include coordination of fares and operations.

Cargo Airline Association
1220 19th Street, N.W. Suite 400
Washington, D.C. 20036
Phone: (202) 293-1030
Fax: (202) 293-4377

The Cargo Airline Association (CAA) is a nationwide trade organization with members made up of all segments of the air cargo community. The Association is responsible for promoting the use of air freight services; monitoring regulatory activity; representing the industry before Congress, various agencies, and courts; providing educational programs; and keeping members up-to-date on all issues affecting air cargo.

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