REFERENCES

ICAO—Chicago Convention Article 26/Annex 13.
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WEB REFERENCES

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CHAPTER FOUR

RECORDING AND REPORTING OF SAFETY DATA

LEARNING OBJECTIVES

After completing this chapter, you should be able to

- Recognize the importance of studying accidents and incidents for the purpose of developing insights, information, and recommendations leading to accident prevention.
- Explain and give examples of an accident, incident, and injury as defined by the NTSB and ICAO.
- Explain the importance of establishing a culture of safety reporting.
- Distinguish between mandatory and voluntary reporting systems.
- Identify and describe some of the accident and incident reporting systems that are maintained by organizations within the FAA.
- Describe the Aviation Accident Data System managed by the NTSB.
- Discuss the role of NASA in managing the Aviation Safety Reporting System.
- Describe the information obtained from flight data recorders and cockpit voice recorders.
- Identify several reports provided by ICAO based on ADREP data.
- Explain OSHA's definition of an injury and illness.
- Highlight some of OSHA's recording requirements.
- Recognize what constitutes an EPA environmental spill and what are its reporting requirements.

ACCIDENTS

Before any discussion on accident reporting, investigation, and prevention can occur, there should be an understanding of the definitions used to classify accidents and incidents. The ICAO Annex 13 definition of aircraft accident is very similar to that used by the National Transportation Safety Board (NTSB); therefore for discussion purposes, this text will focus on the NTSB's definition. Some NTSB definitions used in measuring aviation safety in commercial passenger transportation are as follow:

- *Accident*—an occurrence associated with the operation of an aircraft that takes place between the time any person boards the aircraft with the intention of flight and the time all such persons have disembarked, and in which any person (occupant or nonoccupant) suffers a fatal or serious injury or the aircraft receives substantial damage.
- *Fatal injury*—any injury that results in death within 30 days of the accident.

- *Serious injury*—any injury that requires hospitalization for more than 48 hours, results in a bone fracture, or involves internal organs or burns.
- *Substantial damage*—damage or failure that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component.
- *Incident*—an occurrence other than an accident associated with the operation of an aircraft that affects or could affect the safety of operations.
- *Major accident*—an accident in which a Part 121 aircraft was destroyed, or there were multiple fatalities, or there was 1 fatality and a Part 121 aircraft was substantially damaged.
- *Serious accident*—an accident in which there was 1 fatality without substantial damage to a Part 121 aircraft, or there was at least 1 serious injury and a Part 121 aircraft was substantially damaged.
- *Injury*—a nonfatal accident with at least 1 serious injury without substantial damage to a Part 121 aircraft.
- *Damage*—an accident in which no person was killed or seriously injured, but in which any aircraft was substantially damaged.

The accident and its investigation remain the most conspicuous source of insights and information leading to accident prevention. Accidents provide compelling and incontrovertible evidence of the severity of hazards. The often catastrophic and very expensive nature of accidents provides the incentive for allocating resources to accident prevention to an extent otherwise unlikely.

In an accident investigation, it is essential that a clear and accurate analysis of the relevant factors be developed without delay. Further, the focus of the investigation should be directed toward effective preventive action. This focus applies particularly to government authorities and operators. With the investigation directed away from "pursuit of the guilty party" and toward effective preventive action, cooperation is fostered among those involved in the accident, facilitating the discovery of the true causes of the accident. It is emphasized that the short-term expediency of finding someone to blame for an accident is detrimental to the long-term goal of preventing accidents.

Since, by definition, an accident involves at least serious injury or substantial aircraft damage, there is a likelihood that a legal process will result from an accident. As the official authority on the accident, the investigator is often seen as a ready source of information with which to establish culpability in the courts. Consequently, witnesses and other persons involved in an accident may be inclined to withhold information from the investigator, thereby preventing a full understanding of what occurred, particularly with respect to the human-factor elements involved.

An accident investigation includes an analysis of the evidence to determine all the causes that induced the accident—a process leading to the formulation of safety recommendations. Safety recommendations regarding serious hazards

should be made as soon as the hazards have been positively identified, rather than waiting until the investigation is completed. These safety recommendations should be included in the final report on the investigation. This publicity of safety recommendations fulfills several functions:

- It helps ensure that the recommendations are reasonable and realistic in the circumstances.
- It enables other countries, organizations, and individuals to see what action was recommended. Although the recommendation was not specifically addressed to them, it may enable them to take actions that avoid similar hazards.
- It can provide pressure for a prompt and reasonable response.

Recommendations must cover all hazards revealed during the investigation, not just those directly concerned with the causes. In this way, accident investigation forms the basis of an effective accident prevention program.

INCIDENTS

Incidents are events that can be defined loosely as *near-accidents*. Both ICAO and NTSB define an incident as an occurrence, other than an accident, associated with the operations of an aircraft which affects or could affect the safety of operation. Causal factors leading to accidents also lead to incidents, and all accidents begin as near-accidents. The various combinations of possibly unsafe acts and conditions that occur each day usually end as incidents rather than accidents, and the larger number of incidents offers wider opportunities for safety trend analyses and for suggesting potential accident prevention measures. However, for an aviation incident to be widely known, it must be reported by at least one of the people involved. Yet, the definition of an incident is often subject to the interpretation of the observer, and what appears to be an incident to one person might not appear so to another. NTSB regulations at 49 CFR Section 830.5 require immediate notification (by the most expeditious means available) of aircraft accidents and any of the following *serious* incidents:

- Flight control system malfunction or failure
- Inability of required flight crewmember to perform normal flight duties as the result of injury or illness
- Failure of any internal turbine engine component that results in the escape of debris other than out the exhaust path
- In-flight fire
- Aircraft collision in flight

- Damage to property, other than the aircraft, estimated to exceed $25,000 for repair
- For large multi-engine aircraft: In-flight failure of electrical or hydraulic systems, loss of power on two or more engines, or emergency evacuation
- Release of a propeller blade, excluding release from ground contact
- A complete loss of information, excluding flickering, from more than 50 percent of an aircraft's (glass) cockpit displays
- Certain airborne collision and avoidance system advisories
- Damage to helicopter tail or main rotor blades that requires major repair or replacement
- Certain airplane landings on a taxiway, incorrect runway, or a runway incursion that requires another aircraft to take immediate corrective action to avoid a collision

ICAO Annex 13 states that the difference between an accident and a serious incident lies only in the result.

Under the new ICAO Safety Management System procedures, the reporting, investigation, and analysis of incidents can be a highly effective means of accident prevention. The most important characteristics of incidents are as follows:

- They are similar to accidents, except that they lack the terminal event that causes the injury or damage in an accident. Incidents can, therefore, reveal the same hazards as accidents, without the associated injury or damage.
- They are far more numerous than accidents (estimates range from 10 to 100 times more numerous). Thus, they are a plentiful source of hazard information.
- The people involved in incidents are available to provide additional information on the hazards that caused them.

It stands to reason that the introduction of a comprehensive incident reporting and investigation system requires money and labor hours. However, experience has shown that such systems are cost-effective, as incident investigation offers true "before the accident" prevention. Further details of accident and incident prevention will be explored in Chapter 13.

ESTABLISHING A CULTURE OF SAFETY REPORTING

Timely and accurate reporting of safety occurrences is critical to modern aviation safety management programs. ICAO has long recognized that establishment of a proper safety culture is key to effective safety reporting. According to the ICAO

Safety Management Manual (ICAO Doc. 9859, 2nd edition), certain attributes and traits are necessary for an organization to perform well in this area. The five basic attributes of an effective safety reporting organization are as follows:

- A demonstrated willingness to report errors and experiences
- Information is received from knowledgeable aviation professionals
- Flexibility of reporting is available for information to travel directly to the appropriate decision maker in unusual circumstances
- A learning organization with the ability to draw conclusions and implement major reforms
- An accountable organization where people are encouraged and rewarded for providing essential safety related information.

Figure 4-1 emphasizes the five basic traits of effective safety reporting and additional information is provided at www.icao.int.

Experience indicates that successful incident reporting systems employ most of the following characteristics:

- *Trust.* Persons reporting incidents must be able to trust the recipient organization and be confident that any information they provide will not be used against them. Without such confidence, people are reluctant to report their mistakes,

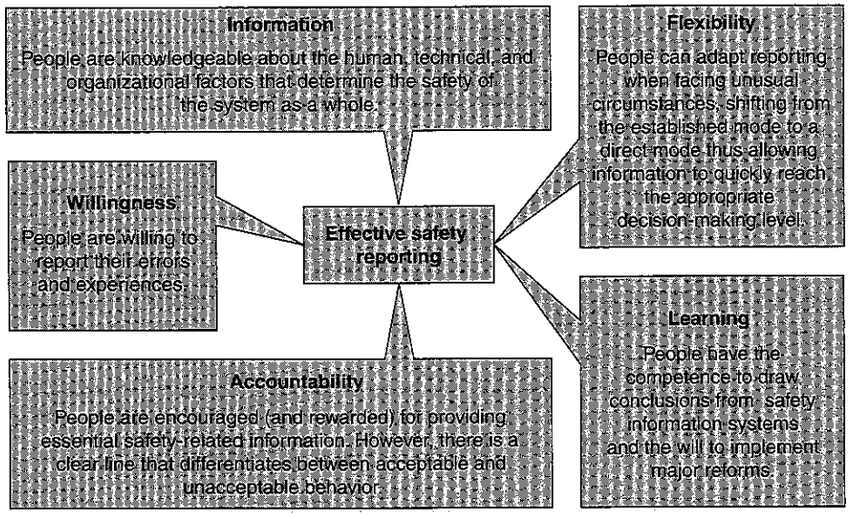

FIGURE 4-1 Effective safety reporting—five basic traits. (*Source: www.icao.int ICAO SMM 9859 2nd ed.*)

and they may also be reluctant to report other hazards they are aware of. For an incident reporting system to be successful, it needs to be perceived as being *non-punitive* with regard to unintentional errors or mistakes.

- *Confidentiality.* Non-punitive systems are based on confidential reporting. The person reporting an incident must be sure that his identity and other information that may be used to identify those involved will not be disclosed.
- *Independence.* Ideally, an incident reporting system should be run by an organization divorced from the federal agency that is also responsible for the enforcement of aviation regulations. Accordingly, some countries, including the United States, use a *third party* for the management of so-called voluntary reporting systems. The third party receives, processes, and analyzes the submitted incident reports and feeds the results back to the federal agency and the aviation community. With so-called mandatory reporting systems, it may not be possible to employ a third party. Nevertheless, it is desirable that the federal agency give a clear understanding that any information received will be used for accident prevention purposes only. This principle also applies to an airline or any other aircraft operator that uses incident reporting as part of its accident prevention program.
- *Ease of reporting.* The task of submitting incident reports should be as easy as possible for the reporter. Reporting forms should be readily available so that anyone wishing to file a report can do so easily. They should be simple to compile, with adequate space for a descriptive narrative, and they should also encourage suggestions on how to improve the situation or prevent a recurrence. Classifying information such as type of operation, light conditions, type of flight plan, weather, and so forth can be presented in a "check" format. The forms should ideally be self-addressed and postage-free.
- *Acknowledgment.* The reporting of incidents requires considerable time and effort by the user and should be appropriately acknowledged. Whenever possible, feedback on the actions taken in response to a report should be provided to the reporting person.
- *Motivation and promotion.* The information received from an incident reporting system should be made available to the aviation community as soon as possible, as this may help to motivate people to report further incidents. Such promotion activities may take the form of monthly regular e-mail or internet bulletins, newsletters or periodic summaries. Ideally, all such methods would be used with a view to achieving maximum exposure.

INCIDENT REPORTING SYSTEMS

Effective incident reporting systems can be organized in different ways. However, there are two main types that characterize the majority of systems used by aviation authorities: mandatory and voluntary.

MANDATORY INCIDENT REPORTING SYSTEMS

In a mandatory reporting system, people are required to report certain types of incidents, which necessitates detailed regulations outlining who shall report and what shall be reported. Otherwise, the mandatory system could not be enforced. To achieve this goal and avoid unnecessary duplication, those items requiring an incident report must be segregated from the day-to-day problems, defects, and so forth for which adequate control systems and procedures should already exist. In effect, this means establishing a base level, in terms of hazards, below which an incident report is not necessary. Unless this is done, the mandatory system may be flooded with reports, possibly obscuring important items. It is important to concentrate what are usually limited resources where they will be most effective.

The number of variables in aircraft operations is so great that it is very difficult to provide a complete list of items or conditions that should be reported. For example, loss of a single hydraulic system on an aircraft with only one such system is critical; on a type with three or four systems, it may not be. A relatively minor problem in one set of circumstances can, when the circumstances change, result in a hazardous situation. The rule should be: *If in doubt, report.*

Because mandatory systems deal mainly with specific and concrete matters, they tend to collect more information on technical failures than on the human-factor aspects. To help overcome this problem, some countries with a well-developed mandatory reporting system also have a voluntary incident reporting system aimed specifically at acquiring more information on the human-factor aspects.

VOLUNTARY INCIDENT REPORTING SYSTEMS

In a *voluntary reporting system,* pilots, controllers, and others involved in aviation are invited (rather than required) to report hazards, discrepancies, or deficiencies in which they were involved or which they observed. Experience in a number of countries, including the United States, has shown that a voluntary system requires a trusted third party (i.e., NASA) to manage the system. The reason is simply that people are reluctant to report their mistakes to the carrier that employs them or the government agency that licenses them.

In voluntary systems, *confidentiality* is usually achieved by deidentification, or not recording any identifying information. Because of this confidentiality, voluntary systems tend to be more successful than mandatory systems in collecting human factor–related information without fear of retribution or embarrassment.

The next sections discuss the salient features of accident/incident recording and reporting systems that are related to aviation, general industry, and the environment.

AVIATION RECORDING AND REPORTING SYSTEMS

The U.S. federal government collects vast amounts of aviation data to support its responsibility for overseeing aviation safety. The four major organizations

the NTSB, The Bureau of Transportation Statistics (BTS) of the Research and Innovative Technology Administration. and the National Aeronautics and Space Administration (NASA).

FEDERAL AVIATION ADMINISTRATION REPORTING SYSTEMS

The FAA collects a wide range of aviation information and automated database systems. Most of the safety-related data are collected and managed under the FAA Associate Administrator for Aviation Safety (AVS) and its subordinate offices. In today's era of internet databases and Web sites, the reader is urged to check the most recent Web site pages for updated information at www.faa.gov.

THE AVIATION SAFETY INFORMATION ANALYSIS AND SHARING SYSTEM (ASIAS) (www.asias.faa.gov)

As indicated on its Web site, the FAA promotes open exchange of safety information in order to continually improve aviation safety. The FAA developed the Aviation Safety Information Analysis and Sharing system to enable users to perform integrated searches across multiple databases. The ASIAS portal to these databases is an evolving data warehouse of safety data which contains weblinks and crosslinks to a variety of sources organized as follows:

- *Lessons learned from transport airplane accidents*—This link features a large library of videos and animations of major aircraft accidents and illustrates the complex interrelationship of accident causes. It is an excellent resource for students beginning the study of commercial aviation safety.
- *Data and information link*—This tab provides access to the multiple databases and tools alphabetically or by subject.
- *Subjects and studies link*—These tabs provide access to high level findings, studies, and reports. Among the more important of these databases are the following:
  - FAA Accident/Incident Data System (AIDS)
  - Aviation Safety Reporting System (ASRS)
  - Bureau of Transportation Statistics (BTS) on Airline Traffic
  - Near Midair Collision System (NMACS)
  - NTSB Aviation Accident and Incident Data System (NTSB)
  - NTSB Safety Recommendations to the FAA with FAA responses
  - Runway Safety Office, Runway Incursions
  - World Aircraft Accident Summary (WAAS) produced by the British Civil Aviation Authority
- Other database services available on FAA.gov
  - *Service Difficulty Reporting System (SDRS).* These reports are filed by air carriers, repair stations, manufacturers, FAA inspectors, and others concerning specific types of mechanical problems, aircraft failures, or malfunction.
  - *Air Traffic Activity Data System (ATADS).* This system contains the official

- *Operational errors*. An operational error is a violation of ATC separation standards that define minimum safe distances between aircraft, between aircraft and other physical structures, and between aircraft and otherwise restricted airspace. Separation is one of the fundamental principles of aviation safety. FAA air traffic facilities have a software program that detects possible operational errors and sends alert messages to FAA supervisory personnel. The FAA conducts annual reviews of reported data and summarizes it in the Air Traffic Operational Error and Deviation database.
- *Pilot deviations*. A pilot deviation is defined as an action of a pilot that results in a violation of a FAR regulation while in flight. Such deviations could result in the loss of separation between one airplane and another, or a safety of flight violation. The most frequent types of pilot deviations are altitude, course clearance, airspace and airspeed violations, and flying VFR into Instrument Meteorological Conditions (IMC). When ATC observes a pilot deviation, it asks the pilot to telephone the controlling agency, and files a report to the local Flight Standards District Office (FSDO).

INDUSTRY VOLUNTARY SAFETY REPORTING INITIATIVES

As noted in Chapter 1, the serious nature of the circumstances surrounding the crash of Colgan Air Flight 3407 near Buffalo, New York, has prompted new safety legislation signed into law August 1, 2010 entitled the *Airline Safety and Federal Aviation Administration Extension Act of 2010*. Section 213 of this statute strongly endorses four existing voluntary safety programs:

- Aviation Safety Action Program (ASAP)
- Flight Operational Quality Assurance (FOQA)
- Advanced Qualification Program (AQP)
- Line Operations Safety Audit (LOSA)

Section 214 of this law provides for an ASAP and FOQA implementation plan for all FAR Part 121 air carriers not later than one year after enactment of the Act (August 1, 2011), and requires a detailed report if an air carrier is not using AQP and LOSA as part of their safety system. Thus, these complementary "voluntary" safety programs will likely be required as FAA mandated programs in the near future.

AVIATION SAFETY ACTION PROGRAM (ASAP—FAA ADVISORY CIRCULAR 120-66B). The goal of ASAP is to prevent accidents and incidents by identifying unsafe practices and correcting them. Voluntary reporting of safety issues by employees is encouraged. Under ASAP, safety issues are resolved through corrective action rather than through punishment or discipline. The program's strategy is to create a nonpunitive environment through enforcement-related incentives for employees to report

safety issues, even though these issues may involve an alleged violation of aviation regulations. In ASAP an airline enters into a safety partnership with the FAA and could include a third party such as the employee's labor union. Information contained in ASAP reports may be considered sensitive by some airlines so the FAA has tried to overcome this problem by proposing regulations that would protect ASAP reports and other sensitive safety and security information from being disseminated to the public.

FLIGHT OPERATIONAL QUALITY ASSURANCE (FOQA—FAA ADVISORY CIRCULAR 120-82). Flight operational quality assurance programs involve collecting and analyzing data recorded during flight to improve the safety of flight operations (for more on this see Automatic Recording Systems later). In excess of 200 flight parameters can be accessed from digital flight data recorders downloaded frequently through quick-access recorders. While FOQA programs are quite popular with international airlines, only a few U.S. airlines use FOQA because of data confidentiality issues. In 2001 the FAA took steps to address the confidentiality issue by codifying carrier data and ensuring confidential enforcement protection for any operator who operates aircraft under an FOQA program approved by the FAA. The regulations would ban disclosure of sensitive safety information and security information that was voluntarily submitted to an approved FAA program.

ADVANCED QUALIFICATION PROGRAM (AQP—FAA ADVISORY CIRCULAR 120-54A). The overall goals of AQP are to increase aviation safety by using innovative training and qualification concepts, and to be responsive to changes in aircraft technology, operations, and training methodologies. Some distinguishing features of AQP:

- It is proficiency based using a full cockpit crew environment.
- It is aircraft specific by make, model, and series of aircraft using full flight simulators or other simulator flight training equipment.
- It emphasizes the concept of crew resource management (CRM) training, which is mandatory.

The ultimate goal of AQP is to achieve the highest possible standards of individual and crew performance to levels above the present pilot training standards in FAR Parts 121 and 135.

LINE OPERATIONS SAFETY AUDIT (LOSA—FAA ADVISORY CIRCULAR 120-90). As indicated in the advisory circular, a LOSA is a voluntary formal process that uses highly trained observers to collect safety-related date on regularly scheduled airline flights. The observer is often a trusted airline captain who rides the jump seat in the cockpit to obtain data about flight crew behavior and crew strategy for managing threats and errors under conditions of operational complexity. The concept of Threat and Error Management (TEM) provides that such threats and errors are part of everyday operations that flightcrews must manage to maintain flight safety.

ICAO also promotes the importance of LOSA to the international aviation community in its Line Operations Safety Audit Manual (ICAO document 9803).

The initial research on LOSA was developed during a joint effort between FAA, Continental Airlines and the University of Texas at Austin. This research became known as the University of Texas Human Factors Research Project. Typically, a LOSA project can take between 6 and 12 months to conduct, and the FAA recommends a LOSA be conducted every 3 years. Additional information will be provided in Chapter 7, entitled Human Factors in Aviation Safety.

AIR TRANSPORTATION OVERSIGHT SYSTEM (ATOS). The Air Transportation Oversight System was implemented in 1998 as a new approach to FAA certification and surveillance oversight, using system safety principles and systematic processes to ensure that air carriers are in compliance with FAA regulations and have safety built into their operating systems. Unlike the traditional oversight methods, ATOS incorporates the structured application of new inspection tasks, analytical processes, and data collection techniques into the oversight of individual air carriers. This approach enables Flight Standards inspectors to be more effective in the oversight of air carriers by focusing on the most critical safety aspects of an air carrier's operation. As currently applied, ATOS provides a systematic process for conducting surveillance, identifying and dealing with risks, and providing data and analysis to guide the oversight of each carrier. As provided on its Web site, ATOS implements FAA policy by providing safety controls of aviation business organization that fall under FAA regulations. Three major functions define this oversight system (source: www.faa.gov).

- *Design assessment.* Is the ATOS function that ensures an air carrier's operating systems comply with FAA regulations and safety standards.
- *Performance assessments.* Confirm that an air carrier's operating systems produce intended results, including mitigation or control of hazards and associated risks.
- *Risk management.* This process deals with hazards and associated risks, and is used to manage FAA resources according to risk-based priorities.

By collecting and analyzing data on the many airline systems, FAA inspectors are better able to target areas for improvement. ATOS is a significant shift in the way in which the FAA oversees airlines and how its inspectors operate. It should lead to a more collaborative partnership toward system evaluation and may open doors for additional information sharing between air carriers and the FAA. With the cooperation of the air carriers, ATOS will foster a more proactive relationship with the FAA on safety-related issues as emerging trends and concerns are identified. This will aid in achieving the AFS mission, which is to provide the public with the safest aircraft operations in the world. The relationship between FAA oversight and the concept of Safety Management Systems (SMS) will be further explored in Chapter 13 of this book.

AFS is in the process of developing a centralized analysis and information management system to accumulate, analyze, and disseminate safety data and information within Flight Standards and to assist airlines in the interpretation of data. Information will be disseminated from a computer-based decision support tool called the *Safety Performance Analysis System* (*SPAS*). It will include selected air carrier data and data summaries from ATOS and other sources including Aviation Safety Reporting System (ASRS) reports and Office of System Safety information. This information will assist inspectors and air carriers in decision making with respect to targeting surveillance resources and taking corrective actions to mitigate safety risks. Planned enhancements will continue to be validated for effectiveness and added to the system as appropriate.

NTSB ACCIDENT/INCIDENT REPORTING SYSTEM

Since its inception in 1967, the NTSB has kept records of civil aircraft accidents and its Aviation Incident/Accident Database contains information on every known civil aviation accident in the United States. Accidents involving only military or public-use aircraft are not usually investigated by the National Transportation Safety Board. While this incident/accident reporting system was primarily designed for administrative purposes, the system does have analytical capabilities. The NTSB Aviation Accident/Incident database is the official repository of aviation accident data and causal factors. The NTSB publishes annual reviews of aircraft accident data and occasional special studies, which are supported by statistical analyses accomplished with the data system. As discussed earlier, the NTSB is responsible for investigating all aircraft accidents and certain incidents, determining their probable causes, and making recommendations to the FAA. The NTSB uses Form 6120.19A to generate a preliminary report that is completed within 5 working days. It then develops the more informative factual report using Form 6120.4F. The final report may take months and even years to complete. Preliminary reports contain a limited amount of information (date, location, aircraft operator, type of aircraft, etc.). The NTSB Aviation Accident/Incident database is presented in the following categories: location information, aircraft information, operator information, narrative, sequence of events, findings, injury summary, weather/environmental information, and pilot information.

DEPARTMENT OF TRANSPORTATION REPORTING SYSTEM

The *Bureau of Transportation Statistics* (*BTS*), a unit of the U.S. Department of Transportation, compiles and analyzes data on the nation's transportation system. By law, the airlines are required to provide financial, activity, and other data to BTS. They are used to develop and provide information to the flying public on the condition and performance of the nation's air transportation system. Some of the measures cataloged include the number of departures, flight hours, and miles performed in domestic commercial service during the most recent 5 calendar years, by airline.

These are also the same measures tracked by government and industry to calculate accident or incident rates for the air transportation system.

On February 20, 2005, BTS became a part of the Research and Innovative Technology Administration (RITA). RITA is composed of BTS, the former Research Office of the Research and Special Programs Administration (RSPA), Volpe National Transportation Systems Center (formerly with RSPA), Transportation Safety Institute (formerly with RSPA), and Office of Intermodalism (formerly with the Office of the Secretary). BTS is headed by a Director, appointed by the Secretary of Transportation, and the Director reports to the RITA Administrator.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION REPORTING SYSTEM

The National Aeronautics and Space Administration provides and supports aviation research and development and administers the confidential, voluntary, and nonpunitive *Aviation Safety Reporting System* (*ASRS*). The Aviation Safety Reporting System is designed to encourage reports by pilots and air traffic controllers concerning errors and operational problems in the aviation system by guaranteeing anonymity and immunity from prosecution for all reporters. More than 880,000 incident reports have been submitted to date without any reporter's identity ever being revealed. System data can provide an alternate federal insight into the nature and trends of aviation incidents.

NASA AVIATION SAFETY REPORTING SYSTEM (NASA REPORT). The Aviation Safety Reporting System is an extremely successful joint effort by FAA, and NASA, to provide a voluntary reporting system where pilots, controllers, flight attendants, mechanics and others can submit accounts of safety-related aviation incidents. The system is funded mainly by the FAA, administered by NASA, and maintained by Battelle Laboratories. Reports are sent to the Aviation Safety Reporting System office at NASA Ames Research Center, where the data are analyzed and entered into a computer by employees of Battelle.

Since its inception in 1976, the NASA report process has been very successful as a voluntary, nonpunitive means to report and correct aviation safety discrepancies and this process has been widely copied in the strong immunity policy in FAA Advisory Circular 00-46D and FAR Section 91.25 which provide that FAA will not use NASA ASRP reports in any enforcement action absent a crime, intentional violation or serious accident excluded from the program. The only significant limitation is that the aviation professional must file the report within 10 calendar days of the incident to avoid FAA fines and penalties. This 10-day deadline is strictly construed by FAA, but the electronic report submission available at Web site http://asrs.arc.nasa.gov/ facilitates such reports. A copy of page one of the NASA Report format is provided in Fig. 4-2 for your information.

The Aviation Safety Reporting System report form was designed to gather the maximum amount of information without discouraging the reporter. Structured information blocks and key words are provided, not only to guide the reporter, but also to aid subsequent data retrieval and research. Narrative descriptions are

DO NOT REPORT AIRCRAFT ACCIDENTS AND CRIMINAL ACTIVITIES ON THIS FORM.
ACCIDENTS AND CRIMINAL ACTIVITIES ARE NOT INCLUDED IN THE ASRS PROGRAM AND SHOULD NOT BE SUBMITTED TO NASA.
ALL IDENTITIES CONTAINED IN THIS REPORT WILL BE REMOVED TO ASSURE COMPLETE REPORTER ANONYMITY.

(SPACE BELOW RESERVED FOR ASRS DATE/TIME STAMP)

IDENTIFICATION STRIP: *Please fill in all blanks to ensure return of strip.*
NO RECORD WILL BE KEPT OF YOUR IDENTITY. This section will be returned to you.

TELEPHONE NUMBERS where we may reach you for further details of this occurrence:

HOME Area _____ No. _____ Hours _____
WORK Area _____ No. _____ Hours _____

NAME _____
ADDRESS/PO BOX _____
CITY _____ STATE ____ ZIP _____

TYPE OF EVENT/SITUATION _____
DATE OF OCCURRENCE (MM/DD/YYYY) _____
LOCAL TIME (24 hr. clock) (HH:MM) _____

PLEASE FILL IN APPROPRIATE SPACES AND CHECK ALL ITEMS WHICH APPLY TO THIS EVENT OR SITUATION.

REPORTER
☐ Captain ☐ First Officer ☐ pilot flying ☐ pilot not flying ☐ relief pilot ☐ check airman
☐ Single Pilot ☐ Instructor ☐ Trainee ☐ Dispatcher: ____ yrs ☐ Other: _____

FLYING TIME (in hours)
Total Time ____ hrs
Last 90 Days ____ hrs
Time in Type ____ hrs

CERTIFICATES & RATINGS
☐ Student ☐ Sport/Rec ☐ Private ☐ Commercial ☐ ATP
☐ Flight Instructor ☐ Multiengine ☐ Instrument ☐ Flight Engineer ☐ Other: _____

ATC EXPERIENCE
☐ FPL ☐ Developmental
radar ____ yrs
non-radar ____ yrs
supervisory ____ yrs
military ____ yrs

AIRSPACE
☐ Class A ☐ Class E ☐ Class B ☐ Class G ☐ Class C ☐ Special Use ☐ Class D ☐ TFR

CONDITIONS/WEATHER ELEMENTS
☐ VMC ☐ IMC ☐ Mixed ☐ Marginal
☐ fog ☐ snow ☐ hail ☐ thunderstorm ☐ haze/smoke ☐ turbulence ☐ icing ☐ windshear ☐ rain ☐ other: _____

LIGHT/VISIBILITY
☐ dawn ☐ night ☐ daylight ☐ dusk
Ceiling ____ feet
Visibility ____ miles
RVR ____ feet

ATC/ADVISORY SVC.
☐ Ramp ☐ Center ☐ Ground ☐ FSS ☐ Tower ☐ UNICOM ☐ TRACON ☐ CTAF
ATC Facility Name: _____

	AIRCRAFT 1			AIRCRAFT 2		
Your Aircraft Type (Make/Model) (e.g. B737) NOT "N #", Flt #, etc.: _____		**Operating FAR Part:** ____		**Other Aircraft:** _____		**Operating FAR Part:** ____
Operator	☐ air carrier ☐ air taxi ☐ corporate	☐ fractional ☐ FBO ☐ government	☐ military ☐ personal ☐ other: ____	☐ air carrier ☐ air taxi ☐ corporate	☐ fractional ☐ FBO ☐ government	☐ military ☐ personal ☐ other: ____
Mission	☐ passenger ☐ personal	☐ cargo/freight ☐ training	☐ ferry ☐ other: ____	☐ passenger ☐ personal	☐ cargo/freight ☐ training	☐ ferry ☐ other: ____
Flight Plan	☐ VFR ☐ IFR	☐ SVFR ☐ DVFR	☐ none	☐ VFR ☐ IFR	☐ SVFR ☐ DVFR	☐ none
Flight Phase	☐ taxi ☐ parked ☐ takeoff ☐ initial climb	☐ climb ☐ cruise ☐ descent ☐ initial approach	☐ final approach ☐ missed/GAR ☐ landing ☐ other: ____	☐ taxi ☐ parked ☐ takeoff ☐ initial climb	☐ climb ☐ cruise ☐ descent ☐ initial approach	☐ final approach ☐ missed/GAR ☐ landing ☐ other: ____
Route in Use	☐ airway (ID): ____ ☐ direct ☐ SID (ID): ____	☐ STAR (ID): ____ ☐ oceanic ☐ vectors	☐ visual approach ☐ none ☐ other: ____	☐ airway (ID): ____ ☐ direct ☐ SID (ID): ____	☐ STAR (ID): ____ ☐ oceanic ☐ vectors	☐ visual approach ☐ none ☐ other: ____

If more than two aircraft were involved, please describe the additional aircraft in the "Describe Event/Situation" section.

LOCATION
Altitude: _____ (single value) ☐ MSL ☐ AGL
Distance: _____ and/or Radial (bearing): _____ from:
☐ Airport _____ ☐ ATC Fac _____
☐ Intersection _____ ☐ NAVAID _____

CONFLICTS
Estimated miss distance in feet: horiz ____ vert ____
Was evasive action taken? ○ Yes ○ No
Was TCAS a factor? ○ TA ○ RA ○ No
Did terrain warning system activate? Reset ○ Yes ○ No

FIGURE 4-2 NASA Aviation safety reporting system. (*Source: http://asrs.arc.nasa.gov/*)

encouraged. Space is provided for the reporter's name, address, and telephone number, which permits NASA to acknowledge the report's receipt by return mail and also allows the Battelle analyst to contact the reporter for follow-up data. Information that identifies the reporter is deleted before data are entered into the computer.

Under the guidance of NASA, Battelle receives the incident reports, processes and analyzes the data, and publishes reports of the findings. Human factors in aviation safety, a continuing concern at the NASA Ames Research Center, were a major consideration in the development of the Aviation Safety Reporting System. The data analysts, primarily experts in aircraft operations and air traffic control, provide insight into the nature of the human error or other underlying factors in the incidents. Although the reports are encoded in detail, the complete narrative text of each report is retained for later reevaluation. As the result of this process, over 5000 safety alert messages have been issued, correcting aviation safety discrepancies, and a wealth of human factors information is readily available from the ASRS database.

AUTOMATIC RECORDING SYSTEMS

Many modern air transport aircraft have automatic recording devices installed. The *flight data recorder* (FDR), which monitors selected parameters of the flight, and the *cockpit voice recorder* (CVR), which records voices and cockpit sounds, are installed to assist with the investigation of accidents and, in some cases, incidents. An engineering recorder may also be installed to monitor aircraft systems. The data from this recorder can be used to detect impending failures and to verify the adequacy of component life and overhaul schedules.

Automatic recorders that are installed in air traffic control and communication systems primarily for accident investigation purposes may also be used as a check on correct operating procedures.

FDRs and CVRs were initially installed to assist accident investigators in determining accident causes, particularly for catastrophic accidents to large aircraft. In some countries, professional groups such as pilots and air traffic controllers accepted the philosophy that the installation of these recorders would be of significant benefit to the aviation industry in helping to determine accident causes. Accordingly, they agreed to their use, provided that guarantees by operational and administrative agencies were negotiated and honored, preventing disciplinary action from being taken on the basis of information determined from the recorders unless willful negligence or dereliction of duty could be proved (see FOQA earlier).

Many countries routinely use flight recorder information for accident prevention. They regard this information as an invaluable source of safety insights and information on the operation of their aircraft. Standard flight profiles are usually programmed into a computer along with acceptable deviations. Recorded data are then compared with these standard profiles. Significant deviations are then examined to see if hazards could be present. If so, corrective action can then be taken.

This method need not require the identification of individuals, since it is often the number and type of deviations that reveal hazards.

Some carriers that routinely examine FDR records for indications of hazards or deviations from standard operating procedures have the findings reviewed by a committee consisting of retired captains or flightcrews. This group has the respect of both management and pilots and thus avoids direct employer/employee contact. The fear of job loss or punishment is avoided, and the accident prevention insights are more readily obtained.

ICAO INTERNATIONAL REPORTING SYSTEMS

The international exchange of accident and incident data provides a broad range of experience on which to base safety guidance. Such information can be of particular value to smaller countries or carriers that are not in a position to maintain an accident or incident reporting system, or whose database is too limited to permit the identification of potential hazards. Safety data interchange is, therefore, strongly encouraged among civil aviation authorities and safety organizations.

Annex 13 to the Chicago Convention entitled "Aircraft Accident Investigation" provides the basic standards which require member States to report to ICAO pertinent information on aircraft accidents and incidents (occurrences). Furthermore, ICAO standards provide that the "State of occurrence" shall forward notification of an accident or serious incident with minimum delay and by the most suitable and quickest means available to the following:

- State of registry of the aircraft
- State of the operator
- State of design
- State of manufacture

ICAO has developed a detailed process for such notification called the ICAO Accident/Incident Data Reporting System (ADREP). The version of the ADREP system in current use is ADREP 2000. Complete information on this system is available of www.icao.int and in ICAO Document 9156, its Accident/Incident Reporting Manual. Additional information is available in ICAO Document 9859, Safety Management Manual (2nd edition).

The ADREP system operates using a software program called the European Coordination Center for Aviation Incident Reporting System (ECCAIRS). This software system is provided to ICAO member States free of charge and has greatly improved ADREP reporting and classification of occurrences. Additionally, the ADREP/ECCAIRS system allows member States to easily exchange accident analysis tools. Many of the larger countries and safety organizations distribute material, such as films, videos, magazines, and summaries of accidents which are available to the general public.

ICAO ADREP SYSTEM. The ICAO ADREP system is a databank of worldwide accident and incident information for large commercial aircraft. Thus, ICAO can provide countries with accident prevention information based on wide international experience. The ICAO Accident/Incident Reporting Manual (ADREP) (Document 9156) contains detailed information on this system. ICAO provides the following information based on ADREP data:

- *ADREP Bi-monthly Summary* is a computer-generated publication containing the ADREP preliminary reports and data reports received by ICAO during a 2-month period. The last issue of each year contains a comprehensive index of the accident and incident reports reported to ICAO during that year.
- *ADREP Annual Statistics* is an ICAO circular containing annual statistics from the databank. These statistics may be useful for safety studies and accident prevention programs.
- *ADREP Information Requests* are computer printouts provided by ICAO in response to specific requests from countries. Guidance for the formulation of ADREP requests is contained in the ADREP manual.

The ADREP computer programs are available to countries wishing to utilize their computer systems for accident or incident recording. These programs, in addition to promoting standardized coding, offer significant financial savings to smaller ICAO member countries.

OTHER ICAO SAFETY INFORMATION. The ICAO also publishes the following aircraft accident and incident information:

- *Integrated Safety Trend Analysis and Reporting System* (iSTARS). Similar to the FAA ASIAS portal, ICAO recently released a *Beta* test version of its new iSTARS system. The iSTARS is a safety risk-based decision making tool which has the capability to facilitate identification of hazards and resolution of unacceptable safety risks through analysis of multiple safety related factors. ICAO member States are able to become registered users of iSTARS and contribute comments, maps, charts, documentation, or updates to ICAO accident data. As the system develops, this new portal of interactive safety information will greatly facilitate the sharing of international safety information.
- *Aircraft Accident Digest* is a publication that contains, narrative-type accident or incident final reports, selected for their contribution to accident prevention or the use of new or effective investigative techniques.
- *List of Final Reports Available from Countries* is a listing of narrative-type aircraft accident final reports available on request from the reporting countries. The list is updated every 6 months on the basis of information supplied by

No single measurement or statistic provides a complete picture of commercial aviation safety. Although accident and fatality statistics are the best measures of long-term past risk in commercial aviation, they are of limited value over short periods and are not suitable monitors of short-term effects of policy decisions. For example, the consequences of rulings requiring collision avoidance systems on commercial transports and transponders on many general-aviation aircraft might not be apparent in the accident data for years to come. The safety benefits of the next generation of navigation and air traffic control communication systems will also be a major area of analysis and study for the foreseeable future.

Nonaccident safety data, while not substitutes for accident and fatality data, are valuable supplements. If properly collected and maintained, nonaccident data can help identify and estimate the magnitude of safety problems and permit the monitoring of safety programs. The usefulness of such data will be discussed further in later sections of the book.

GENERAL INDUSTRY (OSHA) RECORDING AND REPORTING SYSTEMS

APPLICABILITY

OSHA regulations listed in 29 CFR 1904 require every employer covered by the OSHA Act with 11 or more employees to record and report all employee occupational (work-related) deaths, injuries, and illnesses on OSHA Forms 300 and 301. Employers with 10 or fewer employees are required to keep injury and illness records only if OSHA or the Bureau of Labor Statistics (BLS) specifically notifies them in writing that they must keep these records. However, all employers covered by the OSHA Act must report all deaths and events that cause in-patient hospitalization of 3 or more employees orally to OSHA (in person or via phone to the OSHA area or central office) within 8 hours of being aware of the events. Injuries and illnesses that require only first aid are exempt from being recorded. *Injuries* include, but are not limited to, cuts, fractures, sprains, or amputations. Illnesses include both acute and chronic illnesses such as skin disease, respiratory disorder, or poisoning.

Injury and illness records are used for several purposes. OSHA collects data through the OSHA Data Initiative (ODI) to help direct its programs and measure its own performance. Inspectors also use the data during inspections to help direct their efforts to the hazards that are hurting workers. Records are used by employers and employees to implement safety and health programs at individual workplaces. Analysis of the data is a widely recognized method for discovering workplace safety and health problems and for tracking progress in solving those problems. Records also provide the base data for the BLS Annual Survey of Occupational Injuries and Illnesses, the nation's primary source of occupational injury and illness data. Each year, the BLS uses a stratified random data collection survey process to collect injury and operational data (e.g., hours worked) from companies across the United States. It then analyzes, categorizes, and publishes the data by industry

groupings called *standard industrial classification* (*SIC*) codes. Companies can use these data to compare themselves to their peer industries. More on SIC codes and injury statistics will be covered in Chapter 5 on injury statistics.

OSHA FORM 300–LOG OF WORK-RELATED INJURIES AND ILLNESSES

This form requires the employer to record all occupationally related injuries and illnesses other than first aid and requires the following information:

- Employee's name, employee's job title, date, and the place (department) where the injury/illness occurred
- A very short description of the injury/illness including the body part that was affected and what caused it
- The number of lost or restricted workdays that the injury/illness caused
- The type or classification of the injury/illness

OSHA FORM 301–INJURY AND ILLNESS INCIDENT REPORT

This incident report Form 301 contains more detailed information on the injuries/illnesses than that listed in Form 300. Every injury or illness listed in Form 300 must have an accompanying Form 301. Information on Form 301 describes in greater detail how the injury or illness occurred, what time of day it happened, what the employee was doing when he or she was injured, and the extent of medical treatment the injury or illness required. Actual copies of OSHA Forms 300 and 301 can be downloaded from the OSHA Web site (www.osha.gov). Note that the FAA uses the Mishap Report Form 3900-6 (or succeeding form) for its own internal facilities and operations.

OSHA FORM 300A–SUMMARY OF WORK-RELATED INJURIES AND ILLNESSES

OSHA Form 300A, the annual summary of illnesses and injuries form and the OSHA Form 301 incident report must be retained on file by an employer for 5 years following the end of the calendar year that these records cover (29 CFR 1904.33). An employer is required to post a summary (Form 300A) of the total number of injuries and illnesses for the (calendar) year in a conspicuous place (preferably on the employee bulletin boards) at each establishment. Totals for the previous year must be displayed continuously from February 1 through April 30 of the year, following the year covered by the form.

OPEN GOVERNMENT INITIATIVE (TRANSPARENCY IN GOVERNMENT)

OSHA is considering implementation of a new, improved and modernized record-keeping system which will be made public to encourage innovative ideas in improving occupational, safety and health. Current information on this new process is

ENVIRONMENTAL (EPA) RECORDING AND REPORTING

Under federal environmental laws, any facility or vessel (e.g., oil spills from ships) must report to government authorities about any hazardous substance that is released into the environment in quantities that exceed a threshold amount. These threshold amounts are referred to as *reportable quantities* (*RQs*) and must be reported in a timely manner. In addition to release reporting required under CWA, CERCLA, (Superfund), EPCRA (SARA Title III), RCRA, and TSCA, state statutes may require additional release reporting. The environment can be air, water, soil, or a combination of the three media. A release includes any contact of a hazardous substance with the environment through either intentional or unintentional discharge and by any method (e.g., spilling, leaking, dumping, leaching, and abandonment of barrels or other closed containers containing hazardous substances). Notification of releases is usually required immediately or within 24 hours of knowledge of the release. EPA regulations cover a variety of reporting requirement that include

- Medium (environments) into which the release is applicable
- Listing of hazardous substances together with their quantities
- Persons responsible for reporting
- Time line for reporting
- The agency to contact in case of a release
- Fines for not reporting

In some cases there is also a requirement for follow-up reporting which must include the original notification, response actions taken, acute or chronic health risks associated with the release, and advice on medical care to exposed victims.

All these reporting release requirements help ensure accountability for clean-up, provide data for regulatory and public policy purposes, and enable federal, state, and local authorities to effectively prepare for and respond to emergencies that could harm humans and the environment. The EPA does not necessarily take enforcement action against releasers, but is quite strict against those violators who fail to report releases.

CERCLA REPORTING REQUIREMENTS

Under this act, if CERCLA-defined hazardous substances greater than or equal to their RQs are released into the environment, then the person in charge of the vessel or facility from where the release occurred must immediately notify the *National Response Center* (*NRC*). The NRC is staffed by U.S. Coast Guard personnel who are on watch 24 hours a day, 365 days a year. The NRC can be reached

at (800) 424-8802 or on the web at www.nrc.uscg.mil/. The NRC acts as the single federal agency point of contact for all hazardous release reporting.

CERCLA-defined hazardous substances include substances listed in 40 CFR Part 302.4 and under certain sections of the CAA, CWA, RCRA, and TSCA. As and when substances get regulated under the CAA, CWA, RCRA, or TSCA, they automatically become CERCLA hazardous substances. When a substance is delisted from the CAA, CWA, RCRA, or TSCA lists, it may still be regulated under CERCLA if the EPA administrator independently determines the substance to be hazardous.

EPCRA REPORTING REQUIREMENTS

EPCRA (SARA Title III) was enacted in 1986, with the primary objective of informing communities of chemical hazards in their areas. All rules pertaining to this section are found in the EPA regulation of 40 CFR Subchapter J, Superfund, Emergency Planning, and Community Right-to-Know Programs (Parts 300 through 399). EPCRA reporting requirements are the same as CERCLA requirements, but in addition, EPCRA regulations list *extremely hazardous substances* (*EHSs*) and requires their reporting in case of a release in excess of the RQs. EPCRA requires facilities to notify *state emergency response commissions* (*SERCs*) and *local emergency planning committees* (*LEPCs*). SERCs and LEPCs are dedicated emergency response groups that exist at the state and local levels and were established under EPCRA. The governor of each state must designate a SERC. Many SERCs include state department agencies involved with the environment, natural resources, emergency services, public health, occupational safety, and transportation. The SERC designates local emergency planning districts and appoints LEPCs for each district. The LEPC has representation from elected state and local officials, police, fire, civil defense, public health professionals, environmental, hospital, emergency planning, and transportation officials.

If an EPCRA release also qualifies as a CERCLA release, then in addition to the SERC and the LEPC, the NRC must be notified. Since different criteria were used to compile the list of chemicals, there are chemicals common to both CERCLA and EPCRA while there are some chemicals that appear on one list, but not the other.

EPCRA's emergency planning requirements (40 CFR Parts 302 to 303 and 355.30) requires SERC and LEPC notification if an EHS equal to or in excess of its *threshold planning quantity* (*TPQ*) is stored or used at a facility. EHSs and their TPQs are identified in 40 CFR Part 355. For example, the FAA triggers this reporting requirement as it has sulfuric acid (used in battery electrolyte) present at the Air Route Traffic Control Centers (ARTCCs) and the Air Traffic Control Towers (ATCTs) in excess of its 1,000-pound TPQ. In addition, the FAA's Aeronautical Center and Technical Center has chlorine (used in water and wastewater treatment) in excess of 100 pounds, calcium hypochlorite (used in water and wastewater treatment) in excess of 10 pounds, and methyl chloroform (used as a solvent cleaner) in excess of 100 pounds.

EPCRA Section 313 requires EPA and the states to collect data on chemical releases and make the data available to the public through the *Toxics Release Inventory* (*TRI*) program. And 40 CFR Part 370 (Hazardous Chemical Reporting: Community Right-to-Know) establishes reporting requirements of hazardous chemicals to enhance community awareness and to facilitate the development of state and local emergency response plans. And 40 CFR Part 372 (Toxic Chemical Release Reporting: Community Right-to-Know) requires timely reporting of chemical releases to the EPA. There are several different types of reports that cover diverse topics ranging from oil spills and chemical accidents to releases of dangerous substances into the water or air. The EPA compiles and organizes all this reported information annually, and it makes this information available to the public through printed documents and online databases such as the Toxics Release Inventory. The goal of TRI is to educate the public by disseminating this information so that communities may be empowered to hold companies and local governments accountable for how toxic chemicals are managed. Currently, there are about 650 chemicals included in the TRI. Extended information on TRI including chemical lists, toxicity, and other reporting and program information can be found at http://www.epa.gov.

RCRA SUBTITLE I (UNDERGROUND STORAGE TANKS)

The sections within this part (40 CFR Parts 280 and 281) set technical standards and corrective action requirements for owners and operators of *underground storage tanks* (*USTs*). Underground fuel tanks are of primary concern in fueling handling and storage at airports and fuel supplier work sites.

Reporting requirements. Facilities must submit the following information:

- Notification for all UST systems which includes certification of installation for new UST systems
- Reports of all releases including suspected releases, spills and overfills, and confirmed releases
- Corrective actions planned or taken including initial abatement measures, initial site characterization, free product removal, and investigation of soil and groundwater cleanup
- A notification before permanent closure or change in service

Recordkeeping requirements. Facilities must maintain the following information:

- A corrosion expert's analysis of site corrosion potential if corrosion protection equipment is not used
- Documentation of operation of corrosion protection equipment
- Documentation of UST system repairs
- Recent compliance with release detection requirements
- Results of the site investigation conducted at permanent closure

OTHER REPORTING REQUIREMENTS

Other regulations (in addition to CERCLA and EPCRA) may also require reporting of releases of hazardous materials. Some of these are as follows:

- *The Hazardous Materials* (HAZMAT) *Transportation Act* (HMTA) requires reporting of hazardous material releases during shipping and handling. These regulations are administered by the Department of Transportation (DOT).
- *The Toxic Substances Control Act* (TSCA) requires reporting of releases of polychlorinated biphenyls (PCBs), and also addresses asbestos, radon and lead-based paint.
- *The Clean Water Act* (CWA) requires reporting of hazardous substances listed under 40 CFR 116.4 and oil releases from vessels and facilities into navigable waters.
- *RCRA listed* hazardous wastes (F, K, P, U) under 40 CFR Part 261, Subpart D, and *characteristic* wastes (I, C, R, TC) under 40 CFR Part 261, Subpart C, are reportable if the release equals or exceeds the designated RQ.

CONTROL OF AIR POLLUTION FROM AIRCRAFT AND AIRCRAFT ENGINES

The sections within this part (40 CFR Part 87) deal with setting limits on exhaust emissions of smoke from aircraft engines, ban venting of fuel emissions into the atmosphere from certain types of aircraft engines, and require the elimination of intentional discharge to the atmosphere of fuel drained from fuel nozzle manifolds after engines are shut down. The EPA is also reviewing new regulations regarding lead emissions from piston engine aircraft using AVGAS. Current information is available on www.epa.gov.

KEY TERMS

Accident
Fatal injury
Serious injury
Substantial damage
Incident
NTSB accident classifications: major, serious, injury, damage
Near-midair collision
Mandatory reporting system
Voluntary reporting system
Aviation Safety Information Analysis and Sharing System (ASIAS)

FAA Accident/Incident Data System
Service Difficulty Reporting System
Operational Error and Pilot Deviation Reporting System
Aviation Safety Reporting System
Aviation Safety Action Program (ASAP)
Flight Operational Quality Assurance (FOQA)
Advanced Qualification Program (AQP)
Line Operations Safety Audit (LOSA)
Air Transportation Oversight System (ATOS)
Flight data recorder (FDR)
Cockpit voice recorder (CVR)
ICAO Accident/Incident Reporting System (ADREP)
ICAO Integrated Safety Trend Analysis and Reporting Systems (iSTARS)
OSHA Forms 300, 300A, and 301
OSHA injury and illness
Standard industrial classification (SIC) codes
CWA, CERCLA, EPCRA (SARA Title III), RCRA, RCRA Subtitle I, TSCA, and HMTA reporting
Underground storage tanks (USTs)
Pollution from aircraft and aircraft engines—40 CFR Part 87

REVIEW QUESTIONS

1. What is the difference between accidents and incidents? Identify several types of incidents.
2. List and define NTSB's classification of accidents.
3. Why do accident investigations still provide the best insight and information leading to accident prevention? What is the purpose of publicizing safety recommendations following an accident?
4. Explain the importance of establishing a culture of safety reporting. What is the difference between a mandatory and voluntary reporting system? What characteristic of voluntary systems is particularly important?
5. What is included in the FAA Accident Incident Data System? What is the purpose of the Service Difficulty Reporting System?
6. How does the Aviation Safety Information Analysis and Sharing System work?
7. Discuss the salient features of ASAP, FOQA, AQP and LOSA.

8. Describe the database system managed by the NTSB. Why was NASA chosen to manage the Aviation Safety Reporting System? What is its function?
9. What is the purpose of flight data recorders and cockpit voice recorders? How might they be used for accident prevention purposes? What is the ICAO ADREP? Give several examples of information provided by ICAO and based on ADREP data.
10. Discuss OSHA's recording requirements for injuries and illnesses and discuss the reasons for collecting these data.
11. Discuss the role that BLS plays in recording and analyzing occupational injury/illness data.
12. Discuss some of the salient features of EPA's hazardous substance reporting requirements, giving reasons for the same.
13. What does 40 CFR Part 87 address?

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