Environmental, Health, and Safety Guidelines for Airports

Introduction

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)[1]. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the **General EHS Guidelines** document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. A complete list of industry-sector guidelines can be found at: www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

Applicability

The EHS Guidelines for Airports apply to the operation of commercial airports. The document does not include activities associated with aircraft operators including aircraft maintenance activities, which are covered by the **EHS Guidelines for Airlines**. This document is organized according to the following sections:

Section 1.0 — Industry-Specific Impacts and Management
Section 2.0 — Performance Indicators and Monitoring
Section 3.0 — References
Annex A — General Description of Industry Activities

[1] Defined as the exercise of professional skill, diligence, prudence and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

1.0 Industry-Specific Impacts and Management

The following section provides a summary of EHS issues associated with airports which occur during the operational phase, along with recommendations for their management. These recommendations should be applied while taking into account the overriding priority for the safety of aircraft. Recommendations for the management of EHS issues common to most large industrial facilities during the construction and decommissioning phases are provided in the **General EHS Guidelines**.

1.1 Environmental

Environmental issues associated with airport operations include:

- Noise and vibrations
- Stormwater and wastewater
- Hazardous materials management
- Solid waste
- Air emissions
- Energy and water consumption

Noise and vibrations

The most significant sources of noise and vibrations from airport operations are aircraft during the landing and takeoff (LTO) cycles, followed by a variety of ground operations equipment including aircraft taxiing; operation of ground support vehicles (e.g. passenger buses, mobile lounges, fuel trucks, aircraft tugs, aircraft and baggage tractors, and dolly carts); aircraft auxiliary power units (APUs); and aircraft engine testing activities in airports with aircraft maintenance activities. Other indirect sources of noise include ground vehicle traffic from access roads leading to the airport.

Measures for the prevention, minimization, or control of noise and vibration impacts depend on land-use planning and management activities, which may be the primary responsibility of local authorities, or the type and age of flight equipment used by the airlines.[2] Recommended noise management practices include:

- Planning of site for airport location (new developments and expansion of existing facilities), and orientation of routes for arriving and departing aircraft relative to actual and projected residential development and other noise sensitive receptors in the surrounding area. This may include coordination with local authorities with influence over land-use planning and overall transportation planning activities;[3]
- In areas where significant impacts are anticipated, implementation of preferred procedures and routes for landing and take off (LTO) to minimize potential noise from approaching and departing aircraft for noise-sensitive areas.[4] These procedures may include instructions on the use of descent profiles or "noise preferential" routes (NPRs), such as the "continuous descent approach" to avoid noise-sensitive areas, the use of "Low Power / Low Drag" (LPLD) procedure to fly the aircraft in a 'clean' condition (e.g. no flap or wheels deployed) as long as possible to minimize airframe noise, and instructions on minimizing reverse thrust on landing. An alternative approach may include the dispersion of noise through

[2] Noise management activities should be based on the International Civil Aviation Organization (ICAO), Resolution A33/7, Balanced Approach to Aircraft Noise Management. The balanced approach identifies the noise problem at the airport and analyzes measures available to reduce noise based on four principal elements: reduction at source (quieter aircraft); land-use planning and management; noise abatement operations procedures; and operating restrictions (e.g. operating restrictions and noise charge).

[3] Additional information is provided in ICAO, Airport Planning Manual, Part 2 – Land Use and Environmental Control.

[4] Procedures and routes are published in the Aeronautical Information Publication (AIP) of the airport and are mandatory for operating airlines. They may be used to avoid noise-sensitive areas within the limits of aircraft operational safety regulations and should be developed in consultation with local authorities and operating airlines.

equal use of multiple flight tracks as opposed to a preferential flight track;

- Use of nighttime or other operating restrictions;[5]
- If necessary, working with local authorities to identify and implement noise prevention and control strategies in noise abatement zones (e.g. sound insulation of buildings that are exposed to aircraft noise above levels stipulated by local authorities or limitations on nighttime operation of certain landing routes);
- Reducing noise of ground operations at the source or through the use of sound barriers and deflectors, as described in the **General EHS Guidelines**;
- Provision of power supply to the aircraft to reduce or eliminate the need for use of APUs.

Air Emissions

The main sources of airport air emissions include combustion exhaust from aircraft during landing and takeoff and ground operation, from ground service vehicles, vapors from fuel storage and handling, and emissions from local ground transportation activities servicing the airport. Other sources of emissions may include fuel combustion during fire training activities, combustion emissions from on-site electricity and heat generation systems, and emissions from solid waste incineration activities.

Recommendations to prevent, minimize, and control air emissions from ground services and aircraft ground movements include:

- Optimizing ground service infrastructure to reduce aircraft and ground vehicle movements on taxiways and idling at the gate;
- Improving ground service vehicle fleets as described in the **General EHS Guidelines**;
- Minimizing fugitive air emissions from jet kerosene and other fuel storage and handling activities, as presented in the **General EHS Guidelines**;
- In airports operating in degraded airsheds, supplying electrical power and preconditioned air through ground-based equipment to minimize the use of aircraft APUs;
- Operating on-site small combustion plants within the applicable performance levels described in the **General EHS Guidelines**;[6]
- In fire-fighting drills, selecting cleaner fuels such as liquefied petroleum gas, avoiding the use of waste oil or jet fuel (jet kerosene) where possible, and selecting fire-fighting drill locations and atmospheric conditions that best avoid short-term impacts to the air quality of nearby populated areas;
- Incineration of wastes should only be conducted in permitted facilities operating under internationally recognized standards for pollution prevention and control;[7]

Stormwater and Wastewater

Effluents from airport operations mainly consist of stormwater runoff from paved surfaces and sanitary wastewater from public and employee services and from airplanes. Stormwater runoff may include pollutants associated with leaks and spills of oil, diesel, and jet fuels during operation and maintenance of ground service vehicles, and fuel storage and handling activities.

[5] Operating restrictions should be applied as a last resort and only after consultation and approval by the local authorities. As noted in the ICAO Assembly Resolutions, in force as of 8 October 2004, the use of operating restrictions on existing aircraft may not be financially feasible or cost-effective and aircraft noise standards and certification presented in ICAO Annex 16 to the Convention on Civil Aviation, Volume I—Aircraft Noise is not intended to introduce operating restrictions.

[6] The **General EHS Guidelines** provide emissions guideline values for combustion facilities with a capacity equal or smaller than 50 Megawatt thermal (MWth).

[7] Examples of key environmental issues associated with incinerations facilities are available in the **EHS Guidelines for Waste Management Facilities**.

In cold climates, airport stormwater runoff may include aircraft de-icing / anti-icing fluids (ADF), typically containing ethylene or propylene glycol, as well as runway and taxiway de-icing / anti-icing fluids typically containing potassium acetate, sodium acetate, calcium magnesium acetate, or mixtures of urea and water.[8] While these chemicals are biodegradable, their direct discharge into surface waters through the stormwater drainage network can negatively impact on aquatic environments through an increase in oxygen demand as well as eutrofication caused by nutrients from de-icing chemicals (e.g. nitrogen from urea and phosphorus from glycol).

Recommended strategies for the prevention and control of impacts associated with stormwater and wastewater include:

- Diverting and treating stormwater drainage from areas of potentially frequent leaks and spills of chemicals and fuels through use of an oil / water separator prior to discharge to surface water bodies. Examples of areas where this type of runoff treatment is applicable include fuel and chemical storage, transport and dispensing facilities, fire training areas, airplane maintenance hangars, and ground service vehicle maintenance facilities;
- Collection systems for aircraft and airport facility sanitary sewage should be provided. Collected sanitary wastewater effluents should be managed according to the recommendations for wastewater management in the **General EHS Guidelines**;
- Monitoring of effluents prior to discharge to surface water bodies;
- In cold climates, runoff of aircraft ADF should be prevented and controlled by:
  - Limiting aircraft deicing to small areas such as graded deicing pads, designed to facilitate the collection and recycling of ADF[9]
  - Increasing the storage of multi-strength glycol solutions to allow blending according to ambient temperatures, and avoiding the use of maximum glycol concentrations designed for the coldest expected weather under all weather conditions
  - Use of ice detection systems such as ultrasonic devices to detect ice thickness, or computerized spraying systems that can accurately and selectively apply ADF on airplane surfaces
- In cold climates, runoff airfield (runways and aprons) anti-icing and de-icing fluids should be managed by:
  - Primary use of mechanical de-icing methods such as sweepers and plows complemented by chemical means. Pretreating pavement surfaces with such means prior to the onset of ice to allow for easy removal
  - Substituting urea or glycol deicers with less toxic, more biodegradable, and lower biochemical oxygen demand (BOD) alternatives, such as potassium acetate, sodium acetate, sodium formate, potassium formate, or calcium magnesium acetate;
  - Following manufacturers' recommended application rates and avoiding application of glycol-based deicers near storm drains that lead directly to surface water bodies;
  - Providing a stormwater management system to collect and treat surface runoff containing aircraft and airfield anti-icing and de-icing fluids, including water originating from heaps of snow cleared from aprons

[8] Further information and recommendations for the management of aircraft and runway deicing and anti-icing chemicals are provided in EPA (2002)

[9] Glycol recycling requires specialized filtration and distillation equipment.

and runways.[10] Examples of effective treatment systems include discharge into centralized sanitary wastewater treatment systems (if allowed by the local wastewater treatment plant operator) or use of detention basins or constructed wetlands to reduce the oxygen demand and suspended solids of the runoff prior to discharge to surface water;

- If centralized collection and treatment of stormwater runoff is not feasible, use of vacuum sweeper trucks to recover anti-icing and de-icing fluids for transport to appropriate treatment locations should be considered.

- Additional stormwater and wastewater management recommendations are described in the **General EHS Guidelines**.

Hazardous Materials Management

Airport operations may include the storage and handling of fuels (e.g. jet fuel, diesel, and gasoline) primarily associated with aircraft fueling activities as well as with ground support vehicles. Fuels may be stored in aboveground or underground storage tanks and conveyed to dispensing locations via aboveground or underground piping systems that may be subject to accidental releases during transfer or leaks due to tank and piping containment failure (e.g. corrosion of steel components or faulty construction and installation). Fueling in smaller airports may be conducted through the use of fueling tanker trucks. The use of liquid combustible materials and fire suppression foams and powders in fire fighting drills also may result in releases to soil and water resources.

Hazardous materials should be managed to prevent accidental releases, fire, or explosions, as described in the **General EHS Guidelines**. Operators should develop spill prevention and control plans, and emergency preparedness and response plans for airports that are specific to the nature of the operations. Operators should include environmental impacts, mitigation, and monitoring as part of contractual arrangements with third parties such as fuel handlers and ground service companies. Fire training should take place on impermeable surfaces surrounded by a retaining dyke to prevent foam and powder or other environmentally hazardous fire extinguishing agents or polluted fire water from entering the stormwater system. Water containing fire extinguishing agents and non-combusted flammable materials should be treated prior to discharge to surface water.

Waste Management

Depending on the number of passengers handled and the services provided, commercial airports may generate solid, non-hazardous, waste food from food establishments, packaging materials from retail facilities, and paper, newspaper, and a variety of disposable food containers from offices and common passenger areas. Commercial airports may also receive solid waste from arriving aircraft which may consist of food waste, disposable food containers, and paper / newspaper materials. Food waste from international flights is considered a potentially infectious material by some national jurisdictions. Some airlines may also dispose of pillows following the completion of every flight. Airport operations may also generate liquid or solid hazardous wastes such as used lubricating oils and solvents from aircraft and ground service vehicle maintenance. Recommended waste management strategies include:

- Instituting a solid waste recycling program, depending on the existence of local facilities, that should involve placing labeled waste containers in passenger terminals for metals, glass, paper, and plastics. Food establishments should segregate compostable and other food waste for recycling as agricultural fertilizer and animal feed;

[10] Stormwater management activities should consider potential contamination to soil and groundwater from stormwater that may escape the drainage system and instead infiltrate into the ground adjacent to aprons, taxiways and runways.

- Airline operators and airplane cleaning contractors should be encouraged to segregate waste in the airplane by separating the collection of newspapers / papers, plastic, metallic containers, and used pillows. Used pillows should be recycled in furniture manufacturing or as insulation;
- Food catering waste from aircraft should be managed according to applicable local regulations intended to protect human and animal health.[11] Possible local requirements may include rendering, incineration, or landfilling of food catering waste and mixed waste containing catering waste;
- On-site generation and storage of hazardous wastes and their subsequent treatment and disposal should be managed according to the recommendations provided in the **General EHS Guidelines**.

Energy and Water Consumption

Commercial airports may consume significant levels of energy for space cooling and heating in terminals, external and internal lighting systems, and the operation of luggage conveyance systems. Water consumption may depend on the types of passenger and airplane maintenance services offered and may include the operation of sanitary facilities for large numbers of transiting passengers or cleaning activities in general. Recommended strategies and methods for energy and water conservation are presented in the **General EHS Guidelines.**

1.2 Occupational Health and Safety

Occupational health and safety issues associated with airport operation primarily include the following:

- Noise
- Physical hazards
- Chemical hazards

Guidance on the prevention and control of general physical, chemical, biological, and radiological hazards is also presented in the **General EHS Guidelines.** Occupational safety issues should be included in an airport-wide comprehensive safety management system that incorporates other applicable aspects of airport safety.[12] Occupational health and safety management strategies applicable to airport operators depend on the employment relationship with potentially affected workers, many of whom may be employed by airlines or ground services providers. Consequently, the following recommendations may only be implementable through contractual arrangements or collaboration with third parties.

Noise

Airport ground service personnel may be potentially exposed to extremely high levels of noise from taxiing aircraft, the operation of aircraft auxiliary power units (APUs), and ground service vehicles. As most of these noise sources cannot be prevented, control measures should include the use of personal hearing protection by exposed personnel and implementation of work rotation programs to reduce cumulative exposure. Additional recommendations on the management of occupational noise are provided in the **General EHS Guidelines.**

Physical Hazards

Airport ground service personnel may be exposed to a variety of physical hazards depending on the specific worker function. The most significant occupational hazards may include strains due to carrying of heavy loads, repetitive motions from luggage and cargo handling activities / aircraft service operations; collisions with moving ground service vehicles or cargo, or

[11] Countries have specific regulatory requirements for the disposal of food catering waste originating from international flights. The objective of most of these regulations is to prevent the spread of communicable diseases across borders.

[12] Additional information on the organization and implementation of a Safety Management System is presented in the ICAO Accident Prevention Programme (ICAO 2005). Accident prevention strategies specifically applicable to airports management is presented in Chapter 19 of the ICAO document.

taxiing aircraft; and exposure to weather elements. Workers may also be exposed to jet engine hazards.

Moving Equipment

- Operators should provide safety signs and pavement markings for ground support vehicle circulation and parking areas in ramps, taxiways, and any other areas with a risk of collision between ground vehicles and aircraft. Delineated safety areas should include high risk locations such as jet engine suction areas to protect aircraft service workers;
- Operators should train and certify all workers with access to airfield operations. Workers involved in the operation of aircraft support equipment should be familiar with safety procedures applicable to ramp and taxiway traffic, including communications with the air control tower;
- Safety features of ground support vehicles should be maintained, including back-up alarms, moving part guards, and emergency stop switches.

Strains

- All workers involved in luggage and cargo handling, whether as a regular or incidental aspect of their work function, should be trained in the use of proper lifting, bending, and turning techniques to avoid back injury or extremities. Particular attention should be placed on the handling of luggage and cargo in airplane holds which often do not have adequate standing height (requiring special lifting or pushing techniques) and which may present tripping and slipping hazards. Workers should be provided with appropriate Personal Protective Equipment (PPE), such as knee pads when accessing cargo holds;
- Operators should evaluate the need to implement individual luggage weight restrictions in coordination with airlines, applying weight limits on individual luggage packages according to local regulations or, in their absence, limiting the weight for individual luggage packages to 32 kilograms (70 pounds);[13]
- The frequency and duration of worker assignments to heavy lifting activities should be mitigated through rotations and rest periods;
- Operators should consider mechanizing cargo and luggage handling activities, such as the use of conveyors that extend into the cargo holds.

Weather Elements

- Operators should train workers on the prevention of heat and cold stress, including the identification of early symptoms, and management techniques (e.g. hydration, rest). Workers should be provided with the necessary clothing and fluids to prevent weather related stress and apply other relevant recommendations for working environment temperature as presented in the **General EHS Guidelines**.

Chemical Hazards

Ground service providers may be exposed to chemical hazards, especially if their work entails direct contact with fuels or other chemicals, such as those used in deicing and anti-icing. Work with fuels may present a risk of exposure to volatile organic compounds via inhalation or skin contact during normal use or in the case of spills. It may also present a less frequent risk of fire and explosions. Recommended measures to prevent, minimize, and control the risk of exposure to chemicals hazards is provided in the **General EHS Guidelines**.[14]

[13] The International Air Transport Association (IATA) has established a weight limit of 32 kilograms (70 pounds) for an individual luggage package.

[14] For further recommendations applicable to airports, refer to the ICAO Airport Services Manual (Doc 9137) and the **EHS Guidelines for Crude Oil and Petroleum Product Terminals**.

1.3 Community Health and Safety

In addition to the environmental and occupational health and safety issues already presented in these guidelines, issues potentially affecting local communities include the highly infrequent, but potentially catastrophic, failure of aircraft during the landing and takeoff (LTO) cycle. Although possible causes of aircraft failures are numerous and complex, airport operators can help prevent those related to airport design and land use issues, specifically those that affect the presence of birds and other wildlife which can increase the likelihood of strikes by aircraft, and those related to the operational safety of aircraft during landing, takeoff, and ground operations, including adequate emergency response. These potential hazards can be managed through regular runway maintenance and monitoring to identify and remove non-permissible objects on the runways (e.g. metal or other parts that may have fallen from other aircraft on the runway or during maintenance activities).

Wildlife Strikes

One of the most significant potential hazards at airports is the collision between aircraft and wildlife which may result in damage to the aircraft or even its structural failure (e.g. engine failure from suction of birds). Although wildlife strikes are most commonly associated with birds, mammals such as deer, coyotes, or stray dogs wandering the runways can be a significant hazard to aircraft operational safety. Recommended prevention and control strategies include:[15]

- Working with local authorities to prevent the establishment of wildlife attractants outside the airport property. Examples of wildlife attractants include waste disposal operations (including landfills), water management facilities (e.g. wastewater treatment facilities and retention ponds), natural or artificial wetlands, agricultural activities (including livestock and aquaculture), and golf courses or other artificially landscaped areas;[16]
- Managing land use within the airport property confines to deter birds and other wildlife (e.g. avoiding use of vegetation, structural features or stormwater management structures that can act as habitats or nesting places for birds, or use of anti-perching devises to avoid nesting in existing structures);
- Applying zero tolerance for access to deer, livestock and other large mammals (e.g. by erecting fencing along the site perimeter);
- Applying wildlife repellent and harassment techniques if necessary, which may include the use of chemicals, audio techniques, or visual techniques to scare and repel wildlife;
- Applying wildlife removal techniques, if necessary, which may include capture or other means, and possible consideration of offsite wildlife compensation strategies;
- Developing a Wildlife Hazard Management Plan that integrates the above-referenced approaches.

Operational Safety Management

Airport operators have certain key responsibilities necessary for the safe operation of aircraft during the landing and takeoff cycle and during ground operations. Airport operations should therefore develop and implement a Safety Management System (SMS) able to effectively identify and correct unsafe conditions.[17] The SMS should include a comprehensive and

[15] The following recommendations are largely based on a detailed description of wildlife management techniques presented by Cleary and Dolbeer (2005).

[16] Additional information on recommended separation distances between airports perimeters and areas that attract wildlife is provided in Hazardous Wildlife Attractants on or Near Airports, Advisory Circular (150/5200-33A), United States Department of Transportation, Federal Aviation Administration (2004).

[17] A detailed description of the recommended elements of an SMS, including the organizational structure, responsibilities, procedures, processes and provisions for the implementation of airport safety policies, are presented in the approach, organization, and oversight of Chapter 4 of the ICAO Accident Prevention Programme.

effective Accident Prevention Program.[18] Large airports should also consider appointing a dedicated Accident Prevention Adviser who should organize and lead a safety committee.[19] As required by international conventions applicable to civil aviation,[20] airspace around airports should be kept free of obstacles, although the enforcement of this requirement may be the responsibility of local authorities. Airport operators should prepare necessary emergency preparedness and response plans that provide a coordinated response based on the required airport and community resources for the nature and severity of the emergency event.[21] The emergency plans should specifically address potentially catastrophic incidents such as aircraft crashes and fires, including a fire fighting plan and training program, applicable to airport and aircraft emergencies.

Airport Security

Airport operators may also have certain key responsibilities necessary for the safety of passengers against the consequences of unlawful acts. Airport operators should therefore prepare and implement a Security Plan consistent with internationally recognized standards and procedures,[22] collaborating with the competent public authorities as required to prevent, and respond to, security concerns.

[18] As noted in Chapter 13, ICAO Accident Prevention Programme document.
[19] As noted in Chapter 19, ICAO Accident Prevention Programme.
[20] Specifically, Annex 14, Volume 1 of the Convention on International Civil Aviation
[21] Additional information on the required elements of airport emergency response planning is provided in Chapter 19, ICAO Accident Prevention Programme and ICAO Airport Services Manual (Document 9137).
[22] As noted in Annex 17 of ICAO and the Annex's Security Manual for Safeguarding Civil Aviation Against Acts of Unlawful Interference (Doc. 8973)

2.0 Performance Indicators and Monitoring

2.1 Environment

Emissions and Effluent Guidelines

Airport operations should establish site-specific discharge levels based on the requirements of publicly-operated sewage collection and treatment systems or, if discharged directly to surface waters, on the receiving water use classification as described in the **General EHS Guidelines**. Guideline values for process emissions and effluents in this sector are indicative of good international industry practice as reflected in relevant standards of countries with recognized regulatory frameworks

Combustion source emissions guidelines associated with steam- and power-generation activities from sources with a capacity equal to or lower than 50 MWth are addressed in the **General EHS Guidelines** with larger power source emissions addressed in the **EHS Guidelines for Thermal Power**. Guidance on ambient considerations based on the total load of emissions is provided in the **General EHS Guidelines**.

Environmental Monitoring

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, resource use, and wildlife management strategies applicable to the particular project. Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with

the operating standards so that any necessary corrective actions can be taken. Additional guidance on applicable sampling and analytical methods for emissions and effluents is provided in the **General EHS Guidelines**.

2.2 Occupational Health and Safety

Occupational Health and Safety Guidelines

Occupational health and safety performance should be evaluated against internationally published exposure guidelines, of which examples include the Threshold Limit Value (TLV®) occupational exposure guidelines and Biological Exposure Indices (BEIs®) published by American Conference of Governmental Industrial Hygienists (ACGIH),[23] the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety (NIOSH),[24] Permissible Exposure Limits (PELs) published by the Occupational Safety and Health Administration of the United States (OSHA),[25] Indicative Occupational Exposure Limit Values published by European Union member states,[26] or other similar sources.

Accident and Fatality Rates

Projects should try to reduce the number of accidents among project workers (whether directly employed or subcontracted) to a rate of zero, especially accidents that could result in lost work time, different levels of disability, or even fatalities. Facility rates may be benchmarked against the performance of facilities in this sector in developed countries through consultation with published sources (e.g. US Bureau of Labor Statistics and UK Health and Safety Executive)[27].

Occupational Health and Safety Monitoring

The working environment should be monitored for occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals[28] as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents. Additional guidance on occupational health and safety monitoring programs is provided in the **General EHS Guidelines**.

[23] Available at: http://www.acgih.org/TLV/ and http://www.acgih.org/store/
[24] Available at: http://www.cdc.gov/niosh/npg/
[25] Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992
[26] Available at: http://europe.osha.eu.int/good_practice/risks/ds/oel/
[27] Available at: http://www.bls.gov/iif/ and http://www.hse.gov.uk/statistics/index.htm
[28] Accredited professionals may include Certified Industrial Hygienists, Registered Occupational Hygienists, or Certified Safety Professionals or their equivalent.

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Annex A: General Description of Industry Activities

Airports are typically sited on large areas of open land, with one or several runways. The number and location of runways (each runway for heavy aircrafts being approximately three kilometers long) typically determines the necessary land area requirements. An airport provides an important link for national and international transport infrastructure. Due to security reasons, the airport is divided into a "land-side", to which public access is allowed, and an "air-side" which is only accessible for aircrafts, security cleared personnel and security cleared passengers moving to and from aircrafts. Other types of aircraft (e.g. air taxis, cargo aircraft, business aircraft, non-commercial sport aircraft, helicopters, and military aircraft) may operate at the airport alongside commercial airlines.

In addition to runways for landing and take-off of aircrafts, an airport generally consists of taxiways leading to aprons where disembarkation and embarkation of passengers and cargo is undertaken. Ground handling and terminal buildings allow for transit of passengers and cargo within the airport. Larger airports have an air traffic control tower, along with facilities / buildings for airport security and fire-fighting services, airline companies, aircraft maintenance companies, and cargo handling agents, among other service operators at the airport.

Airport infrastructure facilities typically include fuel storage and distribution facilities, facilities for heat and power supply, ground vehicle and aircraft maintenance hangers, repair and washing facilities, fire-fighting services, wastewater and stormwater management facilities, and waste collection / storage. Airports are also normally equipped with electronic systems for landing (Instrument Landing Systems, ILS), and navigational aids such as distance measuring equipment (DME) or radio beacons.[29]

Whether provided by the airport operator, the airline, or third party service providers, aircraft receive a variety of services which include access to aprons for passenger boarding and exit, fueling, removal of solid and liquid waste, provision of on-board catering supplies, and loading / unloading of luggage and cargo. Ground services require trained personnel and specialized ground service equipment. In cold climates, airport services main include the removal of ice and snow from the runways, taxiways, and ramps as well as aircraft de-icing and anti-icing services. Airports may also provide electricity to aircraft through ground power units (GPUs) which may substitute for the function of aircraft Auxiliary Power Units (APUs) while passengers embark and disembark. Airports also provide emergency services in aircraft rescue and fire fighting to respond to aircraft accidents within the confines of airport facilities. Aircraft movements during landing and take-off (LTO) are guided and controlled by the air traffic controllers.

Aircraft may operate using Instrument Flight Rules (IFR traffic, including all commercial flights) and / or Visual Flight Rules (VFR traffic). Procedures to control IFR traffic are called Standard Arrival Routes (STAR) and Standard Instrument Departure (SID). SIDs and STARs can be defined differently depending on the destination or origin of the aircraft, and the level of technical equipment and certification of the aircraft.

[29] Civil aviation and many of the activities at airports are governed mainly by the principles and arrangements of the UN Convention on International Civil Aviation, commonly known as the "Chicago Convention"29 and to international agreements for signatories of relevant conventions to the extent that these commitments have been translated into national legislation.