RISK ASSESSMENT

Risk analysis deals with the identification and quantification of risks of the airport equipment/facilities and personnel who may get exposed to accidents resulting from the hazards at the proposed airport.

Purpose of Risk Assessment

Although the purpose of risk assessment includes the prevention of occupational risks, and this should always be goal, it will not always be achievable in practice. Where elimination of risks is not possible, the risks should be reduced and the residual risk controlled. At a later stage, as part of a review programme, such residual risk will be reassessed and the possibility of elimination of the risk, perhaps in the light of new knowledge, can be reconsidered.

The purpose of this risk assessment is to evaluate the adequacy of the airport and aircraft security. This risk assessment provides a structured qualitative assessment of the operational environment. It addresses sensitivity, threats, vulnerabilities, risks and safeguards. The assessment recommends cost-effective safeguards to mitigate threats and associated exploitable vulnerabilities. Component/Flowchart of risk assessment is shown in Figure 7.1

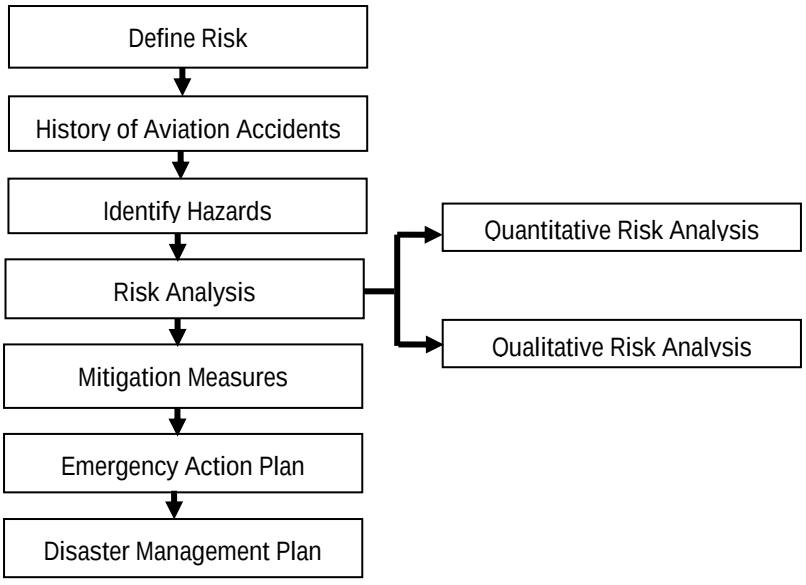

Figure 7.1: Component/Flow Chart of Risk Assessment

However, it is important to know that there are other methods that work equally well, particularly for more complex risks and circumstances. The approach to assessment will depend upon:

- The nature of the workplace
- The type of process
- The task performed
- Technical complexity

In some cases a single exercise covering all risks in a workplace or activity may be appropriate. In other cases, different approaches may be appropriate to different parts of a workplace.

Risk Estimated/Analysis

Risk analysis is conducted in two ways (i) Qualitative Risk Analysis and (ii) Quantitative Risk Analysis

Qualitative Risk Analysis*:* The objective of conducting a qualitative risk analysis is to acquire safety against recognized risks and to increase the alertness of management, team members, and all personnel who are vulnerable to them. The risk ranking and severity of consequences are given in Table

Table: Risk Ranking

Level of Harm	Severity of harm		
	Slight harm	Moderate Harm	Extreme Harm
Very unlikely	Very low risk	Very low risk	High risk
Unlikely	Very low risk	Medium risk	Very high risk
Likely	low risk	High risk	Very high risk
Very Likely	low risk	Very high risk	Very high risk

Table :Severity of Consequences

Minor Injury 1	Minor Damage to aircraft/building/people person can go home first aid treatment or bandage to wounds
Injury (no time lost) 2	Damage but repair cost is low person needs treatment till 2 days
Injury (time lost) 3	High damage repair cost more person needs treatment for more than 2 days
Major Reportable injury 4	Very high damage repair cost admitted to hospital for needed treatment
Fatality 5	Minor Damage major cost death a person on the spot or in hospital during treatment

Quantitative Risk Analysis

Quantitative risk analysis is more focused on the implementation of safety measures that have been established, in order to protect against every defined risk. By using a quantitative approach, an organization is able to create a very precise analytical interpretation that can clearly represent which risk-resolving measures have been most well-suited to various project needs. Risk can be evaluated and ranked according to the severity and frequency of occurrence. The risk rating and quantitative risk analysis for the project is given in Table

Table: Risk Rating

Risks	Rating
High Risk	15-25
Moderate Risk	8-12
Low risk	1-6

Table: Quantitative Risk Analysis for the Project

Operation	Persons Affected	Hazard Type	Risk Level	Severity
Aircraft take-off and landing noise	Airport Staff/Residences below flight path	Physical	11	Moderate
Aircraft take-off and landing (fatalities)	Airport Crew and Passenger	Physical	25	High Risk (Serious)
Lifting/ Moving of luggage	Airport Staff	Physical	3	Minor
Movement of staff near	Airport Staff	Physical	2	Minor

Operation	Persons Affected	Hazard Type	Risk Level	Severity
aircraft				
Contamination/cap not fitted properly	Pilot, Crew and Passenger	Physical	10	Moderate
Door Detachment	Crew	Physical	10	Moderate
Turning Rotor	Crew	Physical	10	Moderate
Rotor Break Application	Pilot, Crew and Passenger	Physical	12	Moderate
Lack of Communication	Airport Staff	Physical	10	High Risk (Serious)
Lack of Communication	Pilot and Passenger	Physical	20	High Risk (Serious)
Engine design	Operator, crew and passenger	Physical	20	High Risk (Serious)
Ground Signals for landing	Pilot, crew and passenger	Physical	12	Moderate
Visibility	Pilot, crew and passenger	Physical	20	High Risk (Serious)
Altitude	Pilot, crew and passenger	Physical	20	High Risk (Serious)
Fuel Exhaustion/Starvation	Pilot, crew and passenger	Physical	15	Moderate
Engine Software Failure	Pilot, crew and passenger	Physical	15	High Risk (Serious)
Obstacles	Pilot, crew and passenger	Physical	20	High Risk (Serious)

HAZARD IDENTIFICATION

Identification of causes and types of hazards is the primary task for planning for risk assessment. Hazard can happen because of the nature of fuels/chemicals handled and also the nature of process involved. The Preliminary Hazard Analysis for process, storage area and whole airport is given in Table

Table: Hazard Analysis

Source	Process	Potential Hazard	Provisions	Remarks
DG Set	Production of electrical energy	Fire Hazard in Lube oil system, cable gallery, short circuit	FRLS/Standard cables to be used, Fire detection system used	-
Power Unit Transfer	-	Fire& Explosion	FRLS/Standard cables to be used, Fire detection system used	-
Switch Yard Control room	220KVA switch yard	Fire	FRLS/Standard cables to be used, Fire detection system used	-
ATF/Jet A1 & HSD Storage Area	Fuel Storage for aircraft, Ground vehicles	Fire & Explosion	Precautions as per TAC, OISD to be followed. Refueller fuelling facility has been provided for Aircraft refueling. Fire detection & alarm system.	Tankers shall do the refuelling /refueller fuelling supplied by BPCL, as & when required.
Buildings	Electrical short circuit causes spark (Source of Ignition)	Fire	All electrical fittings and cables will be provided with standard quality/ FRLS type. All motor starters to be flame proof	Provision of Fire extinguishers at potential points & Fire hydrant network as per TAC / NBC guidelines.

The airport will have limited flights and taxiways are separate and open (no blind spots). There will be dedicated lanes for incoming and outgoing cars with trained drivers. Hence the risk due to taxi/Aircraft collision is not considered significant with available security checks & ATC system.

Hazard during Construction Phase

The main risks associated with the construction of the project are mainly electrical and mechanical failures or lack of safety precautions. During the construction phase, the responsibility of maintaining safety is jointly on the project developer and the deployed contractors. The risks and hazards associated with various construction activities are listed in Table.

Table: Risk & Hazard Associated and Control Measures

Risks & Hazards Associated with Construction	Mitigation Measures
• Manual Handling • Strains and sprains • Incorrect lifting • Too heavy loads • Twisting • Bending • Repetitive movement	• Exercise/warm up • Get help when needed • Control loads • Rest breaks/no exhaustion • No rapid movement / twisting / bending / repetitive movement • Good housekeeping
• Falls - Slips - Trips • Falls on same level • Falls to surfaces below • Poor house-keeping • Slippery surfaces • Uneven surfaces • Poor access to work areas • Unloading materials • Wind • Falling objects	• Good Housekeeping • Tidy workplace • Guardrails, handholds, harnesses, hole cover, hoarding, no slippery floors/trip hazards • Clear/ safe access to work areas &egress from work areas • Dust/water controlled environment as much as possible
• Fire • Flammable liquids/gases like LPG, diesel storage area and combustible building materials • Poor housekeeping • Grinding sparks • Open flames, absence of fire hydrant network.	• Combustible/flammable materials properly stored/used • Good housekeeping • Fire extinguishers made available &fire hydrant network with reserve Fire water (as per NFPA Code) • Emergency preparedness plan in case of fire or collapse of structure. • Regular mock drills
• Absence of Personal Protective Equipment • Lack of adequate footwear • Head protection • Hearing/eye protection • Respiratory protection • Gloves, goggles	• Head/face - footwear - hearing/eye - skin – respiratory protection provided • Training for use of PPEs • Proper maintenance of PPEs
• Electricity • Electrocution • Overhead/underground services • Any leads damaged or poorly insulated • Temporary repairs • No testing and tagging • Circuits overloaded • Non use of protective devices.	• All electrical equipment in good condition and earthed • No temporary repairs • No exposed wires &good insulation • No overloading • Use of protective devices • Testing and tagging • No overhead / underground services
• Scaffolding	• All scaffolds correctly braced and stabilized

Risks & Hazards Associated with Construction	Mitigation Measures
• Poor foundation • Lack of ladder access • Insufficient planking • Lack of guardrails and toe boards • Insufficient ties or other means • All scaffolds incorrectly braced or stabilized to prevent overturning.	• 3:1 height to base ratio • Firm foundation, plumb and level • Ladder access provided and used • Proper platform • Planks secured • Guardrails and toe boards
• Ladders • Carrying loads • Not secured against dislodgement • Defective ladders • Not sufficient length • Wrong positions • Incorrectly placed (angles, in access ways, vehicle movements	• Secured against movement or footed • Ladders in good condition and regularly inspected for faults • Extend 1m above platform and placed at 4:1 angle • Out of access ways, vehicle movements • No carrying loads while climbing • 3 points of contact • Use for access only, not working platforms
• Excavations • Trench collapse • Undetected underground services • Falls • Hazardous atmosphere	• Knowledge of Soil stability • No water accumulation and pumping facilities • Material 600mm from edge • Clear of suspended loads • Hardhats/PPE • Ladders • Atmospheric testing • Traffic controls • Emergency Plan.
• Noise • Unknown noise levels • Known noise levels over 85 decibels	• Levels below 85 decibels • Proper protections.
• Falling Material • Fall during carrying / lifting materials • Dislodged tools and materials from overhead work areas.	• Materials to be secured • kept away from edge • toe boards • Use of hard hats
• Cranes& Lifts • Display of carrying capacity i.e. loads (No. Of person), incorrectly slung, defective lifting equipment, unsecured loads, craning in close proximity to building • Falls • Falling materials.	• Periodic testing by competent authority • Correctly slung/secured loads, lifting equipment good condition • Use of proper hand signals • Falls while unloading controlled
• Visitors Presence at site • Falls • Struck by dropped materials • Road accidents • Insufficient hoarding or fencing - pedestrian access past site • Mechanical plant movement on and off site	• Sufficient hoarding • Fencing and barricades • Safe pedestrian access past site traffic management for loading and delivery • Construction separated from occupied areas of projects.

Hazard during Operational Phase

Natural Disaster: Natural Disasters are often sudden and intense and results in considerable destruction, injuries and death disrupting normal life as well as the process of development. Disasters due to natural calamity could be (i) Earthquake, (ii) Floods, and (iii) Storms/ Cloud burst/lightning/extreme weather conditions

The functioning of airport may be affected by earthquake; cyclones and NBC attack instantly where as the impact of other disasters may be governed by three prepositions of impact of disasters given below and therefore the details of the responsibilities shall be (i) When only airport is affected; (ii) When outside the airport is affected and (iii) When airport and outside both are affected.

When Only Airport Is Affected

In case only airport is affected, the disaster scenario in all above cases may render land aids including the runway, NAV Aids, electrical services and other assisting services at airport unserviceable / damaged as such the airport shall be closed for aircraft operation depending on extent of damage. The following actions will be taken up by airport:

- Declare the airport closure with tentative timings for resumption of operation;
- Inform Navy/ Port Authority/ Army/ IAF/ Explosive Department/ Atomic Energy Department for necessary assistance, as the case may be;
- A message shall be passed on to aerodrome telephones exchange or over local VHF frequency to HoDs to resort for rescue work within their premises and leave the area to a safer place. Necessary help should be extended to external services who have responded for assistance;
- Mobilize rescue tools and emergency lights in CFT's before moving to a safe place;
- Render assistance to city /district/state command team;
- Maintain contact with ATC/ATCO; and
- Use of portable pumps, hydraulic cutters, lifting bags, hydraulic jacks, ladders, ropes, life buoys, rafts, first-aid boxes are considered to be very important to meet post disaster scenario.

When Areas outside the Airport Is Affected

In case when disaster has affected the city but airport remaining safe the action taken up by Airport will be:

- Airport shall remain open round the clock for receiving aids and dispatching injured causalities, etc.
- All possible help from each unit shall be extended to city / district / state disaster team.
- Arrangement for additional crew and rescue equipment may be made for rendering assistance.
- Establish a command post for dissemination of information.
- Arrange for change of crew at regular intervals and provide necessary relief for disaster team.
- Standby rescue tools and crew can be utilized for extending help to outside agencies.

When Airport and Outside Both Are Affected

In case when disaster has affected the airport as well as the city the action taken up by airport will be:

- Establish contact with FIC, city / district / state command center and inform the impact of disaster.
- Declare airport closed.
- Establish alternate communication channel through for subsequent instructions.

- Inform Army/ Navy/ Air-force/ Port Authorities/ Explosive Dept./ Atomic Energy Dept. for necessary assistance.
- Arrange for salvage operation and remain standby for giving / receiving any assistance
- Arrange standby crew and equipment for additional task
- Arrange a mobile command post at the airport.

Other Important Actions and Departments

CNS: Additional communication channel should be established among all responding agencies.

- APSU: Security staff shall be mobilized to provide protection against breach of security. Manpower for rescue and salvage work and any other duty assigned during emergency.
- Engineering: The role of engineering would be highly desirable during. Rescue and salvage operation from buildings. Arrangement for additional emergency lighting, skilled labour and heavy- duty equipment like cranes / bulldozer etc. should be made from its own resources or by engaging these services on contract.
- E&M Workshop: Effects shall be made maximum possible transportation facility as such repair teams along with MT Vehicles at the command post.

Risk Assessment & Evaluation

Preliminary hazards analysis is based on the philosophy "*Prevention is better than cure*". This calls for identification of hazards, quantification of risk and further suggests hazard mitigating measures. An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to operation of the proposed airport, utility and support systems, environmental factors and the safety measures.

Maximum Credible Accident Analysis (MCAA)

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the question of how the consequences of the release of such substances and the damage to the surrounding area can be determined. Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis encompasses certain techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, etc. A host of probable or potential accidents of the major units in the airport premises arising due to use, storage and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed.

Damage Criteria

The fuel storage may lead to fire and explosion hazards. The damage criteria due to an accidental release of any hydrocarbon arise from fire and explosion. Contamination of soil or water is not expected as these fuels will vaporize slowly and would not leave any residue. The vapours of these fuels are not toxic and hence no effects of toxicity are expected.

Fire Damage

A flammable liquid in a pool will burn with a large turbulent diffusion flame. This releases heat based on the heat of combustion and the burning rate of the liquid. A part of the heat is radiated while the rest is convected away by rising hot air and combustion products. The radiation can heat the contents of a nearby

storage or unit to above its ignition temperature and thus result in a spread of fire. The radiation can also cause severe burns or fatalities of workers or fire fighters located within a certain distance. Hence, it will be important to know before handling the damage potential of a flammable liquid pool likely to be created due to leakage or catastrophic failure of a storage tank. Table provides the damage effect on equipment and people due to thermal radiation intensity.

Table: Damage due to Incident Radiation Intensities

Sl. No.	Incident Radiation (kW/m^2)	Type of Damage Intensity	
		Damage to equipment	Damage to people
1	37.5	Damage to process equipment	100% lethality in 1 minute 1% lethality in 1 second.
2	25.0	Minimum energy required to ignite wood at indefinitely long exposure without a flame	50% Lethality in 1 minute Significant injury in 10 second
3	19.0	Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment	-
4	12.5	Minimum energy to ignite with a flame; melts plastic tubing	1% lethality in 1 min.
5	4.5	-	Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)
6	1.6	-	Causes no discomfort on long Exposures

Source: Techniques for Assessing Industrial Hazards by World Bank.

Emergency Resources and Equipment's

- High mast lighting on generator trailers is essential for protracted night operations. A source for fuel for the generators should be identified.
- A trailer equipped with sufficient backboards and stretchers to accommodate 250+ causalities.
- Sufficient body bags and causality identification tags.
- A trailer mounted medical disaster kit containing long shelf life items such as bandages, compresses, splints, trauma kits etc.
- Tents and tarpaulins for use during inclement weather.
- A trailer / container with stakes, heavy hammer, colored tape and poles to mark are at an accident site and to identify triage sites and evacuation routes. These stakes can also be used to mark locations where bodies, voice and flight recorders, and aircraft parts are found.
- Heavy cranes to lift debris during rescue activities
- Buses and other vehicles to transport ambulatory passengers.
- Vehicles to transport dead to temporary morgue.
- Tow bars and wing / fuselage jacks for all aircraft types using airport.
- Pneumatic lifting bags and compressors.
- Heavy cranes and forklifts.
- Aircraft loading equipment and tow tractors

EMERGENCY PLANNING

Emergency planning is essential for overall loss control programme for effective management of an accident / incident to minimize losses to people and property both in and outside the airfield.

Natural disasters such as floods, storms and earthquakes and manmade disasters like aircraft accidents, fires, terror attack and hijacking do occur at airports; therefore, it is required to have an emergency preparedness and Disaster Management Plan.

Emergency Handling Procedure

Airport Controller is the Coordinator to deal with such situations and will issue instructions to various agencies suitably depending upon the gravity. Airports are among the essential utility services listed in the National Disasters Mitigation Plan. The role of airports in such exigencies prepared on the guidelines issued by National Disaster Mitigation Plan Committee recommendations and shall form part of airport emergency procedure.

The responsibility for dealing with aircraft accidents and other emergencies on and in the vicinity of the airport is primarily that of Air Traffic Services and Airport Fire Services. However, to deal effectively with serious situations involving saving of human lives and valuable property, it is imperative that all organizations and agencies involved to establish for providing rescue, fire fighting, and medical aid or salvage services be mobilized as quickly as possible to render assistance with minimum delay.

Types of Emergency

Different types of emergencies, which can be anticipated, are:

Emergencies involving aircraft

- Accident – aircraft on airport.
- Accident – aircraft off airport.
- Incident – aircraft in flight.
- Incident – aircraft on ground.
- Sabotage including bomb threat.
- Unlawful seizure.

Emergencies not involving aircraft

- Fire in Terminal or other buildings.
- Leakage of flammable materials
- Sabotage, including bomb threat (for terminal).
- Natural disaster
- Special service calls.
- Medical Emergencies

The aircraft emergencies are classified as under:

- Visibility/weather standby
- Local standby.
- Ground Incident
- Full Emergency.

- Aircraft accident on or in the vicinity of the airport.
- Aircraft accident off the airport
- Emergency due medical reasons
- Sabotage including bomb threat.
- Unlawful interference

VISIBILITY/ WEATHER STAND BY

Visibility standby will be instituted in poor weather conditions, when the visibility is 2500 meters or below and/ or cloud at height 1500 ft. or when more than 4/8 cloud amount is present. Weather standby will be instituted when it is absolutely necessary for the aircraft to land at the airport under poor weather conditions such as heavy rain, gusty wind, storm etc. Visibility/weather standby will be declared by ATC Control Tower and following actions will be taken up:

- In case of poor weather conditions, details of weather and runway-in-use will be provided earliest and also inform the regarding expected air traffic.
- Mounting of Fire crew on their respective vehicles and to proceed to the predetermined positions. Also to brief all the fire crew to maintain listening watch on R/T in their vehicles for instructions and guidance.
- He will take the standby situation seriously; maintain full state of alertness and preparedness so that in case the situation so demands it could be converted into full emergency/accident situation (Under such situation, the stipulated procedure will then be followed).

AIRCRAFT CRASH (INSIDE THE AIRPORT)

The Aircraft fire incidence emergency procedure shall be implemented immediately upon the aircraft accident on or in the vicinity[1] of airport.

Action by ATC Control Tower:

- Immediately press the siren, which will have a continuous steady tone for at least two minutes and also alert the fire station by pressing Immediately ensure full-scale turnout to the scene of the accident without delay.
- Maintain continuous communication on walkie-talkie with ATC for obtaining clearance for reaching the incident- site and keep ATC informed of all pertinent information from time to time.
- Arrange to extricate persons from the aircraft and arrange immediate first aid and medical attention and to press fire crew for fire-fighting using fire tenders etc to extinguish fire.
- While rescuing the injured cabin crew/trapped person (due to fire) in building or at the fire incidence place followed by their identification and location in and around aircraft must be carefully observed and recorded.
- Location of passengers/trapped personnel whether alive or dead should be recorded immediately during rescue/removal operations. (removal of injured persons for treatment must not be delayed for want of formalities the crash bell.
- Immediately inform the fire station with the following information like call sign, type of aircraft and about fire incidence (In case of fire), operator of aircraft etc.

[1] Vicinity means area up to 5km in the approach path and in other areas, 2km around the airport boundary.

Action by Shift in Charge (Airport Fire Station):

With regard to the recordings as stated above.

Action by Airport Controller:

- A Command Post will be established at the scene of the aircraft crash / emergency related to fire. A vehicle has been designed and named as COMMAND POST has the various facilities such as loud hailer, emergency lights, radio network, mobile phone, tents and medical equipment etc.
- In co-ordination with the affected airlines, establish: (1) Survivor Reception Centre (SRC) in the arrival hall of Terminal; and (2) Friends / Relatives Reception Centre (FRRC) at the Terminal building.

Action by Duty Terminal Manager / Manager (Aero):

- He will coordinate with all agencies for speedy recovery of passengers and ensure the Rescue and Fire Fighting vehicles get unobstructed access to the aircraft/ Fire Incidence site.
- Coordinate and assist the Airport Controller and ATC for further action.
- Set up SRC and FRRC in the terminal for providing information and assistance to relatives and friends of fire/accident victims.
- Shall work in close liaison with the operator whose aircraft is involved in the accident.
- Obtain a copy of the passenger manifest from the airline concerned to answer the queries from relatives of the passengers on board the ill-fated aircraft.
- Obtain information on the bodies / remains of the crash/fire victims.
- Facilitate the handing over of bodies / remains of victims in close coordination with Airport Controller, Airline, APSU, Police and Hospital authorities.
- Keep the Airport Controller informed about the development of situation from time to time.

Action by the District Medical Officers and Doctors:

All doctors and medical officers will initially report at the Airport Controller's Office and from there, they will be dispatched to accident site or Emergency Medical Centre in coordination with the Command Post. The doctors on arrival will ensure the following:

- Supplement the medical aid requirement at the accident site, if directed by Command post.
- Organize reception of casualties at the EMC.
- Maintain record of the casualties attended to, the type of treatment given, and medicines administered to each of the casualty
- Reviewing of categorization of the casualties in a manner defined by colour coded system

AIRCRAFT CRASH-OFF THE AIRPORT (WITHIN THE VICINITY OF AIRPORT)

Area up to 5km in the approach path and other areas, 2km around the airport boundary is defined as the vicinity of the airport.

Action by ATC Control Tower: Inform to the concerned authorities about the incident.

Role of Airport Fire Services during aircraft crash off-the airport: In case of aircraft accident off-the airport, but in the vicinity of the airport, airport fire services are required to play a role in fire fighting and rescue operation and following actions will be taken by the airport fire fighting and rescue services:

- One AFFRV (Rescue Tender) and one Ambulance will proceed to the accident site, if the aircraft is of length less than 39 mtrs and fuselage width 25 mtrs.
- One AFFRV (Rescue Tender) and one ambulance will proceed to site if the aircraft is larger than the above. Shift In charge / Sr. Supdt.(FS) will lead the turn out.
- Spare CFT should be manned by deploying off duty crew, where available, to maintain the category of airport.
- When the category of the airport is lowered than the declared category, this information should immediately be passed on to ATC (first through telephone followed by written).
- Airlines, Airport Controller and Airport Police Station will take other actions.

AIRCRAFT CRASH-OFF THE AIRPORT (BEYOND THE VICINITY OF AIRPORT)

In case the aircraft accident occurs, beyond the vicinity of the airport, normally NO CFT from Airport Fire Service should be sent to the crash site.

- Action by ATC Control Tower: Inform the authorities as Mumbai FIC/Chennai FIC, airport fire & rescue service, city fire service, airport police station, concerned airlines, airport controller and RCAS/DAW
- Action by Airlines: Establish a Public Relation Cell in coordination with Airport Controller AAI and Provide Copy of Passenger Manifest to Control Room
- Action by Airport Controller: Information will be provided to the Regional Executive Director and other concerned authorities and Govt. Officials like SPCB, Inspectorate of Factories, DM, District Medical Officers etc.
- Action by Airport Police Station: Information will be provided to the Police officials of concerned city and District and depute staff at the airport for crowd control.

SABOTAGE INCLUDING BOMB THREAT

- It is important that an aircraft, which is suspected of having an explosive device or dangerous substance on board, be isolated from normal aircraft operations. To achieve this, airport should designate an isolated parking to which such aircraft may be moved.
- The site selected should be, if possible, a minimum of 400 m from any other aircraft parking position, taxiway, runway, building, public area, and fuel tank farm or storage area for explosive or incendiary material. The isolated parking position may also be used to handle unlawfully seized aircraft which require servicing or special attention; therefore, consideration should be given to its location so it cannot be easily observed from public areas off airport property.
- Care should be taken to ensure that there are no services such as gas pipelines, refueling hydrant pipes, other fuel lines or electric power cables beneath the aircraft parking area surface. If possible, a second isolated parking spot may be designated in case the primary isolated parking position is unavailable or in case of multiple crises.
- Airport emergency procedures should designate one or more points to which affected aircraft might be directed. However, plans must be flexible enough not to rely on such an aircraft being able to park at a designated point and must allow for the aircraft to change its position.

The following should be taken into account in selecting designated points:-

- The availability of covered approaches to facilitate action by the security forces; for example, adjacent buildings, natural features such as undulations in the terrain and the presence of trees.
- The need for ASG to have quick and easy access to the scene to deal with the situation.
- The possible danger to other aircraft or people in the vicinity, and hazards such as fuel tanks.
- The need for isolation from the press and public.
- The continuance, as far as possible, of normal air traffic in and out of the airport during the incident.

Explosive Disposal /Cooling Off area

- It is recommended that each airport should set a site for an isolated explosive disposal area, where explosive expert may disable the suspected article/item and also cooling off of suspected baggage is carried out.
- Ideally, bunker of the size of 15m x 5m may be constructed 400m away from the services e.g. gas pipe line, refusing hydrant, tube pipes, fuel lines or electronic power cables beneath the surface etc. The bunker should be located rectangular in shape. The exit corridor should be located at the extremity of the rectangle at right angle to the length. The walls of the bunker should be at least 3m in height made of earth piled or timber lining, sunk 3m into the ground.
- The ceiling should consist of timber lining, which is not secured to the walls. The design will permit the upward escape of the shock wave and debris in the event of an explosion. The shelter shall be covered by earth to a minimum thickness of 1 mtrs.
- The shelter exit should be protected by an earth bank 1.8 mtrs height on which a secured anti-blast shield which will collect debris and deflect it downward back into the bunker area. The design is capable of withstanding an explosion of 5 kgs charge of plastic explosive and access should be designed in such a way that a ROV can easily enter inside the Explosive Disposal Area. Adequate fire proof lighting arrangements should be done inside the Explosive Disposal Area.
- Details of Security and Explosive Detection Equipment.

The details of various security and explosive detection equipment installed by the Airport Operator/ASG along with their condition. The details of equipment are given below:

- **Search Equipment's:** (i)Hand held metal detector; (ii) Telescope Metal Detector; (iii) Electronic Stethoscope; (iv) Fibre Optics surveillance device; (v) Search kit magnified (SKM); (vi) Non-Linear junction detector; (vii) Search light with charger; (viii) Telescopic search mirror; (ix) Under vehicle viewing mirror and (x) Non-metallic prodder
- **Detection Equipment's:** (i) Explosive vapor detector; (ii) Real time viewing System; (iii) Letter bomb detector; (iv) Remote operated vehicle with shoot gun disrupter camera night vision and manipulator; (v) Explosive detection and identification spray kit and (vi) Binoculars
- **Protection Equipment's:** (i) Bomb Suit; (ii) GSM jammer; (iii) Frequency jammer; (iv) Suspect luggage contaminant vessel and (v) Blast inhibitor
- **Transportation Equipment's:** (i)Telescopic Manipulator and (ii) Threat Contaminated Vessel (with self driving mechanism)
- Disposal Equipment: (i) Recoilless Disruptor (Range 30m); (ii) Render safe procedure tool kit; (iii) Car remote opening tool set; (iv) Hook and line set; (v) Thermal cutter and (vi) Remote wire cutter

AIRCRAFT HIJACK SITUATION & OTHER ACTS OF UNLAWFUL INTERFERENCES

Contingency plan is prepared for handling aircraft hijack situation and other acts of unlawful interference at Airport and to specify the different scenarios possible in a hijack situation as also the available options and the modalities for handling these scenarios. The plan is to specify the actions to be taken at station level immediately on receipt of intimation about the hijack without waiting for any higher-level officers or decisions Airport. The Contingency Plan has been formulated keeping the following principles in view:

- A clearly defined policy and decision-making system with Cabinet Committee on Security (CCS) at the apex.
- Clear definition of roles of different Government agencies with their own sub-plans for effectively discharging their role / responsibilities.
- An institutionalized system for instantaneous hands on response at the airport level suitably supported with requisite arms, equipment, forces and training.
- A well designed system for flow of information and communication both internally for decision-making and externally for the media and friends / relatives of the affected passengers / functionaries.
- In case of an aircraft hijacked for being used as a missile, the situation should be handled directly by IAF.

Doctrine: Basic Doctrines in which a directive for hijacking may be established are:

- An attempt to hijack an aircraft will be considered to be a terrorist act against the country and shall provoke a response as against a terrorist.
- There shall be no negotiation on the demands of hijackers. Negotiation, if any, shall only be tactical.
- If an Indian registered aircraft is hijacked, personnel at all airports shall, without seeking any order from a superior authority, see to immobilize the aircraft at that airport itself.
- In case an aircraft is hijacked and is airborne, the IAF fighter planes shall escort it within Indian airspace at all times.
- Once it is determined that a hijacked aircraft is to be used as a missile to hit strategic targets or thickly populated buildings / areas, due to chances of collateral damage, the decision to term aircraft as "threat" is to be taken on case to case basis. Also, such buildings / areas need to be identified and earmarked so that the list of such vital targets should be available with radar units and at decision making centres, and action taken by the IAF as per Coordination Procedures and SOP.
- Penalty for hijacking shall be death penalty.

Following shall be the policy of Government of India in dealing with acts of unlawful seizure of aircraft:

- All efforts should be made to get any hijacked Indian registered aircraft to land at an Indian Airport preferably one of those already identified for the purpose. Once such an aircraft lands at an Indian airport it shall be immediately immobilized and shall not be allowed to go out of India.
- With regard to foreign registered aircraft, while it may be normally advisable for diplomatic reasons to expedite the hijacked aircraft's exit from the Indian Territory and airspace. Permission may be granted to such an aircraft when unavoidably necessitated by the circumstance as required under the Convention on International Civil Aviation. In case of such landings, further action would be taken in full consultation with the concerned state.
- The hijackers would be engaged in negotiations for bringing an ending to the incident without loss of life or capitulation to the hijacker's demands, for obtaining relief for passengers and crew of the

affected aircraft and even for practical reasons for getting time to prepare for use of force. The demands of the hijackers shall, however, not be conceded, especially if they have an adverse impact on the national security.

- In case of unlawful seizure of an aircraft, if evidence of any violence is reported or there is serious apprehension of imminent violence on part of those effecting the seizure, adequate measures shall be taken to terminate the seizure, including use of force.

RESPONSE ACTION AT THE AIRPORT

Advance Preparations

At Aerodrome, the following actions are to be taken in advance by the concerned agencies/ officials so as to be fully prepared to deal with the hijack situation without loss of time.

- Contingency plan for specific Aerodrome to deal with unlawful interference with civil aviation is prepared and maintained by the Airport Director, after getting approval from Commissioner of Security (CA), BCAS. Units which are to handle Unlawful Interference and all Aerodrome Committee members will be supplied with a copy of the Contingency Plan for acquainting themselves with the procedure.
- An Aerodrome Committee is established at Aerodrome. On occurrence of emergency, the aerodrome committee shall assemble in the Control room without loss of time and not later than half an hour.
- The Control Room of the Aerodrome Committee will be equipped with the following communication facilities. All channels have recording facility with time.
  - VHF frequency 122.2 MHz (ATC)
  - STD telephone (parallel connection with control tower).
  - Intercom with zero dialling facility.
  - VHF walkie-talkie sets will be provided by OIC (ACS) on request.
  - Hot line with local police control room and 4 independent telephone lines are yet to be provided.
  - ACS-in-charge/Manager (Aero) will ensure that all communication system / equipments in the Aerodrome Committee Control Room are properly maintained. Assistance of BSNL can be obtained for this.
- The Airport Director ensures the following advance preparations to deal with hijack situation properly and successfully:
- Isolated Parking Bay for the hijacked aircraft: Located on the taxiway B. Aircraft will be parked facing Tower.
- A tactical operation room for NSG Task Force with BSNL STD telephone for the NSG Commandos.
- A room of the technical block will be kept ready for task force to be used as tactical operation room. An intercom with zero dialling facility will be provided. An STD telephone will be provided by ACS-in-charge as and when required (parallel extension to COM centre STD phone)
- A barrack/ tent accommodation with toilet facilities for the command task force. The CFT parking shed adjacent to Fire station can be used for this purpose.
- Airport Director will provide required number of transport to the Command Task Force for operational purposes.
- Maintain panel of doctors from local hospitals, maintain lists of hospitals, psychologist/psychiatrist, local negotiators, linguists etc.
- A Grid map of the Airport is displayed in the Aerodrome Committee Control Room.

Following immediate actions shall be taken to deal with the hijack of aircraft:

- Once a hijacked Indian registered aircraft lands at Airport, it shall be taxied to the isolation bay (taxiway B) and shall be immediately immobilized. Aircraft to park facing tower.
- All possible strategies / method shall be used for immediately immobilizing the aircraft which could include:-
  - Positioning of obstacles on runway like vehicle/fire tenders.
  - Putting off the lights of the runway/taxi track (at night).
  - No foreign registered aircraft shall be allowed to land in India unless necessitated by the circumstances as required under the Convention on International Civil Aviation. In case of such landings further action would be taken in full consultation with the concerned State.
  - Quick Reaction Team (QRT), of Police would take action as per SOPs specified for such situations.
  - Forward Command post with staff of airlines and others shall be established at the location (behind the hijacked aircraft) fixed for establishment of NSG command posts.
  - Fire tenders shall take position as per prescribed drill. Efforts will be made to direct the hijacked aircraft to be taken to predetermined isolated parking area.
  - Initial contact shall be established with the hijackers at the earliest, by the Chairman of the AC through the ATC. Negotiations may also commence with the help of senior most local police officer and local negotiators as per requirement and shall continue till the same is taken over by the central team of negotiators.
  - Quick Reaction Team (QRT), at the airport, would take action as per SOPs specified for such situations.
  - Proper communication system between Aircraft and ATC; ATC and Aerodrome Committee; Aerodrome Committee and Central Committee (with the help of BSNL) shall be established by the ATS (Aeronautical Communication Service) Units and Airport Director.

Termination of the Hijack Situation

Termination of the hijack can be through negotiation or through armed intervention. In the first instance, the hijackers would be engaged in negotiations for bringing and ending to the incident without loss of life or capitulation to the hijacker's demands, for obtaining relief for passengers and crew of the affected aircraft and even for practical reasons for getting time to prepare for use of force. The demands of the hijackers shall however, not be conceded, especially if they have an adverse impact on the national security.

Objectives of Negotiation

- Comfort and safety of passengers and crew while they are still in the aircraft and their release unharmed.
- Release of Aircraft.
- Surrender of hijackers.

Process of Negotiation

- The process of negotiation by local negotiators shall start as soon as possible under the direction of the Aerodrome Committee.

- A team of trained negotiators (the composition of which shall be notified by Commissioner of Security Civil Aviation from time to time) with a complement of psychologist / psychiatrists shall be sent to the Indian airport where the hijacked aircraft lands.
- This effort should be to ascertain the demands of the hijackers, their mood, affiliations etc. and in any case, the local negotiators should continue dialogue till the arrival of the Central Team.
- Central team of negotiators shall be properly briefed about the policy of Government with regard to the demands of the hijackers. It is essential to ensure as much delay as possible so as to provide time for officials to evaluate the situation and plan the best possible counter action, to create uncertainty and stress for the hijackers to reduce their concentration and enhance their concentration and enhance the possibility of making mistakes, and taking them into surrender.

Armed Intervention

- In case negotiations fail and the CCS decides to terminate the hijack through armed intervention, the responsibility for planning the strategy and taking action with the use of force shall be of the Commander of the designated armed force (NSG etc.) till the action is over.
- The decision of the CCS for armed intervention to terminate the hijack should be conveyed to the Commander of the designated force as well as to their Operations Room through the Central Committee.