ANG Safety

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Risk associated with transportation of Lithium ion batteries

On 10th February 2007 an Airbus A320 operated by JetBlue Airways, was on a scheduled passenger flight from JFK International Airport to Nassau Airport when Cabin Crews reported to flight deck there were signs of smoke from an incipient overhead bin fire. The Cabin Crew discharged a fire extinguisher into the locker and at the source of the smoke. The Flight Crew declared an emergency and made an air return to JFK International Airport.

NTSB Investigation into the event found that the smoke had originated from a bag containing a case of two 14 volts and one 9 volt rechargeable lithium ion battery packs. The 9 volt battery had sustained damage consistent with a catastrophic internal failure. Further investigation revealed a short circuit is the most common cause of the battery fires and is often initiated when the batteries come into contact with another battery.

The Investigation determined that “The in-flight fire which was caused by the catastrophic failure of a 9-volt battery from an unknown cause.”

The event of 10th February 2007 involving Airbus A320 and other similar events should remind us that emerging technologies such as the proliferation of lithium have the potential to introduce new challenges to aviation safety record.

Lithium batteries have become the common battery of choice to power many portable electronic devices (PEDs) such as laptops, tablets, mobile phones, etc. mainly due to their ability to power such devices for hours or even days, than previously commonly used batteries. These batteries are taken for granted by consumers, even though Lithium batteries are defined as dangerous goods by the United Nations, which specifies the very stringent manufacturing and testing requirements the batteries must meet.

It is estimated every year one billion lithium batteries are transported by air as mail, cargo or in passenger/ crew baggage. This constitutes a safety hazard that must be managed in a clear and comprehensive manner, because lithium batteries present a risk of both igniting and fuelling fires in aircraft cargo/baggage compartments.

Specific requirements to ensure Lithium batteries can be carried safely by air in both cargo and baggage are determined by the International Civil Aviation Organization (ICAO). These are then reflected in IATA’s *Dangerous Goods Regulations* and *Lithium Batteries Risk Mitigation Guidance for Operators.*

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NAC Directive —High Visibility Clothing/Vest

Policy: National Airports Corporation has a mandatory requirement for the Wearing of High Visibility garments in all areas, in hazardous working situations on landside areas including roadways, terminals and other buildings.

Definition: High Visibility garments are items of clothing manufactured to meet the recognise traffic control purpose – High visibility materials.

Applicability: This policy applies equally to all individuals who are working airside including, pilots, engineering personnel, airline staff, contractors, ground handling agents and other persons being escorted on airside. This policy also covers personnel in hazardous working situations on landside areas such as on and beside roadways.

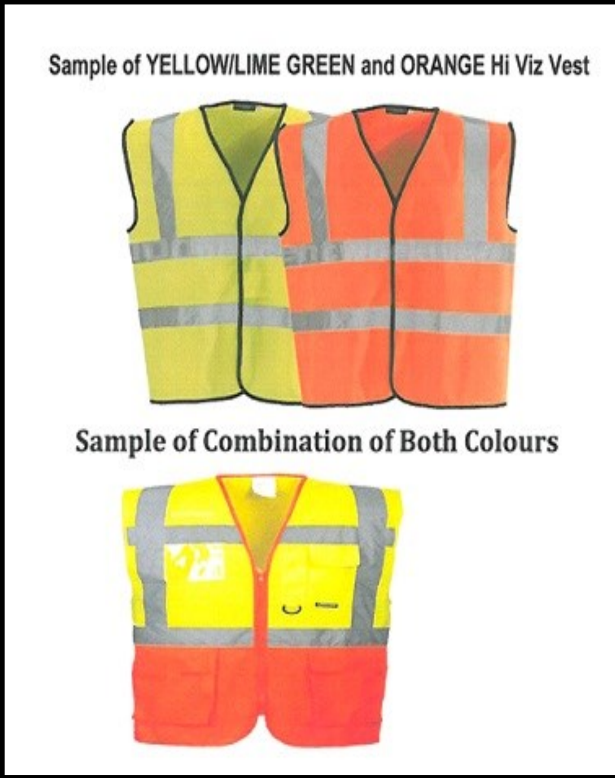
The following exemptions apply: Passengers moving between the aircraft and the terminal, (Who are being Supervised and marshalled by an airline representative or handling agent)

Procedure/Guidelines: High visibility clothing shall be compliant and limited to ONLY two acceptable colours, **YELLOW/LIME GREEN** and **ORANGE or a combination of the two as** compliant garments for all operational movements within the aviation specific activities inclusive of all airside areas with all aerodrome areas. All NAC staff shall be compliant to ONLY YELOW/LIME GREEN Hi VIZ vest and clothing whilst on airside.

***Garment Requirements*:** The garment ideally should also be designed to accommodate an Aviation Security Identification Card (ASIC)/ Airside Driving & Valid PNG license/Employee ID card and have means of securing the garment i.e. buttons, Velcro, zip front or pull over the head styles.

The pocket must be made clear material so that the ASIC card is clearly visible when been worn.

All persons working airside are required to wear high visibility garments so that they are fastened in a way that the full surface of the garment is visible.



Garments must also be maintained to limit fading and damage. Damaged garments and those that have had the reflectiveness compromised must be replaced. Where High Visibility clothing is supplemented with a warmer piece of clothing (e.g. non-High Visibility jumper or vest), High Visibility clothing must be layered over the top to ensure high visibility compliance.

For personnel involved in aircraft /vehicle refuelling operations, the material should encompass a minimum of 50% natural fibre or some other anti-static reducing properties to reduce the risk of ignition sources in the presence of fuel vapours.

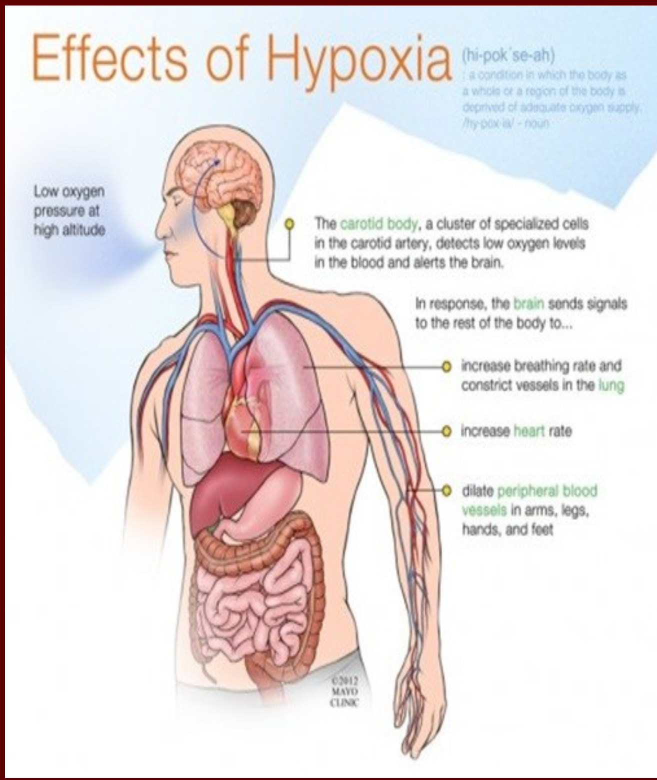
This Policy is effective Monday, 27th July 2015
Chief Executive Officer/Acting Managing Director

Date: Custodian: Airside Operations Compliance Manager

Hypoxia in Aviation

By Rocky 'Apollo' Jedick In Aerospace Medicine, Blog, Civilian Aviation Medicine, Flight Medicine, ...On April 28, 2013

Before becoming a flight doc, I often felt sceptical as the flight attendant showcased what appeared to be a yellow Dixie cup connected to an empty IV bag prior to take off on commercial airliners. This darting glance wavered as my attention faded. Then, it was back to a few precious final minutes with the smartphone before all electronic items must be turned off prior to take off. After my first experience in the altitude chamber at 25,000 feet without supplemental O2 though, I quickly gained an appreciation for emergency oxygen while flying.



Physiology of Hypoxia

Hypoxia is the inadequate amount or inability to use sufficient oxygen to meet the body's metabolic needs. Although there are several categories of hypoxia, the main threat to aviators is hypobaric hypoxia. This form of hypoxia is experienced by one attempting to breathe in an oxygen-scarce environment. As you ascend through the Earth's atmosphere, ambient pressure decreases non-linearly, and with it the partial pressure of oxygen. At 8,000 feet the atmospheric pressure drops to 75% of pressure at sea level and at 18,000 feet it cuts to nearly 50%!

An altitude of 10,000 feet (3,048 meters) is generally the lowest elevation causing symptoms of hypoxia in a typical person. A fighter pilot flying at this altitude who was to suddenly experience a failure in cabin pressure would respond to the same oxygen levels in a much more deleterious way. The time of useful consciousness (the length of time a pilot is physically able to take corrective action) for the average pilot instantly exposed to a 30,000 ft cabin pressure is 1-2 minutes. This is the reason why pilots and aircrew must train extensively to carry out EP's (emergency procedures) in the event of a loss of cabin pressure or hypoxic symptoms.

Altitude	Time of Useful Consciousness
45,000 feet MSL	9 to 15 seconds
40,000 feet MSL	15 to 20 seconds
35,000 feet MSL	30 to 60 seconds
30,000 feet MSL	1 to 2 minutes
28,000 feet MSL	2 1/2 to 3 minutes
25,000 feet MSL	3 to 5 minutes
22,000 feet MSL	5 to 10 minutes
20,000 feet MSL	30 minutes or more

Time of Usefulness Consciousness (TUS)

THE RAPID DECOMPRESSION

Although a rapid decompression should be feared by any serious aviator, aerospace engineers have incorporated protections into the design of aircraft and life support equipment in order to prevent this scenario. The first line of defense against hypoxia is cabin pressurization. This technology allows passengers of commercial airliners to experience an altitude equivalent to 8,000 feet although the actual cruising altitude may be nearer to 40,000 feet MSL. This technology dates back to 1931 when a balloon gondola was first pressurized allowing the pilot to reach an altitude > 50,000 feet.

Cabin size is directly related to the rate of pressure change in the event of decompression. A typical cabin of a commercial airliner is large, in the event of a compromise in cabin integrity passengers will have significantly more time to don emergency oxygen (the Dixie cup/IV bag alluded to above). For this reason, airline passengers have a longer time of useful consciousness.

SYMPTOMS OF HYPOXIA

One of the first and most common symptoms of hypoxia is loss of judgement. When the cabin pressure (and accompanying O2 partial pressure) diminishes gradually, the condition itself may develop without recognition by the aviator.

Household Dangerous Goods

Many common items used everyday in the bathroom, kitchen, or garage may seem harmless, but due to their physical and chemical properties, they can be very dangerous when transported by air. Check-in staff must seek confirmation from passengers about the contents of any item or package that they suspect may contain dangerous goods.

Below is a list of common household articles or substances that may contain dangerous goods. Dangerous goods associated with each are explained in the accompanying text. If there is a possibility that the items you are attempting to bring on-board may contain dangerous goods, you will be prevented from doing so by check-in staff.

Breathing apparatus - This gear may include cylinders of compressed air or oxygen, chemical oxygen generators or refrigerated liquefied oxygen.

Camping Equipment - This gear may contain flammable gases (butane, propane, etc.), flammable liquids (kerosene, gasoline, etc.), or flammable solids (hexamine, matches, etc.).

Chemicals - These may contain items meeting any of the criteria for dangerous goods, particularly flammable liquids, flammable solids, oxidizers, organic peroxides, toxic or corrosive substances.

Frozen fruit, vegetables, etc. - These may be packed in dry ice (solid carbon dioxide).

Household goods - These items may meet any of the criteria for dangerous goods. Examples include flammable liquids such as solvent-based paint, adhesives, polishes, aerosols, bleach, corrosive oven or drain cleaners, ammunition, matches, etc.

Refrigerators - These may contain liquefied gases or an ammonia solution.

Swimming pool chemicals - These may contain oxidizing or corrosive substances.

For more information on Household Dangerous Goods contact PX Dangerous Goods Trainer on **+675 7372 5101**

Mercury—Dangerous Goods Item

A passenger arriving on an international flight was detected by Customs officials during routine screening of checked baggage carrying 5ml of mercury. Mercury is a Class 8 dangerous goods and is highly corrosive to aluminium. Not the sort of substance which should be carried in passenger's baggage. Fortunately, none had escaped. The passenger was counselled.

A shipper from the Middle East sent some dental supplies to a colleague in Sydney. He used the postal system and the consignment was transported by air both internationally and domestically. The dental supplies included a glass container of about 100 mls of mercury. The glass container broke during transport and leaked into the hold of the aircraft. Fortunately it was discovered and cleaned up - very costly. Had it not been discovered, significant weaknesses in the skin of the aircraft could have occurred.

The previous two paragraphs are factual scenarios relating to some of the dangerous goods incidents involving passengers which have come to the attention of the CASA Australia over the past couple of years. Persons involved in a number of the incidents were prosecuted and received heavy monetary fines.

Mercury, along with many other common chemicals, is classified under "dangerous goods" in international regulations developed by the International Civil Aviation Organization, which is part of the UN. It is classified under Class 8 – Corrosives. Corrosive substance can dissolve organic tissue or severely corrode certain metals through chemical reaction.

Why Is Mercury Classified as Dangerous Goods by the Airlines and How Is Mercury Corrosive to Aluminium?

Planes are largely made from aluminium. A small amount of mercury can destroy a large amount of aluminium. Despite its apparently inert behaviour, aluminium is actually a rather reactive metal which will combine violently with oxygen in air. However, this reaction quickly produces a thin, tough oxide layer which stops further attack. The process of anodising the aluminium thickens this layer to give better protection.

Mercury has the ability to disrupt this protective oxide layer, and the results can be spectacular. It can dissolve aluminium to form an amalgam which may break up the oxide layer from below, presumably the initial attack occurs through tiny faults in the oxide. An aircraft in which mercury has been spilled must be put into quarantine until the amalgam makes its presence known. Ultimately, the aircraft is likely to be scrapped because the amalgam slowly spreads like wood rot to adjacent areas. Should mercury-containing articles need to be transported they must be consigned as air freight and packaged in-accordance with ICAO and IATA standards and recommended practices.

Operational and Human Factors Involved in an In-Flight Dangerous Goods Incident

When dangerous goods are discovered in the cabin, this may be an indication of:

- A lack of security screening on ground
- A lack of dangerous goods awareness training for passenger handling staff and security staff
- Not adhering to the Operator's policy regarding the transportation of dangerous goods in the cabin
- A lack of visible information provided to passengers regarding dangerous goods that may be carried onboard, e.g. at check-in desks, or on the tickets.

Prevention Strategies

Dangerous goods are regularly and routinely carried on passenger and all cargo aircraft and present little hazard in transport provided they are correctly identified, packaged and handled.

But, dangerous Goods can be potentially harmful to passengers and crew, release smoke in the cabin or develop into an on-board fire. Therefore, both the operator and the cabin crewmembers should take the following preventive actions:

- Display notices for passengers at check-in areas, ticket sales desks, etc.
- Ensure that the regulations regarding the transportation of dangerous goods are strictly adhered to by ground personnel, passengers, and the cabin and flight crews
- Provide detailed and precise procedures for dangerous goods handling and emergencies to all employees who may be in contact with dangerous goods.

Air Rage

Air rage is the general term for disruptive or violent behaviour perpetrated by passengers and crew of aircraft, typically during flight. Air rage has been defined as "aberrant, abnormal, or violent behaviour exhibited during the air travel process". *Wikipedia*

The Causes

There are numerous factors and triggers that can lead a typical member of the travelling public towards unruly behaviour. These include, but are not limited to:

- Intoxication
- Drug use (both prescription and non-prescription)
- Mental health issues
- Anxiety (including a fear of flying)
- Fatigue
- Frustration as a result of personal issues or from travel related dissatisfies such as:
    - Pre-boarding issues such as Long queues, The security and screening process, Departure delays (and the lack of timely information), and Missed connections
    - Post-boarding issues - Crowded conditions, Lack of personal space, Unserviceable equipment (seat won't recline, in-flight entertainment system inoperative etc.), and Annoying individuals in one's vicinity (loud or boisterous passengers, seat kickers, crying babies etc.)

Of all of the causal factors listed, intoxication is the single item that triggers the majority of unruly passenger events.

Prevention

Identification and mitigation measures for the prevention of, or the control of, an unruly passenger incident must occur at all stages of the journey, beginning when the passenger first enters the terminal at the point of origin. To do this, Company and airport employees must be vigilant when interacting with the travelling public. Some suggested strategies are as follows:

⇒ **Check In** - Check In staff should be encouraged to identify, *and to report*, any passenger whose behaviour would suggest that they might be unsuitable for carriage. As an example, if a person appears to be in an intoxicated state or is acting strangely, their condition and actions should be reported to the ground supervisor before they are processed for acceptance onto the flight. Where a potential problem is identified, an assessment should be made by the person(s) nominated by the operator (Airline Duty Manager, PIC, Cabin Service Manager, etc.) and a decision made to grant or to deny carriage.

⇒ **Security Screening** - Personnel at the security screening points can be trained to be part of the mitigation measures. For example, the Canadian Air Transport Security Authority (CATSA) developed a Zero Tolerance Unruly Passenger policy after noticing an increase in the number of unruly passenger incidents at screening checkpoints. CATSA considers that people who engage in unruly behaviour during screening could be a safety risk to passengers and crew during a flight. A number of airlines now use a CATSA report of unruly behaviour during security processing as the basis for denying carriage.

⇒ **Boarding Gate** - A passenger's state of intoxication, anxiety or agitation may not be recognized until his or her arrival at the boarding gate. A passenger who has checked in early or who has been subject to a departure delay may well have ample time to consume excessive amounts of alcohol after the assessments that took place at check in or during security screening. Frustration levels will often rise with mechanical or weather related flight delays.

⇒ **Prior to Departure** - The final chance to leave a potential problem on the ground occurs just before the aircraft doors are closed. Observation of the boarding passengers by the Cabin Crew is an important tool for identifying potentially problematic behaviour. Cabin Crew should note passengers who are extremely nervous, intoxicated, loud or belligerent or who otherwise appear suspicious. The first step in intervention would be for a member of the Cabin Crew to attempt

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speaking with the passenger. Often, this contact is all that is required to defuse the behaviour and to gain the passenger's cooperation. If it does not, then the situation should be handles appropriate to the level of unruly behaviour. Unless the situation can be resolved to the satisfaction of the crew, if a passenger displays disruptive behaviour whilst the aircraft is still on the ground, they, and their baggage, should be removed from the aircraft.

⇒ **In Flight** - Once the aircraft is in flight, the Flight Crew is no longer able to leave the flight deck to assess or assist in the resolution of a passenger problem. Responsibility for determining the threat level of a specific situation and dealing with it appropriately now lies in the hands of the Cabin Crew. Cabin Crew training, in regard to unruly passengers, has become significantly more comprehensive in areas such as regulations, early detection, intervention and restraint. In all cases, it is critical that the senior Cabin Crew member and the PIC be kept informed of any developing situation.

Intervention

Intervention strategies vary with the Level of Threat and are initially intended to defuse the situation and prevent an escalation in the threat level. To be effective, all personnel involved in the prevention chain described above should be trained in areas such as:

- Communication skills/customer service skills.
- Conflict management skills/ verbal social skills.
- Team skills.
- Dealing with persons under the influence of drugs/alcohol/suffering from mental health issues.

If the problem is detected on the ground and cannot be resolved to the full satisfaction of the Operator nominated responsible person(s), carriage should be denied or, if the threat level warrants, intervention by security or police personnel should occur.

In addition to the aforementioned areas of training, Cabin Crew should also be instructed in the following:

- How to limit service (e.g. when/how to stop serving alcohol).
- Physical breakaway and controlling skills.
- Restraint device training.
- Restrained passenger welfare.

At threat level 1 or 2, Cabin Crew should make unruly or disruptive passengers aware of the consequences of their actions and the type of measures that could be taken if their behavior does not change. This information can be conveyed verbally. or by means of a pre-printed warning card, and should include notification that the passenger will not be served further alcohol. The message conveyed should call for the person to desist or suffer the consequences of being refused return carriage or of having the incident reported to the authorities and face the possibility of arrest and prosecution leading to a possible fine or imprisonment.

Crew members should continue to attempt to defuse a critical situation until it becomes clear that there is no way to resolve it verbally. Utilisation of restraining devices should only be considered when all conciliatory approaches have been exhausted. Once restraints have been used, they should remain on the passenger for the duration of the flight.

Operators provide specific guidance, beyond the scope of this article, to their crew to assist them in making the decision to physically intervene in more serious situations. In these cases, it is common for the Cabin Crew to enlist the support of travelling law enforcement personnel, or other able bodied passengers, to assist in restraining an unruly passenger. If restraint is used, other security protocols such as flight deck lockdown, diversion and law enforcement involvement, once on the ground, are also likely to occur.

In all cases, the incident should be fully documented and witness statements taken.Drug and alcohol use by aviation professionals can have a detrimental impact on aviation safety. Important cognitive and psychomotor functions necessary for safe operation of an aircraft can be significantly impaired by drugs and alcohol.

Many organizations have automatic mandatory drug and alcohol testing after events involving maintenance activities or Flight Operations.

Air Niugini has a zero-tolerance policy in relation to employees and contractors reporting for duty or carrying out their duties under

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the influence of alcohol and other drugs. The permitted level of Blood Alcohol Content (BAC) is 0.019%. Any employee or contractor in a critical operational function who returns a BAC reading of 0.020% or higher when checked/tested is in breach of this policy.

Alcohol, taken even in small amounts; impaired brain and body functioning, induced acidosis (excessive production of lactic acid), induced Ketoacidosis (when your body burns fat instead of sugar because not enough insulin is being produced to convert the glucose into energy), induced sleep deprivation, produces a dulling of judgement, comprehension and attention, lessened sense of responsibility, a slowing of reflexes and reduced coordination, decreases in eye efficiency, increased frequency of errors, decrease of memory and reasoning ability, and fatigue.

Alcohol is absorbed very rapidly into the blood and tissues of the body. Its effects on the physiology are apparent quite soon after ingestion and wear off very slowly. In fact, it takes about 3 hours for the effects of 1 ounce of alcohol to wear off. Nothing can speed up this process. Neither coffee nor hard exercises nor sleep will minimize the effects of alcohol.

The presence of alcohol in the blood interferes with the normal use of oxygen by the tissues (**histotoxic hypoxia**). Because of reduced pressure at high altitudes and the reduced ability of the hemoglobin to absorb oxygen, the effect of alcohol in the blood, during flight at high altitudes, is much more pronounced than at sea level. The effects of one drink are magnified 2 to 3 times over the effects the same drink would have at sea level.

A person's judgement is impaired under the influence of alcohol. His/her reactions during ascent to higher altitudes are unpredictable. He/she may become belligerent and unmanageable and a serious hazard to the safety of the flight.

The rule for both pilot and passengers in relation to alcohol quite simply should be **"No alcohol in the system when you fly"**. Air Regulations require that a pilot allow at least 12 hours between the consumption of alcohol and piloting an airplane. In fact, more time is probably necessary. An excellent rule is to allow 24 hours between the last drink and take-off time.

An evaluation of the Australian Transport Safety Bureau's accident and incident database was conducted for all occurrences in which drugs or alcohol were recorded between 1 January 1975 and 31 March 2006. There were 36 drug and alcohol-related events (31 accidents and five incidents). The majority of these occurrences were related to alcohol (22 occurrences).

Given this broad analysis on the effects of alcohol on the human body it should not be too hard to see why alcohol should be avoided for aviation professionals. Alcohol can have many negative effects on the human body, and these when combined with a flight-deck / maintenance scenario have the potential to cause great harm.

As aviation safety professionals, we must demonstrate our high standards and the ethical qualities expected in the performance of our duties. It is our duty to educate ourselves on the effects of alcohol.

As individual, we should also be aware of the long term health risks associated with excessive use of various stimulates. Our customers and families expect the best from us.

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