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INTERNATIONAL CIVIL AVIATION ORGANIZATION

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TENTH MEETING OF ASIA PACIFIC PERFORMANCE BASED NAVIGATION IMPLEMENTATION COORDINATION GROUP (APAC PBNICG/10)

19-21 April 2023, Bangkok

PBN Training for ATC - Final Approach

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PBN Training for ATC - Final Approach

Back Ground

- Baro-VNAV approaches provide significant safety benefits over conventional LOC, NDB and VOR approaches as they provide vertical guidance.
- Baro-VNAV approaches are however significantly less robust than geometric PBN approaches enabled by SBAS, and GBAS as they depend on temperature & QNH setting.
- The main vulnerability of baro-VNAV approaches lies in their dependence on correct altimeter setting, which involves multiple human interventions such as,
    - determination of the local QNH by the meteorological service provider,
    - publication of the local QNH in ATIS,
    - transmission of the local QNH by ATC to the flight crew,
    - altimeter setting by the flight crew, and
    - correction for the effects of temperature on the atmospheric pressure at aircraft altitude.
- Several reports of unsafe situation in the final approaches due to incorrect QNH setting have come to light over the years in various parts of the world.

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ICAO PBN Manual(Doc 9613 – 5th Edition)

5.2.7 Controller training

Air traffic controllers, who provide control services at airports where RNP APCH operations down to LNAV or LNAV/VNAV minima have been implemented, should have completed training that covers the items listed below:

5.2.7.1 Core training

a) How area navigation systems work (in the context of this navigation specification):

1) include functional capabilities and limitations of this navigation specification;

2) accuracy, integrity, availability and continuity including on-board performance monitoring and alerting

3) GNSS receiver, RAIM, fault detection inclusion (FDE), and integrity alerts; and

4) waypoint fly-by versus fly-over concept (and different turn performances);

b) flight plan requirements;

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5.2.7.1 Core training

c) ATC procedures;

1) ATC contingency procedures;

2) separation minima;

3) mixed equipage environment;

4) transition between different operating environments; and

5) phraseology.

5.2.7.2 Training specific to this navigation specification:

a) Related control procedures:

1) vectoring techniques (where appropriate);

b) RNP approach and related procedures:

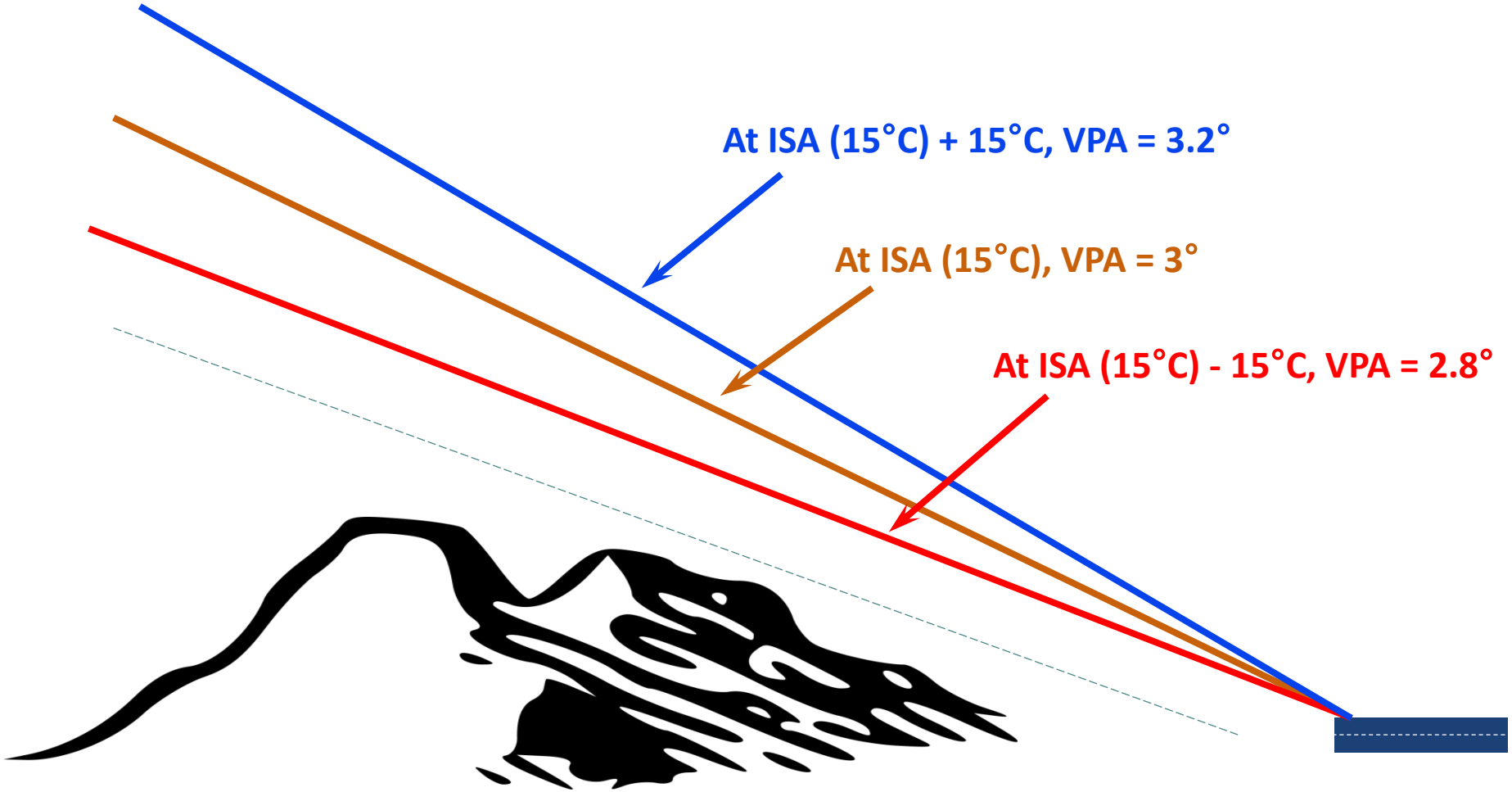
1) including T and Y approaches; and

2) approach minima;

c) impact of requesting a change to routing during a procedure

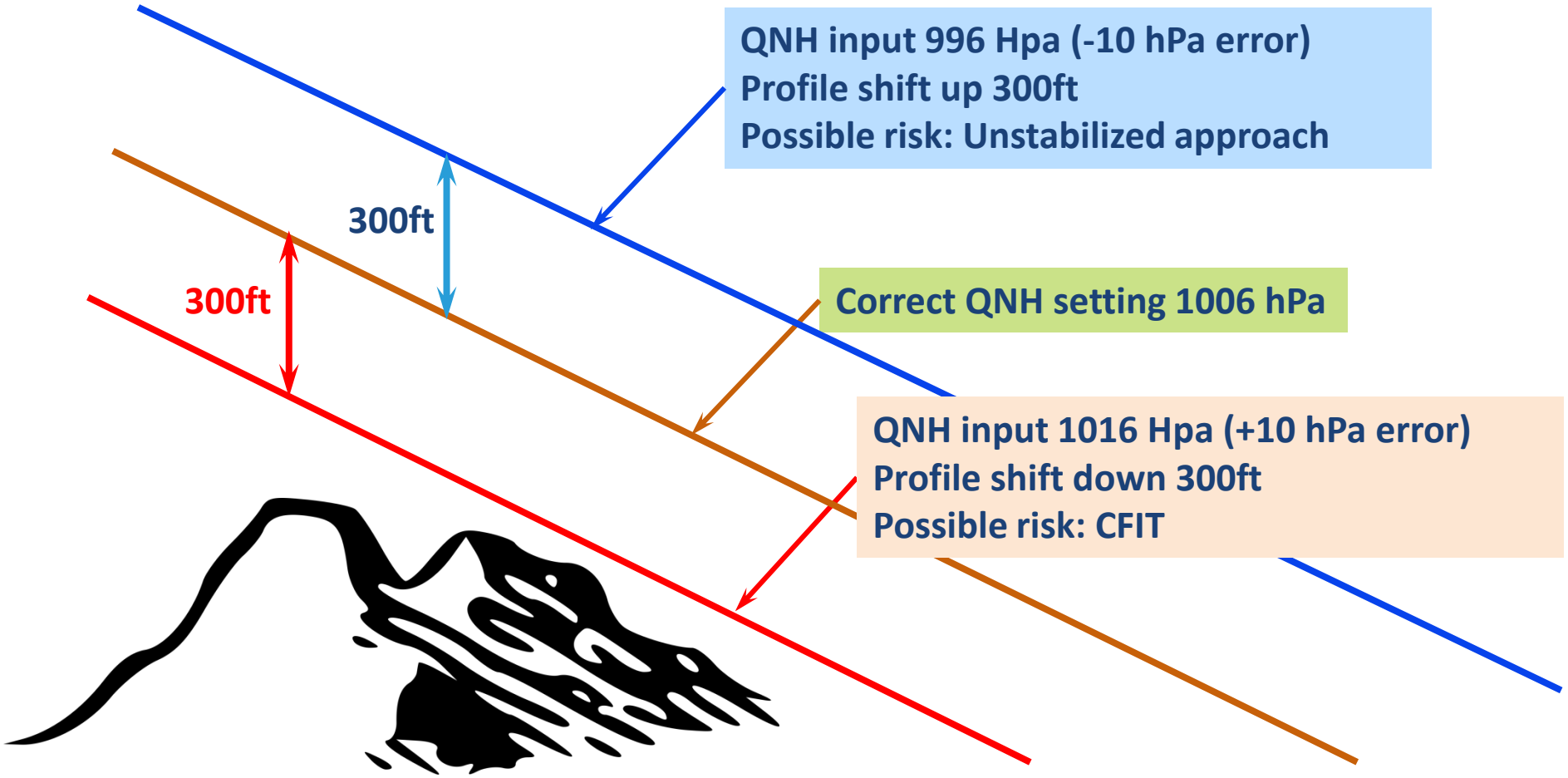
Baro-VNAV

- Temperature effect on final approach profile



Baro - VNAV

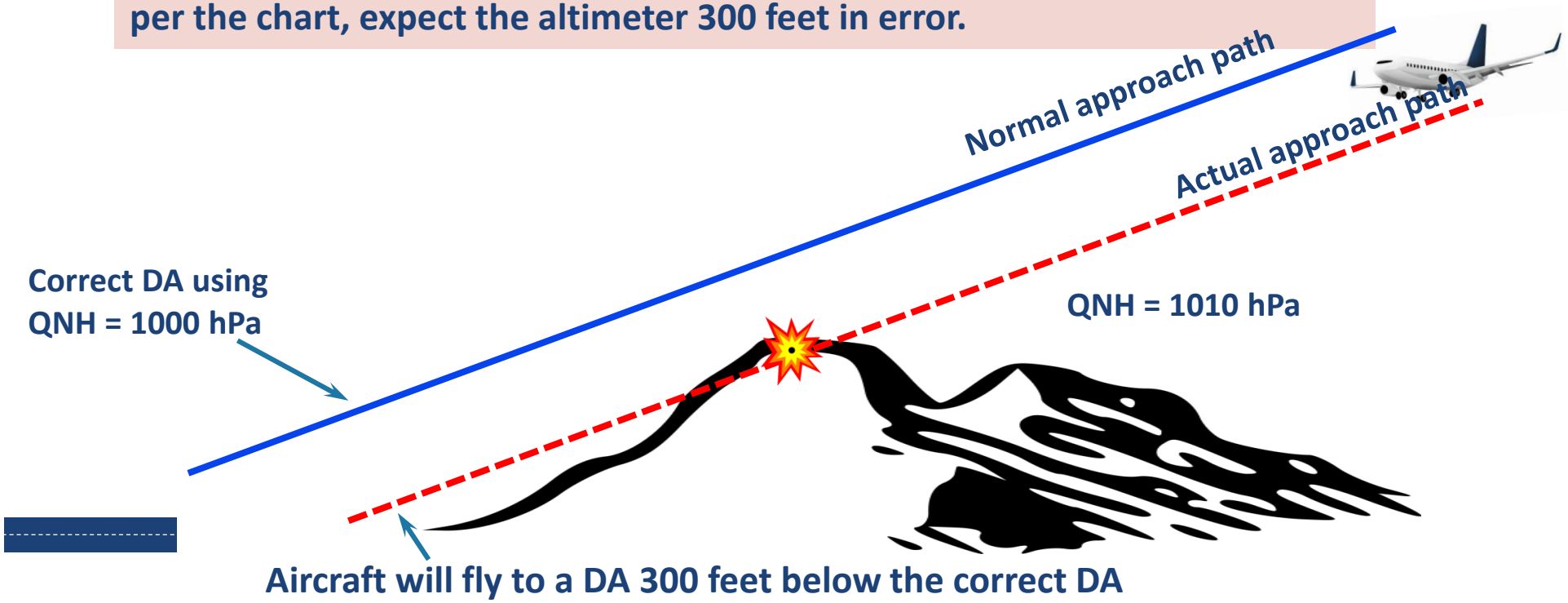
- Altimeter Setting Error



Baro -VNAV

❖ Altimeter Setting Error

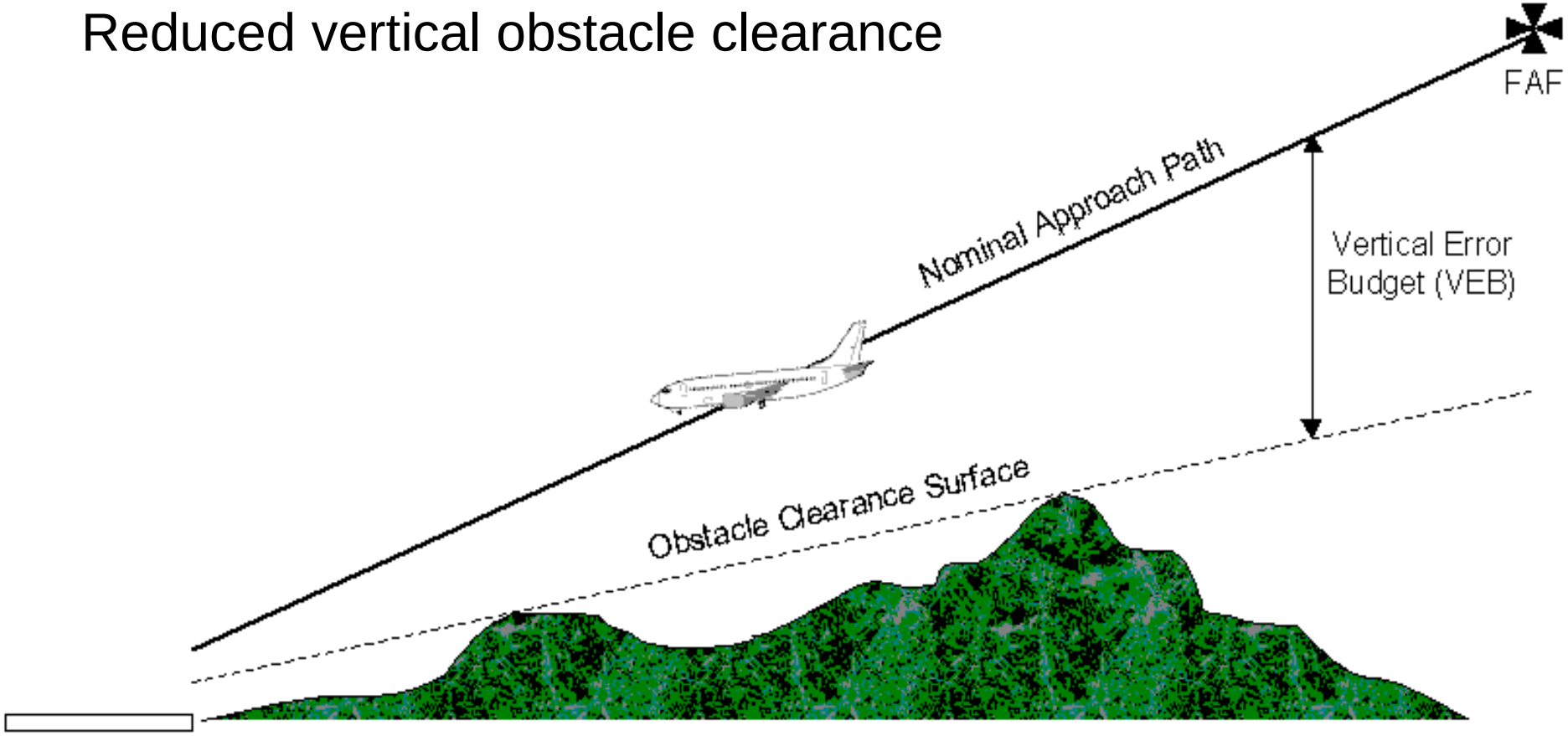
The aircaft flies a descent path which is 300 feet (10x30ft) below the required path. The barometric information display to the crew is incorrect. All distance and barometric altitude checks during the approach will be as per the chart, expect the altimeter 300 feet in error.



RNP AR APCH

VERTICAL ERROR BUDGET

Reduced vertical obstacle clearance



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QNH and altimeter setting Errors need to be emphasized in the training of both pilots and ATC, with a special attention to the following:-

- Vertical path based on Baro-VNAV information is dependent on altimeter setting.
- These errors cannot be detected through cross-check between altimeter indication and values shown on approach chart (altitude – distance check).
- APV Baro-VNAV (LNAV/VNAV minima) approaches are not authorized in the absence of local altimeter setting (local QNH).
- Pilot must have a recent altimeter setting information. Therefore, the crew may request the confirmation of altimeter setting before passing the FAF.
- ATC must be doubly sure of QNH read back by the pilots doing Baro-VNAV Approaches.
- A system should be in place to capture and analyse any incidents happening during PBN procedures so as to update the training system.

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Action by Meeting

The meeting is invited to:

1. note the information presented; and take action, as appropriate; and
2. provide update on the subject in subsequent meetings.

Thank You!

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