

**5<sup>th</sup> Meeting of the Technical Advisory Panel on Accidental Aircraft Crash Risk  
13 March 2014 – Redgrave Court**

**Attendees**

<b>Panel members</b>	
Tim Allmark (TA)	Technical Lead – ONR
Matt Lloyd Davies (MLD)	Technical Secretary – ONR
Malcolm Goodwin (MG)	ABS Consulting
Sid Hawkins (SH)	Air Accident Investigation Branch
Roger Jackson (RJ)	AMEC – Representing DNSR
David Pitfield (DP)	Loughborough University
Malcolm Spaven (MS)	Aviatica
Matt Greaves (MGr)	Cranfield University
Michael Johnston (MJ)	EDF Energy, representing Safety Director's Forum
<b>Guest Speakers</b>	
Nick Warren (NW)	Health and Safety Laboratory
David Gleave (DG)	Loughborough University
██████████	Independent (11:30 – 13:00)

**Apologies**

None received

**Introduction**

TA welcomed the TAP members to the meeting and thanked them for their continued participation and contributions. He reminded TAP members of the terms of reference of the TAP and the behaviours expected of TAP members.

**Previous minutes and actions**

No comments were received on the minutes and there were no actions outstanding.

**Presentation by ██████████**

██████████ joined the meeting to make a presentation on technical issues associated with evaluating accidental aircraft crash risk.

██████████ sought consensus from the Panel on a number of assertions made in the presentation. However, the Panel made a number of challenges and felt that some of the issues on which ██████████ was trying to achieve consensus could not be agreed without further debate amongst Panel members. ██████████ agreed to make a number of changes to ██████████ presentation before formally issuing it to the Panel.

██████████ concluded ██████████ presentation at 13:00 and the Panel broke for lunch.

**Presentation by Nick Warren**

Nick Warren presented the research report prepared by the Health and Safety Laboratory at the request of the Panel on 'Statistical modelling of the frequency and location of accidental aircraft crashes within Great Britain'. A Copy of the presentation is attached to these minutes.

Following NW's summary of the report's findings and recommendations, TA asked the panel if it could advise on obtaining data on a per kilometre flown basis in UK airspace.

- MS advised that NAB charges on a per kilometre basis which would provide data, and that radar records routes taken by aircraft.
- SH reiterated a statement he made at a previous meeting that the CAA is open to requests for information and data on UK flights
- DG suggested that publicly available flight data could be harnessed. On a local basis, he suggested that Licensee's could obtain data from local flying clubs etc

Other queries raised and observations made:

- Is there a correlation between crash rate per kilometre flown and flight density? NW was not able to answer this, but the panel agreed that if the methodology was to be followed up in more detail, this question should be addressed.
- MS recommended that whilst it is important to look at localised data, it is important to consider how to combine this with higher (flight) level data.
- MJ queried the practicality of the approach, and the cost to Licensees. TA advised that if a new methodology were to be adopted, the impact of such a change would be considered.
- RJ commented that Sellafield Limited had investigated an alternative to the Byrne methodology that was similar to the per kilometre flow approach suggested by HSL, and took account of site specific factors.

TA asked the panel if the per kilometre flown approach represented a viable alternative for exploration.

**The general consensus was that it is worth considering the per kilometre approach further, taking account of the comments made and queries raised by the panel**

NW discussed issues relating to the location of near-airfield crashes, and the accuracy of recorded crash location data. The current methodology does not take account of non-linear flight paths but instead measures deviation from the runway centre line. An aircraft turning immediately after take off and subsequently crashing would be judged to have deviated because it is some distance from the runway centre line. In reality, the flight may have been on its planned flight path.

NW presented a comparison of the HSL, Byrne and Wong models using Lydd airport as an example. With the exception of landing at runway 03, the Byrne methodology consistently calculated the highest crash frequency.

MS sought clarification on whether the example used in relation to Lydd airport took account of airport specific factors. NW confirmed that it did not.

TA clarified regulatory expectations i.e. that a best estimate approach should be adopted and a sensitivity analysis undertaken. Calculations should be based on a 50% confidence interval not 95%, which would lead to a decrease in the calculated level of risk.

**Presentation by David Gleave**

David Gleave presented the research report prepared by Loughborough University at the request of the Panel titled 'Review of aircraft crash probability, frequency and location models for accidents in the vicinity of an airport and off-airport'. A Copy of the presentation is attached to these minutes.

Following DG's summary of the findings and recommendations from the report, MLD commented that it appeared that no comparison had been made between the models, e.g. strengths, weaknesses etc. Completing the Table presented by TA at Meeting 4 would provide a useful summary of the model comparison.

**ACTION 5/01:** MLD to forward copy of summary table to DG and DP.

**ACTION 5/02:** DG and DP to complete table and incorporate into report.

Other comments and observations made by the Panel included:

- Many of the models appear to be over simplistic and focus on some specific aspects but none addresses all aspects.
- Modelling the military aircraft aspect appears to be understudied
- SH commented that military activity was very changeable and this would make it very difficult to provide a useful contribution to risk modelling
- TA asked for definitions of 'on-airport' and 'on-airfield' to be clarified in the report, and queried whether these were relevant areas to focus on.
- Section 10 of the LU report, Sources of Aircraft Crash Data, should be expanded to review the data rather than just providing references to them

- SH welcomed the breadth of models reviewed and suggested tabulating the 'requirements' of a model and mapping between this and the different models.
- TA asked if there were any purely theoretical models. DG confirmed that all models are based on historical crash data.

**ACTION 05/03:** DG/DP to tabulate the mapping between 'requirements' identified during meeting 4 and the models reviewed in the report

TA challenged the panel to consider that it should focus only on Lydd Airport, as it was the only airport within 10kM of a nuclear licensed site. MS commented that the panel should identify all local factors at all sites and not only Dungeness.

David Gleave commented on the availability of publically accessible flight data and that Licensees could harness this data to inform risk calculations.

**ACTION 05/04:** MJ to investigate EDF's appetite for trialling a flight monitoring system on site

In closing the meeting, TA asked the Panel to provide comments on the reports, including how well the work addressed the original specification, to MLD for collation ahead of dissemination to LU and HSL.

TA asked the panel's view on whether the reports should stay separate or be combined as a single report. The Panel's view was mixed:

- RJ commented that the reports could stand alone and still make sense
- MJ questioned whether they needed to be read together to make sense. On balance, a single report would preferable to avoid readers 'cherry-picking' information.
- TA took the decision that a single report should be produced.

**ACTION 05/05:** ALL to provide comments on the LU and HSL technical reports to MLD

**ACTION 05/06:** MLD to collate and discuss comments from the Panel with LU and HSL

**ACTION 05/07:** NW and DP/DG to act on comments, incorporate changes and combine their reports into a single report.

#### Summary of actions

Ref	Assigned to	Action description
05/01	MLD	MLD to forward copy of model summary table to DG and DP
05/02	DP/DG	Complete model summary table and incorporate into report
05/03	DP/DG	Tabulate the mapping between 'requirements' identified during meeting 4 and the models reviewed in the report
05/04	MJ	MJ to investigate EDF's appetite for trialling a flight monitoring system on site
05/05	ALL	Provide comments on the LU and HSL technical reports to MLD
05/06	MLD	Collate and discuss comments from the Panel on technical reports with LU and HSL
05/07	NW/DP/DG	Act on comments, incorporate changes and combine their reports into a single report.