

**TOWN AND COUNTRY PLANNING ACT 1990 - SECTION 77 AND TOWN AND COUNTRY PLANNING
(INQUIRIES PROCEDURE) (ENGLAND) RULES 2000**

APPLICATIONS BY LONDON ASHFORD AIRPORT LTD

SITE AT LONDON ASHFORD AIRPORT LIMITED, LYDD, ROMNEY MARSH, TN29 9QL

**NOTE TO INQUIRY
NUCLEAR ASSESSMENT CRITERIA**

TRUDY AUTY, BSc, ARCS

FOR LAAG

PLANNING INSPECTORATE REFERENCE: APP/L2250/V/10/2131934

LPA REFERENCES: Y06/1647/SH and Y06/1648/SH

May 26th 2011

NUCLEAR ASSESSMENT CRITERIA

1. INTRODUCTION:

- 1.1) The following is a note prepared for the inquiry on the definitions and application of NII's assessment criteria.
- 1.2) Our overall position remains that, as the model is not fit for purpose, then comparing its outcome with the NII's safety marker has no meaning. From my experience in industry, one would not use a model that is unable to reliably predict the frequency of occurrence when the consequences are so extreme but would find a solution that cuts out the uncertainty; hence our proposal for a minimum separation policy.
- 1.3) If the model were to be used (and we do not condone its use for the reason given) then the thresholds should have been tightened¹ significantly in recognition of the intolerable consequences and deficiencies which ESRT acknowledges but which it did not account for in an integrated or numerical way.²
- 1.4) That said, this note confirms that the crash rate which Mr Nicholls estimates would have led to objection when measured against the thresholds and guidelines which NII applied to this case.
- 1.5) The fact that the airport's own consultant puts the value in this range highlights the uncertainty surrounding these planning applications. Moreover, Mr Nicholls numerical assessment is grossly underestimated as it fails to take account of skidding, fires³, Dungeness A, the railhead and a range of site specific factors which he admits will increase the risk but which

¹ i.e. The allowable frequency reduced

² In terms of NII's knowledge, whilst they will have seen ESRT reports, they have not been made aware of the issues arising from them, as explained in my supplementary evidence, my evidence in chief and these notes.

³ LAA/13/F, No 4; 'NII's Technical Assessment Guide..External Hazards', Annexe 2.2 (which also notes the inability of the Byrne and other models to represent non-aligned and curved flight paths) states '*In addition to structural effects, fuel fire is highly probable. This will be more significant for the heavier classes or aircraft.*' There is no reference to any assessment of the risk posed by fuel fire in any of the ESRT reports. Annexe 2.2 also refers to the need to consider skidding which was given only a cursory review in ESRT's 2007 report but not followed through.

he cannot quantify. These have the potential to increase the probability of a target 9 incident by orders of magnitude, well above a level which is acceptable to society.

2. BSL, BSO AND ALARP

Extracts from the relevant sections of NII guidelines and letters written by the Principal Nuclear Installations Inspector (contained in appendix LAAG/3/I) confirm the following:

- 2.1) HSE's policy is that any new facility or activity should at least meet the **Basic Safety Level (BSL)**. However in doing so it may still not be '**as low as reasonably practicable**' (**ALARP**). The application of ALARP may drive the risks lower than the BSL. The higher the risk, the greater the degree of disproportionment (cost/burden) needed to justify not implementing additional safety measures.
- 2.2) **Basic Safety Objectives (BSOs)** are the benchmarks that reflect modern nuclear safety standards and objectives. They also mark the start of the broadly acceptable level (i.e. for frequencies below this value).
- 2.3) Letters from the Principal Nuclear Installations Inspector confirm that the NII regarded this case as having the potential for its highest category 'target 9' accident resulting in more than 100 deaths. **The letters state the application of a BSL at 10^{-5} and a BSO at 10^{-7}** . These statements are clear and not open to interpretation.
- 2.4) In addition, the letter from the NII to Mr Nicholls, 18th March 2011 (LAA/F/No 13) confirmed, in response to his question 'which of the numerical targets in SAPs were the predicted frequencies tested against in order to come to the conclusion that the risk was below levels considered to be 'generally acceptable?' that it was 10^{-7}
- 2.5) The various letters also refer to the BSO as being a level **below** which the regulator need not seek any further improvement (although the guidelines state that the licensee should continue to reduce risks to alarp). They imply

the regulator would seek further improvement in safety if the event probability was above the BSO, in this case 10^{-7} .

- 2.6) This is consistent with the ESRT reports which all use 10^{-7} as the safety marker (**not** 10^{-5} or 10^{-4} as suggested by Mr Nicholls). It is also consistent with the need to reduce risks to alarp in the regime between the BSL and BSO. **ALARP guidance states that, in the absence of gross disproportionment, the option or combination of options which presents the lowest risk should always be selected** . That would lead to refusal of the plans in this case. ALARP guidance also states that the greater the risk, the more that should be spent on reducing it and the greater the bias on the side of safety.
- 2.7) Moreover, we maintain our position that the NII should have reviewed these targets and ‘raised the bar’ considerably based upon:
- a) Intolerable outcome. Events in Japan have shown that these ‘incredible events’ do happen with irreversible consequences to society.
 - b) ESRT’s admission that the Bynre model is unable to represent the risk posed by LAA which has constrained access, curved/non-aligned flight paths as well as site specific factors, such as birdstrike, which are outside the control of either the airport or the nuclear licensee.

NII guidelines call for the allowable frequency to be reduced in situations where there is potential for killing significantly more than 100 people. However it failed to carry out an appropriate review in this case.

- 2.8) The fact remains that Mr Nicholls calculation puts the probability of an accident with the potential for causing, what he terms, ‘*a severe release of radioactivity*’ (LAA/15/F No.1, paragraph 27), at 5.6×10^{-7} . This is above the BSO and would have lead to an objection according to NII guidelines⁴ .

⁴ Also noting SAPs paragraph 601,b which states that, for off-site radiological releases , ‘ It should be assumed that the conditions under which the fault is analysed has the characteristics which produce the highest dose to that person’. In other words one has to assume the worst outcome from a large aircraft crash onto the nuclear island.

Stripping out Mr Nicholls assessment of background crash rate⁵ still leaves a contribution from LAA traffic of 1.6×10^{-7} which exceeds the NII's safety marker (albeit this should have been reviewed and tightened).

- 2.9) This is Mr Nicholls's estimate for small/large transport aircraft impact crashing onto the nuclear island which the ESRT 2007 report (LAAG CD13.9, page 2) classifies as having the potential for large radiological release by breaching the pressure boundary. It does not include light aircraft and it does not include the rest of the nuclear site so there are no grounds for Mr Nicholls's assertion that the figure is conservative.
- 2.10) On the contrary, Mr Nicholls's assessment has grossly underestimated the risk posed by an expanded Lydd Airport as it fails to take account of:
- a) Any landings on runway 21 (due to truncation of the model), and so considers none of the associated go arounds or birdstrike risk.
 - b) Skidding which, in theory, has the potential of increasing the risk by a factor of upto 1000. ESRT makes a more optimistic assumption in its 2007 report (LAAG CD13.9) where it admits the potential for a 10 fold increase but fails to incorporate this into its final numerical assessment.
 - c) Fires which were not accounted for anywhere within the ESRT reports or Mr Nicholls evidence. Although the ESRT 2007 report makes a vague reference to the possibility of structures on the site providing some mitigation against a skidding aircraft, it fails to consider that impact with a building has the potential for causing an explosive fire which could be equally devastating. Such fires again increase the target area and hence probability of a nuclear accident.
 - d) Curved and non-runway aligned flight paths, such the approach onto runway 03, which have the aircraft pointing towards the nuclear power station and/or more closely aligned to it. ESRT admits that such activity will increase the probability of a collision over that predicted by the

⁵ Which we have, in any case, proven to be invalid. Reference supplementary evidence, LAAG/3/E

standard model but has no way of calculating it; hence its admission that a new kind of methodology is required.

- e) Birdstrike threat which has been assessed at 6 times the UK average (reference ESRT October 2010 report, LAA/15/F.1⁶), noting that there will be no control of these hazardous birds in the area which matters most to the power stations i.e. the bird reserve and SPA which separates the airport from the nuclear site.
- f) The risks posed by Dungeness A or the railhead which have been well covered in Mr Large's evidence. It does not consider the extent to which a future Dungeness C would increase all of these factors and hence the potential for this opportunity being ruled out at its detailed design stage; bearing in mind the requirement to consider the integrated risk posed by the whole site, not an individual nuclear power station.

3. CONCLUSION:

- 3.1) This note has explained the role of the BSL and BSO. It has confirmed that the NII's safety marker for this case was the BSO, set at 10^{-7} , for societal risk; albeit we maintain the bar should have been raised due to intolerable consequences and gross uncertainties in the model.
- 3.2) We have demonstrated that Mr Nicholls's interpretation of the safety marker is incorrect and not supported by either NII guidelines nor the nuclear inspector who was managing the case.
- 3.3) We have explained how ALARP considerations would lead to an objection based upon Mr Nicholls's assessment. The fact that the airport's own consultant places it in the range for objection highlights the uncertainty surrounding these assessments which means the Secretary of State would be unable to assure public safety if these plans were approved.

⁶ Small comment for clarity...it has been noticed that LAA/15 evidence has an F1 which is the Areva report in the front of the white book and a F.1 which are the two ESRT reports of April 2010 and October 2010.

4. REVISED STATEMENT ON MR NICHOLL'S ASSUMPTIONS

- 4.1) Conducting this work has created a need to review and clarify statements relating to Mr Nicholls 'Review of Assumptions' LAA/15/F , No1 (Areva report). Page 9, 5.5, paragraph 48.
- 4.2) We contest Mr Nicholls's statement that his assumptions are pessimistic. We believe them to be overly optimistic for the numerous reasons given in paragraph 2.9 above.
- 4.3) Addressing each of his bullet points in LAA/15/F, No1 paragraph 48 in turn:
- a) We agree that the restricted flying zone would reduce the probability of a collision on aircraft departure routes from runway 21. **However** this is the only manoeuvre which the model might treat in a pessimistic way,⁷ and if the pilot fails to turn right or has engine failure the aircraft could still be left flying out in the general direction of the nuclear site.

It should be remembered that the restricted flying zone is not an arrester wire. It cannot physically stop an aircraft which is heading towards the site so offers no mitigation, as recognised in ESRT's report, CD 13.9, page 31 end of the first paragraph:

'Given the location and orientation of the runway relative to the nuclear site there are practical limits to the separation achievable during take off and landing operations' concluding in the last paragraph on page 31:

'In summary we identify no obvious scope for implementation of operational procedures that would mitigate the risk of aircraft crash at the Dungeness nuclear site'

In other words, to suggest that mitigation can be fulfilled through design, licensing, good practice or control is incorrect. ESRT confirms that the manoeuvres posing a threat are fundamental to the proximity of the sites.

⁷ Bearing in mind that the model is, in any case, flawed and not to be relied upon

- b) As confirmed in the cross examination, Mr Nicholls's statement on avoidance is not correct. In fact full credit has been given to the pilot's ability to avoid the nuclear power station as the data base only includes fatal accidents or those where the pilot lost control. As noted, this assumption breaks down the closer the event or culmination of events occurs in relation to the nuclear site.
- c) The third point is misleading. It suggests that Mr Nicholls has put forward a probability for a severe radiological release based on the whole area of the site, which he has not. Mr Nicholls's assessment only considers the area of nuclear island as having potential for causing what he terms as a '*major uncontrolled release of radioactivity*'. In doing so he fails to account for the effects of a collision with other structures on the site, aircraft fuel fires, skidding and the factors listed in paragraph 2.9 of this note. Therefore Mr Nicholls has underestimated, not overstated, the risk.
- d) The fourth paragraph is incorrect as it tries to suggest a criterion of 10^{-4} or 10^{-5} whereas this note has clearly demonstrated that NII's criterion was 10^{-7} , albeit this threshold should have been tightened for the reasons given.

TRUDY AUTY