IN THE GRENFELL TOWER INQUIRY

Chaired by
Sir MARTIN MOORE-BICK

Sitting with fellow Panel members
Thouria Istephan and Ali Akbor OBE

Advised and assisted by Assessors, currently:
Joe Montgomery CB,
Professor David Nethercot OBE, and
John Mothersole

FBU's Written Opening Submissions for Module 3 of Phase 2, confined to smoke control systems

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1) The FBU and the firefighters, Control staff and fire safety officers we represent remain humbled by the suffering of the deceased and the bereaved, survivors and relatives of the deceased (BSRs) as a result of the Grenfell Tower disaster; and committed to a full and open inquiry.

2) Dr Lane explained at §§3.2.5, 3.2.23 and 3.2.31 of her Phase 1 report {BLAS0000003/8, …/12 & …/14} that stair and lobby ventilaton were active fire protection measures which were essential parts of the package of measures to support means of escape and firefighting in a high-rise residential building (HRRB) with a Stay Put strategy.

3) In §2.5.8 of Section 2 of her Smoke control report {BLARP20000035/32}, after considering the functional requirements, Dr Lane concluded "*The fundamental purpose of the design of any mechanical smoke ventilation system for Grenfell Tower was therefore to maintain tenable conditions for means of escape in the extended travel*

lobby and tenable conditions for means of escape and firefighting in the stair." Dr Lane has concluded the refurbished smoke control system did not achieve this purpose: "*…the design of the lobby smoke control system at Grenfell Tower did not comply with the original performance standards in CP 3:1971 or the performance standards documented by the Secretary of State in ADB 2013…*" – see §10.13.1 {BLARP20000036/24}. Moreover, she has concluded: "*…the lobby smoke control system designed and installed at Grenfell Tower did not comply with the functional requirements of Schedule 1 to the Building Regulations 2010 (B1, B3 and B5), when handed over to the KCTMO…*" – see §10.3.9 {BLARP20000036/25}.

4) **Max Fordham's motivation instructing PSB**: Dr Lane described how Max Fordham approached the refurbishment of the smoke control system in Grenfell Tower: it proposed a refurbishment of the original system, but on the basis of the same operational principles as the existing system installed in Grenfell Tower i.e. a mechanical smoke extract system which supplies fresh air from the South shafts and exhausts smoke from the North shafts. But they were unable to demonstrate this was "*no worse*" than existing, as the existing system was not working. Moreover, there is no evidence of any analysis of CP3 1971, or any other original standard, to establish the original core performance objectives. Unsurprisingly it got complicated with Building Control and, according to Matt Cross Smith of Max Fordham, Max Fordham therefore got in contact with PSB. See Section 5 of Dr Lane's Smoke Control report at §§5.3.10, 5.4.3, 5.4.18-19 {BLARP20000035/120, …/127, &…/130}.

5) The FBU asks whether the motivation to consult PSB was to get the refurbishment past Building Control, rather than aiming for fire safety. If so, this is further evidence of:

   a) the minimum compliance culture so prevalent in the refurbishment of the tower, and
   b) yet another contractor's misplaced dependency on Building Control approval.

6) In §3.2.6 of Section 3 of her Smoke control report {BLARP20000035/32}, having explained that no permanent vents from the lobby to outside were provided at Grenfell Tower, where the lobby is located internally, Dr Lane concluded that, at the time of original construction, "*the ventilation provision made in the staircase and lobby in Grenfell Tower was not in accordance with any part of the GLC Section 20 Code of practice 1970…*". Had either Max Fordham or PSB properly researched the existing

smoke control system, which they sought to refurbish to "*no worse*" than existing, they would have realised that the original system was non-compliant.

7) Dr Lane described fundamental flaws in **PSB's design** of the smoke control system for the refurbishment:

a) The lift shaft was not considered (as required by Clause 6 of BS EN 12101-6:2005) as part of the development of the design of the smoke control system - see §5.4.6 {BLARP20000035/127};

b) Her Tables 5-3 {BLARP20000035/147} and 5-4 {BLARP20000035/148} show, respectively, the PSB design proposal and its Technical Submission (Revision 6) both fell far short of the Smoke Control Association (SCA) Guide 2012/15 they purported to follow.

c) The refurbished smoke control system depressurised the lobby with respect to both the stair and the accommodation. This is not an arrangement shown in BS EN 12101-6:2005. As the lobby was depressurised, this would encourage smoke from the fire flat into the lobby - see §5.6.7-8 {BLARP20000035/154}. It seems this foreseeable risk was neither identified, nor communicated, nor mitigated by PSB – see §10.7.25 {BLARP20000036/14}. As a result of this flawed design "… *the system as installed in Grenfell Tower depressurised the lobby thereby drawing smoke from the flat into the lobby. As a result the only protected space in PSB's design was the staircase*…" see §4.3.33 of Section 4 of her Smoke control report {BLARP20000035/55}.

d) Dr Lane interprets the latest witness statement of Mr Mahoney of PSB UK Ltd {PSB00001373} as him now saying that he did not design the mechanical extract depressurisation system to comply with BS EN 12101-6:2005 – see §1.1.12 of Section 1 of her Smoke control report {BLARP20000035/8}.

e) Notwithstanding the guidance clearly required "… *the performance objectives for any system must be clearly devised and recorded*…" (§4.2.18), "…*Mr Mahoney has not set out a clear basis or explanation for the alternative solution he proposed*…" (to

ventilate the means of escape). See §4.2.10 of Section 4 of her Smoke control report {BLARP20000035/47} and also §5.1.7 in Section 5 {BLARP20000035/114}.

f) Notwithstanding the SCA Guide requires the designer to consider the events in a fire (e.g. occupants making their escape and firefighting, and thus different arrangements of open/closed doors) and the fire behaviour at different times in a fire event, PSB's approach failed to give any consideration to the likely range of events which might occur in a fire – see 10.6.17 & 20 {BLARP20000036/10-11}.

g) Dr Lane found only limited evidence that any member of the design team for the primary refurbishment considered the performance requirements of the protected shafts at Grenfell Tower. No attempt appears to have been made to assess the foreseeable circumstances which might arise with regard to these shafts and to ensure that the design was robust to address those circumstances. Such considerations, including both fire resistance and the multiple performance requirements of dampers, are clearly explained in ADB 2013. The compartmentation performance of the smoke control system was not considered as part of PSB's specification for the system. – see §§13.17.7-8 {BLARP20000038/38}. Whilst the Studio E fire strategy drawings {TMOM00000007} indicated that these shafts should achieve 120 minutes fire resistance, Dr Lane found no evidence that any of the relevant parties involved in the design and construction of the refurbished smoke control system actually confirmed that the shafts could meet this performance.

8) The FBU invites the Panel to consider, of Mr Mahoney:

a) whether he realised the original smoke control system in Grenfell Tower for the means of escape was non-compliant with the regulations and guidance,
b) why he neither devised nor recorded any clear basis or explanation for the alternative solution he proposed,
c) whether he realised the effect of his alternative solution was to draw smoke from the fire flat into the lobby and, accordingly, only to protect the stairs until the door from the lobby to the stairs was opened,
d) why the lobby on the fire floor was not even designed to be a protected space,

e) whether he took into account that the normal and expected firefighting procedure in a HRRB required multiple doors to be propped open in order to lay 2 jets, one for the BA team fighting fire in the fire flat, and one for the back up BA team and so, as a minimum, to run a jet from the dry riser outlet on the floor below the fire flat up to the fire flat, thereby propping open at least 3 doors.
   i) the door from the lobby to the stairs on the floor below,
   ii) the door from the stairs to the lobby on the fire floor, and
   iii) the fire flat entrance door.

f) Why he did not take the lift shaft(s) into consideration, and

g) whether there were any constraints put upon him by anyone involved in the refurbishment on the extent of the work he could carry out on PSB's contract which prevented it or him properly researching, designing, installing and commissioning the system?

9) **Performance on the night**: In Section 12 of her smoke control report {BLARP20000037} Dr Lane explains that firefighters opening doors in the early stages of a hi-rise fire was '*entirely expected'*. It follows that firefighters are not to blame for the initial smoke spread due to firefighting operations. She reports:

"*At 01:25 smoke was observed to spread from the Level 4 lobby to the protected stair through the open stair door … therefore the stated primary objective of the smoke control system design failed at this time*" - see §12.31.2 {BLARP20000037/77}.

…

"*Ultimately the evidence shows that by 01:25 the system had already failed in its primary function which PSB had defined as providing protection to the stair from smoke in the Level 4 lobby, with all flat entrance doors closed. I do not consider the fire conditions affecting the Level 4 lobby before 01:30am, nor the escape activity or firefighting activity during that time period, to be anything other than reasonable and entirely foreseeable*" – see §12.31.3 {BLARP20000037/80}.

…

"*The failure of the smoke control system as it was designed, was caused by the entirely expected condition of more than one door being open to the Level 4 lobby, when the fire fighters were fighting the fire in Flat 16*" – see §12.31.4 {BLARP20000037/80}.

…

"*It is … reasonable to assume, as per my Phase 1 report, that from 01:26 the single floor fire design condition had been exceeded and therefore the system could no longer be reasonably expected to provide protection to the protected stair against increasingly substantial smoke spread from multiple lobbies (19 in total) {BLAS0000002}…"* – see §12.31.10 {BLARP20000037/80}.

10) Notwithstanding it was "*entirely expected*", this eventuality should have been, but was not, catered for in PSB's design of the smoke control system installed at GT in the course of the refurbishment.

11) As to the **South shaft**, smoke was observed leaking through closed dampers into the lobbies on levels 6, 20 and 23 in the early stages of the fire (prior to 01:33), suggesting that the stack effect was enabling smoke to spread up the South shaft at this time, providing further evidence that the Level 2 extract system was not operating as intended - see §13.17.48 {BLARP20000038/42}. Dr Lane concluded it is probable that the Level 2 extract system ceased to function in the early stages of the fire, enabled smoke to rise from Level 4 and then when other dampers opened, smoke from other Levels also, to enter the South shaft and rise up through the South shaft. She considers the performance of the South shaft in the early stages of the fire most likely enhanced the flow of smoke from the South shaft through the dampers into the upper lobbies of Grenfell Tower – see §13.17.71 {BLARP20000038/44}.

12) As to the **North shaft**, Dr Lane considers it likely that two sets of dampers in the North shaft were probably open simultaneously (Level 4 and Level 11) in the early stages of the fire up to 01:30, and that performance of the North shaft was a significant breach of compartmentation as the dampers failed to shut when the fire commenced (based on the BRE investigation), and therefore failed to provide the required integrity to maintain the performance of a protected shaft. The failure of the North shaft constitutes an overall failure to comply with functional requirement B3(3) because, as a result, the compartmentation to each lobby at Grenfell Tower, from the floor of fire origin (Level 4) to the top of the building, was not provided – see §13.17.20 (a) {BLARP20000038/40}.

13) Dr Lane has concluded that damper leakage and smoke control system performance issues contributed to conditions in the lobbies in Grenfell Tower: §13.17.40 {BLARP20000038/41}. Coupled with the failure of the Level 11 dampers in the North shaft to close at 00:55 as was required, these conditions would also result in the air flow velocity through the Level 4 stair door failing to meet the required design velocity in the early stages of the fire. She considers the evidence of how the smoke control system at Grenfell Tower, was designed, installed, commissioned and maintained to be another example of a failure by apparently competent persons, to provide a fire safety system that relevant persons and fire fighters could depend upon to work reliably in the event of fire – see 13.17.72 -73 {BLARP20000038/44}.

14) The FBU invites the Panel to ascertain the underlying reasons why "apparently competent persons" persistently failed to 'think fire' sufficiently or at all and specifically to consider whether the cumulative effects of 10 to 15 years of austerity cuts and deregulation materially contributed to the culture of minimal &/or non-compliance.

15) Having analysed all the evidence available to her throughout Module 2 and Module 3 Dr Lane has re-affirmed her "Phase 1" view that due to the severity of the consequences of the fire at Grenfell Tower, the building design condition for Stay Put failed substantially by 01:26 and all events after that time occurred in the context of the total loss of the only safety condition provided for – see §13.17.66 {BLARP20000038/44}.

16) The Chairman referred to the smoke control system in his Phase 1 report.

17) **As to using the controls**: At §§14.6 to 14-8 of Volume 2 the Chairman cited the evidence that, soon after 2am on the night of the fire SM Walton and WM Dowden had approached the smoke control panel on the wall in the ground floor lobby, that SM Walton remembered previously attending a demonstration of the controls and asked WM Dowden to see if it was working. The Chairman further noted that WM Dowden chose not to actuate the manual override and told SM Walton that the smoke control system was not working. As a result of this exchange, SM Walton decided that the LFB could not rely on any of the systems in the building.

18) Dr Lane's conclusions in her smoke control report show that WM Dowden's assessment was correct (see above). Additionally, she considered the instructions provided to the

fire service, including the demonstration which SM Walton had earlier attended, were wholly inadequate to allow attending firefighters to understand the full complexity of the system – see §7.21.9 {BLARP20000035/325}. The FBU submits that in these circumstances no blame attaches to the firefighters for deciding not to try to take control of the system at this or any earlier stage of the fire.

19) **As to the failure of compartmentation**: At 24.36 &ff of Volume 4, the Chairman concluded:

> ...
> 24.36 Firefighting operations undoubtedly played a part as well, because some doors to flats had to be broken down to enable firefighters to gain entry and the use of established firefighting techniques led to the doors to the stairwell being propped open by equipment, including hoses. However, that was limited to the floors on or adjacent to which active firefighting operations were being conducted. For example, on floor 5 FFs Wayne Archer and Thomas Abell forced the door of Flat 26 shortly after leaving the bridgehead at around 01.21. They attempted to fight the fire inside the flat for about 10 minutes, but by the time they left to return to the bridgehead conditions in the lobby were almost as bad as those in the flat. The front door of Flat 16 itself had been forced open as firefighters responded to the initial fire, which could have allowed smoke to spread into the lobby when the fire re-entered the compartment later in the night.[92] It seems reasonably clear that, where firefighters forced entry into flats, or where firefighting equipment such as hoses were being used on different floors, doors were propped open, which enabled smoke to enter areas that had previously been unaffected.
> ...
> 24.39 Many other factors may have played a part in the spread of smoke in the tower, such as the movements of occupants and leakage through the smoke control shafts and vents and other open channels, but it is not possible at this stage to determine the extent to which, if at all, they contributed to the outcome. It is clear from what has been learnt so far that the building suffered a total failure of compartmentation. How the building came to be in that state is the most pressing question to be answered in Phase 2.

20) In light of Dr Lane's smoke control report the FBU invites the Inquiry to conclude (a) that firefighting activities were entirely as expected in the early stages of the fire and should have been allowed for in the design of the smoke control system and (b) that the failings in design, commissioning, installation and maintenance of the smoke control system materially contributed to the total failure of compartmentation inside the tower.

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FBU's Opening Statement on the issue of smoke control for Module 3 of Phase 2 of the GTI

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