THE FIRE BRIGADES UNION

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Monday 4 April

LIVES AT RISK AS ODPM CIVIL SERVANTS BURY THE MOST CRITICAL FIRE SERVICE SAFETY RESEARCH IN 50 YEARS

The most important safety research carried out in the fire service for 50 years is being buried by Civil Servants at the Office of the Deputy Prime, says the Fire Brigades Union. The union says the lack of action at national level is putting the lives of firefighters and the public at risk with key parts of the research being ignored.

FBU General secretary Andy Gilchrist accused the ODPM of "breathtaking complacency". He called for an urgent programme of national action to be led by the ODPM and fire service stakeholders including additional resources.

Commissioned after 9/11, the Buildings Disaster Advisory Group (BDAG) research is the first to measure the effect on the human body of fighting fires in a range of day-to-day scenarios and in extreme conditions such as high rise blocks. It found that a mix of heavy workload and heat from fires leads to dangerously high levels of heat exhaustion in firefighters even in normal firefighting conditions.

In the research trials the core body temperatures of firefighters reached such high levels that most of the tests had to be stopped. It shows that firefighters can only fight fires for between 13-16 minutes before unsafe body temperatures are reached.

Instead of urgent action at national level ODPM civil Servants sent out a non-descript circular to fire authorities outlining the research "for information". They added that it did not require a response and that it was not relevant to the Government's fire service policy.

But a DVD film taken of the research trials leaked to the union contains footage of firefighters exhausted with many of the tests being cut short on health and safety grounds. Many took several hours to recover.

General Secretary Andy Gilchrist said: "The most important safety research in 50 years is being swept under the carpet because it shows we need more firefighters. They asked the questions and now they don't like the answers.

"The inaction of the ODPM is breathtakingly complacent. It is putting the lives of firefighters and the public at risk.

"The research clearly shows that firefighting is dangerously exhausting even for very fit individuals. We also need proper rest periods to recover.

“This clearly suggests that more firefighters are needed in the first response to fires with more needed throughout the incident. This contradicts current Government thinking which is why key parts of the research are being swept under the carpet.

“We need a national action plan put together by all fire service stakeholders which must include more resources. Instead we only have suggestions including changes to building design which will take 50 years to have an impact.”

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Notes 1:

DVD BRIEFING: Extracts

HIGH RISE scenario of climbing stairs and fighting fire:

Watch Manager Keith Feltham:
“If you went in now you’d last a couple of minutes, that would be it then, you’d become a danger to your crew.”

Narrator: Climbing many floors with EDBA [Extended Duration Breathing Apparatus] and hose resulted in fatigue, heat strain and physical exhaustion to the extent that committing firefighters into a fire compartment would be unsafe, whilst climbing unloaded was less arduous and the subsequent commitment to the fire compartment would appear to be tolerable to the majority of firefighters.

Simon Hunt – Area Manager and Project Manager BDAG
“ What has become clear is that existing assumptions that firefighters would be able to climb a given number of floors and then commence a fire fighting operation would given the evidence we have here appear to be limited, in fact it might require a separate team to commence fire fighting operations where others have actually provided equipment and apparatus for them.”

12.58 – 15.45

Narrator: **As the trials progressed it became clear that thermal load [heat] was the prohibiting factor for crews in the accomplishment of any task and this would be at its most severe in a fire compartment.**

THE NEXT PHASE IS LOW RISE

19.00 – The timetable of the trials incorporated 5 basic scenarios.

The first condition was on the top floor of a building (3rd floor)

The second was on the second floor of a building.

The third – on the first floor.

The fourth – was the use of a lift and connection to a dry riser on the second floor.

The fifth – in a basement.

Narrator: **On a number of occasions the trials were terminated early as firefighters were taken out due to heat stress. The data from the live fires confirm that physiological stress factors should play an important role in planning the appropriate response [FBU comment: this means the number of fire engines and firefighters sent - and the length of time it is anticipated they will take to get there] to a major fire incident.**

Simon Hunt, Project Director again:
"Certainly we've been surprised by what we've found**. In the case of the firefighting with live fires, the distances we've set and the fire sizes are nothing that might be regarded as extreme and yet on pretty much a larger number of fires, firefighters are going over the core temperatures and it is only because we've got the safety systems in place that we are able to ensure the firefighters safety. In an operational incident those control measures may not actually be in place."**

Narrator: The results of this work have shown that the physiological demands of firefighting and rescue operations are significant. These factors must be taken into account when planning operational response [FBU comment: this means the number of fire engines and firefighters sent to fires - and the length of time it is anticipated they will take to get there] producing guidance for fire and rescue procedures and developing building designs. New and revised standards for respiratory and protective equipment will also need to be re-evaluated in the light of this research.

Note 2:

What the written research shows:

Heat exhaustion: it is usually recognized that a maximum safe core body temperature is 38 degrees. In these tests the core temperature for termination was in fact 39.5 degrees, already above the maximum temperature considered to be safe.

Extracts from:

Physiological Assessment of
Firefighting, Search and Rescue
in the Built Environment.
Published by the ODPM

Executive Summary
All firefighting and other rescue activities are dependent to a greater or lesser extent upon the physiological capabilities of firefighters. Thus the physiological limitations of firefighters must be considered when planning for conventional and terrorist incidents within the built and natural environment.
Currently, there is limited information available to fire and rescue service incident commanders on whether activities assigned to firefighters may exceed their ability to undertake the task safely within their physiological limitations, taking account of appropriate personal and respiratory protective equipment (PPE and RPE). This information is required for all operational incidents, from those attended on a routine basis, through to extreme events. While acknowledging that the expectations and performance demands placed upon firefighters will differ with the activity, there is presently little human factors guidance to support both planned and dynamic risk assessment of work activities.

Ambient conditions: no-fire

4 (12%) were successful in completing the scenario, rescuing the casualty;
10 (31%) were terminated because the threshold core temperature was reached;
6 (19%) were stopped for safety reasons (usually associated with apparent uncertainty or confusion on the part of the firefighter, possibly fatigue or heat induced); and
12 (38%) were terminated prematurely due to a shortage of air (all in the SDBA conditions).
There were no successful outcomes on the two days when the routes were novel to all participants (day 1 and day 4), suggesting that participants achieved success on the scenario only once they had 'learned' the route.
(From page 18, Chapter 3.1)

Live fire: basement/ground/first/top floor

Of the 40 serials on all floors, 9 (22.5%) were classified as *completely* successful….
… Fifteen (37.5%) were stopped as their core temperature exceeded the termination criterion of 39.5ºC, and a further 16 (40%) were stopped for safety reasons either by the safety officers or by the firefighters themselves.
In 24 of the 40 serials, the casualty was successfully rescued, but the serial was subsequently stopped prematurely as one of the termination criteria was reached during the remaining firefighting and search and rescue operations. These were classified as a 'partial success', as although the desired outcome of casualty rescue was achieved, the firefighters failed to complete the scenario safely using SOPs.

(from p 27 Para 4.1)

Note 3
Leaked DVD (time lapse indicated for broadcasters)

The first is a HIGH RISE scenario

8.10 – 11.08

A vertical component of gaining access to fire compartments was studied in a multi storey building to record the physiological demands of reaching different floor levels. Climbing stairs maybe required where either no firefighting lifts have been provided or in the case of their failure. The crews were instructed to self pace the climb taking rest periods on the way up. **This assessment did not cover the physiological component of returning to the fire service access levels. Two separate assessments were conducted in personal protective equipment both with and without carrying extended duration breathing apparatus (EDBA).**

For each floor climbed when carrying EDBA and hose it took approx 30 seconds and core temperature rose by 0.02 degrees celsius. Separate teams were tasked with providing the water supply needed and they were timed.

FF Laura Noble
"It's the weight of the set, not so much the hose, it was done up so tight – its quite restrictive"

Watch Manager Keith Feltham

"If you went in now you'd last a couple of minutes, that would be it then, you'd become a danger to your crew."

Climbing unloaded took approx 15 seconds per floor and core temperature rose by 0.01 degrees celsius. At the termination of the test a finger prick lactate sample was taken as soon as possible, between 1 – 3 minutes after exercise completion. Final readings were taken and participants provided subjected role…….and thermal comfort.

Participants were then escorted back to the instrumentation area where they were cooled and reweighed. **Climbing many floors with EDBA and hose resulted in fatigue, heat strain and physical exhaustion to the extent that committing firefighters into a fire compartment would be unsafe,** whilst climbing unloaded was less arduous and the subsequent commitment to the fire compartment would appear to be tolerable to the majority of firefighters.

Simon Hunt – Area Manager and Project Manager BDAG
" What has become clear is that existing assumptions that firefighters would be able to climb a given number of floors and then commence a fire fighting operation would given the evidence we have here appear to be limited, in fact it might require a separate team to commence fire fighting operations where others have actually provided equipment and apparatus for them."

12.58 – 15.45

At the start of the scenario base line measures of breathing apparatus (BA) cylinder pressure and core temperatures were recorded. Thereafter at 5 minute intervals readings of air pressure and core temperatures were taken. Once a core temperature of 39 degrees was reached readings were taken every 2.5 minutes. Progress along the route was recorded by noting the time at which lead firefighters reached key landmarks. During the trials both 45 and 70ml hose were used inside the building where both sizes of hose had to be dragged up to 45 metres to where the casualty was located. When the larger diameter 70ml hose was used the firefighter was supported by a further pair of firefighters to assist in advancing the hose into the fire compartment. No live fires were used but an external probe registered ambient temperatures and humidity. This was attached to but not in contact with the BA set that the firefighters wore. The trials were all self paced and participants were instructed to stay low at all times when in the building. Again, to mimic worse case scenarios under operational conditions. The termination criteria were essentially fourfold. If the air pressure of the BA set as judged by the firefighter became low participants abandoned the task and withdrew using standard operating procedures. If a core temperature of 39.5 degrees celsius was reached the physiologist terminated the test for that individual immediately and they were withdrawn from the building and actively cooled. If the participant or the safety officer judged the situation to be unsafe at any time the test was terminated for the individual in question and they were withdrawn from the building and actively cooled. Or if the team succeeded in completing the scenario the test was terminated as they exited the building. **As the trials progressed it became clear that thermal load [heat] was the prohibiting factor for crews in the accomplishment of any task and this would be at its most severe in a fire compartment.**

FF Ben Walsh
"That was very very hard. You know, you are on your knees for a considerable amount of time. Hard work on your knees and wearing that kind of set and that sort of fire gear which is very close fitting and doesn't allow for circulation of air, it doesn't cool your body down, so its extremely hot and extremely hard work."

THE NEXT PHASE IS LOW RISE

16.10 – 17.20

The next phase of the trials incorporated fire fighting and search and rescue under live fire conditions. The live fire trials began on the fourth floor of an industrial building in Moreton on the Marsh. It was acknowledged by everyone involved that the programme of live fire provided a significant challenge for both crews and equipment.

Simon Hunt – Area Manager and Project Manager BDAG
In the live fire trials we've tried to ensure we gather the most data that we can, to ensure we feed into different project areas that we are investigating. So we are also establishing not only the physiological capabilities of firefighters but also amounts of water used to fight fires, the effect that has on the fires, the fire environment within the fire compartment and how firefighters are responding to it. We are also looking to establish in the long term an intervention model to take into account the time it actually takes the firefighter to effectively deal with an incident.

19.00 – The timetable of the trials incorporated 5 basic scenarios.

The first condition was on the top floor of a building.

The second was on the second floor of a building.

The third – on the first floor.

The fourth – was the use of a lift and connection to a dry riser on the second floor.

The fifth – in a basement.

Each scenario was logged and recorded from a master time code set for all data teams. This time line meant the ignition, pre burn and any subsequent activity had a common reference in order to analyse all the data at a given point in the exercise.

The data was to be gathered by four teams. Physiological data including body core temperature, the fire environment including smoke density and fire compartment heat gradient, BA air uptake and duration and a video record of task analysis both inside and outside the fire compartment. Once all the parameters had been fixed the data logging systems were set and tested as a preliminary to the trial starting.

There was a preburn time of 40 minutes. Very early on it was realised how critical good communications are to efficient fire – ground operations. In order to randomise the tests the pairings for teams for search and rescue were changed for each scenario. The other fire – ground roles were also regularly changed. Each fire had at least one 75kg casualty to rescue and also other casualties were used in order to keep the search and rescue process unpredictable. The trials were intensive and paramedic help was on standby. The firefighting teams were monitored closely at all times as working in these conditions can quickly affect anyone.

The most challenging scenario was in the basement where crews were tested to their limits. **On a number of occasions the trials were terminated early as firefighters were taken out due to heat stress. The data from the live fires confirm that physiological stress factors**

should play an important role in planning the appropriate response [FBU: numbers and speed of attendance] to a major fire incident.

FF Jim McPartland
"After we got into that second fire compartment that really turned the temperature up. Just rocketed up."

FF Ollie Stalworthy
"We were working ok and then suddenly the heat really hit me and I could feel it on my neck, getting really hot through the flash hood."

FF
"I had plenty of air left and I felt ok but when I was told to return and I stood up it dawned on me that I wasn't ok – I felt light headed and my legs were wobbly."

FF
"We got to the second fire – I felt the heat on the back of my neck and on my knuckles – when we got to the landing I suddenly felt sick."

Simon Hunt
"Certainly we've been surprised by what we've found**. In the case of the firefighting with live fires, the distances we've set and the fire sizes are nothing that might be regarded as extreme and yet on pretty much a larger number of fires, firefighters are going over the core temperatures and it is only because we've got the safety systems in place that we are able to ensure the firefighters safety. In an operational incident those control measures may not actually be in place."**

The results of this work have shown that the physiological demands of firefighting and rescue operations are significant. <u>These factors must be taken into account when planning operational response [FBU comment: means numbers deployed and speed of deployment] producing guidance for fire and rescue procedures and developing building designs.</u> New and revised standards for respiratory and protective equipment will also need to be re-evaluated in the light of this research.