



**Metropolitan Fire and
Emergency Services Board**

PFAS Exposure Pathways Assessment - Largs North Fire Station

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Purpose:

South Australian Metropolitan Fire Service's (SAMFS) Chief Officer Michael Morgan has commissioned this report to provide recommendations on the per-fluoroalkyl and poly-fluoroalkyl substances (PFAS) contamination of the Largs North Fire Station, the exposure pathways to firefighters and the appliance and equipment implications.

Background:

Elevated PFAS levels have been detected in firefighter's blood serums that have been stationed at SAMFS's Largs North Fire Station. Environmental PFAS test results and the produce test results from the Largs North Fire Station, in addition to PFAS test results from the MV Gallantry, have shown PFAS contamination.

MFB have been requested to provide advice in regards to potential occupational PFAS exposure pathways that may have led to these elevations.

The potential exposure pathways for human PFAS contamination are ingestion, inhalation and to a lesser degree skin absorption. These potential exposure pathways are significantly increased for firefighters, compared to the average population, due to operational firefighting duties.

Firefighters are repeatedly exposed to PFAS products in the course of their duties, be that emergency response or training activities.

The MFB PFAS Project Team have been provided with environmental PFAS test results, groundwater test results, drainage plans and produce test results from the Largs North Fire Station. PFAS test results have also been provided from the MV Gallantry, in order to assist in the identification of potential occupational exposure pathways. Telephone interviews have been conducted of both past and current firefighters stationed at Largs North Fire Station.

The potential PFAS exposure pathways that can be identified at Largs North Fire Station are numerous. Based on the presented evidence, firefighters at Largs North Fire Station have increased PFAS exposures due to historical contamination, current local practices, geographical location and role requirements, that are unique to this fire station. This can be confirmed by the number of excessively high PFAS blood test results from firefighters stationed there.

It should be noted that SAMFS have not been the sole contributor to the site contamination, as the station is located in the vicinity of major hazard facilities and industrial sites. Groundwater testing and drainage plans confirm elevated PFAS levels have been detected below the fire station site, particularly in an underground soakage pit beneath the chicken run, which overflows into the gutter on Victoria Drive.

This evidence suggests that some of the PFAS contamination has originated from offsite industrial activities, which have contributed to the legacy PFAS burden now identified. Further independent environmental testing of the surrounding industrial sites would be recommended.

Firefighter safety is paramount in any future decisions regarding the Largs North Fire Station. Whilst various remediation strategies can be employed to reduce the future exposure risks at the station, the location of the station being both downwind and downstream of the various industrial sites, as well as the repeated and unavoidable exposures to firefighters with elevated PFAS blood burdens and confirmed historical site contamination, means acceptable elimination of those risks cannot be achieved.

As outlined in the **PFAS National Environmental Management Plan 2018 (NEMP), Chapter 3, Guiding Principles** ¹, the 'precautionary principle' must be applied in this circumstance.

Historical Practices and Contamination:

After conducting firefighter interviews, obtaining information and reviewing PFAS test results, it has been established that the soil, groundwater and infrastructure at Largs North Fire Station are contaminated with PFAS.

PFAS is a persistent organic pollutant that bio accumulates and bio magnifies. PFAS has a half-life in humans anywhere between 5 to 8.5 years, providing no further exposures occur. Various State and Federal Statutory Authorities have been reluctant to provide much advice and have been slow to set reasonable threshold limits.

The limits that have been set, have been based on community exposures which the recent **Federal Government Senate Inquiry into the management of PFAS contamination in and around Defence bases** ², acknowledged as inadequate and recommends be reviewed. Below is an excerpt of the final report:

Recommendation 3

3.75 *The Committee recommends that the Australian Government review its existing advice in relation to the human health effects of PFAS exposure, including to acknowledge the potential links to certain medical conditions.*

Further to this, the Australian Federal Government commissioned the **PFAS Expert Health Panel** to provide advice to the Government. The **PFAS Expert Health Panel Final Report** ³ released in March 2018 states the following:

The occupational studies relate to manufacturing workers, not end users such as firefighters who are the major group at risk of occupational exposure in Australia.

Firefighting is a unique occupation due to the very nature of the job. Whilst dermal absorption is generally not a major pathway for general public, firefighters are different. For every 5 degree increase in surface body temperature, there is a 400% increase in dermal absorption ⁴. Coupled with the fact that most firefighters have cuts, grazes or abrasions on their bodies at any given time, the calculations for dermal absorption are massively inadequate.

¹ PFAS National Environmental Management Plan 2018 (NEMP), Chapter 3, Guiding Principles

² Federal Government Senate Inquiry into the management of PFAS contamination in and around Defence bases

³ PFAS Expert Health Panel Final Report

⁴ FDNY Reduce your Risk www.fdneypro.org/reduceyourrisk

Summary of Information identified in interviews with firefighters regarding past practices/incidents

- As identified early on, chickens have been kept on site and their eggs regularly consumed.
- Some firefighters have taken eggs and produce home to family members.
- Fruit and vegetables have been grown on site and consumed by firefighters.
- Extensive foam drills have taken place in the rear yard of the station, with donated, expired foam concentrate, donated by major hazard facilities. Similar drills have also taken place in the property directly behind the fire station.
- Foam concentrate has been used on site in an attempt to reduce dust levels.
- Foam concentrate has been used to remove oil and grease on both engine bay floors and rear yard.
- Some firefighters have used foam concentrate as both an engine degreaser and hand cleaner.
- Most firefighters have reported excessive dust build up from neighbouring industrial properties. This dust builds up both inside and outside the fire station, (which is confirmed by testing results of the return air ducts in the station)
- Excessive dust build up found on firefighters private vehicles after most shifts.
- Multiple fires/incidents/false alarms, with massive releases of AFFF foam product, have occurred in surrounding Major Hazard Facilities.
- Structural PPE dry-cleaning is sporadic and not adhered to by some of the firefighters. Reasoning included the fact that only 2 sets of Structural PPE is issued.
- After monthly foam testing on the MV Gallantry, hoses are brought back to the fire station and cleaned and flushed of foam concentrate onto the garden beds.
- Breathing Apparatus is not generally worn at foam drills or false alarms when foam systems have activated.
- Reported gradual and unexplained loss of 1000's of litres of AFFF foam concentrate directly into the ground and water table, from a major hazard facility.
- Reports of foam bubbling out of some of the storm water drains.

Findings

1. Largs North Fire Station, both the site and infrastructure is contaminated with PFAS.
2. Firefighters at Largs North Fire Station have well above average PFAS levels in their blood serum.
3. Site contamination caused by historical SAMFS practices; however surrounding industrial sites have also contributed to this contamination.
4. Likely exposure pathways in order of significance.
 - a. Ingestion via eggs and produce.
 - b. Ingestion via hand-mouth cross-contamination to both foam exposures and contaminated soils.
 - c. Direct skin contact with foam concentrate and foam solution including ingestion and inhalation, during drills and foam releases at industrial sites. Aqueous Film Forming Foam (AFFF) is still the main foam concentrate utilised by the majority of the surrounding Major Hazard Facilities.
 - d. Ingestion and inhalation via contaminated dust and soil. (It should be noted that the PFAS exposures due to contaminated dust from general soil contamination would be minimal compared to the other identified exposure routes).
 - e. Direct skin contact with foam concentrate whilst working on MV Gallantry.
5. The tested fire appliance stationed at Largs North does not appear to be a major contributor to elevated PFAS exposures, based on test results.
6. Firefighters and their families are experiencing varying levels of stress and anxiety in dealing with the information that has been presented. Most firefighters interviewed have expressed their appreciation of the support offered by both MFS and UFU.

Recommendations

Given the evidence that has been presented and evaluating the likely success of any remediation, which would include significant building modifications and extensive excavation, the prospects of continued PFAS contamination remain high. The health and safety, inclusive of the mental health, of firefighting personnel stationed at Largs North Fire Station is paramount.

The decommissioning of any fire station requires careful consideration, however taking into account all of the information presented; it is recommended that SAMFS strongly consider permanently decommissioning Largs North Fire Station. This would require the relocation of staff and equipment to another suitable site, taking into account strategic location, risk profiles and GIS data.

With regard to the firefighting personnel that have been stationed at Largs North Fire Station, both the MFS and UFU should continue to provide both the emotional and medical supports that have been offered to date.

In addition to this it is recommended that MFS seek to participate in the **MFB/Macquarie University PFAS Blood Reduction Study**, in order to reduce the PFAS legacy burdens in firefighter blood serum.