PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) IN AN OCCUPATIONAL COHORT: FINDINGS FROM A PILOT PROGRAM AMONG INDIANA FIREFIGHTERS

Executive Summary

2025

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The Indiana Department of Homeland Security's (IDHS) voluntary pilot program marks Indiana's first step toward proactively assessing and addressing the occupational PFAS exposure risks faced by its first responders – specifically current and retired firefighters. This initiative is being guided by the established research and clinical frameworks developed at the federal level, ensuring Indiana's actions are aligned with national best practices for testing and patient care. As a foundational effort, the study established a preliminary exposure baseline for Hoosier firefighters. While it is too early to definitively pinpoint specific causal factors for the elevated PFAS levels observed, this finding highlights the critical need for continued, expanded research and testing to fully map the specific exposure pathways and implement evidence-based protective protocols statewide to protect our first responders.

The program tested 316 firefighters from across Indiana (career, volunteer/combination, municipal, airport and industrial departments) and paired blood testing with an exposure survey covering foam use, gear handling, station practices, incident tasks and decontamination behaviors.

WHAT WE FOUND

- **PFAS levels may be elevated relative to the U.S. general population.** Using the National Academies' recommended sum of seven PFAS to inform clinical care, 88% of Indiana firefighters fell in the "potential for adverse effects", 3% were "increased risk", and only 9% were "low risk". These bands help orient follow-up but are not diagnoses.
- **Foam use shows a dose–response pattern.** Self-reported frequency of using PFAS-containing foams was significantly associated with higher PFAS risk categories. Firefighters who reported daily, weekly or monthly AFFF use had a notably higher share of elevated results than those who used foam rarely or never.
- **Decontamination of gear and self appear protective.** Cleaning PPE after exposure was linked to lower PFAS categories. Personal decontamination trended in the same protective direction.
- **Gear and station contact matter.** High gear contact frequency was associated with higher averages of PFAS biomarkers, consistent with contact and dust pathways observed in the fire service literature.
- **Task patterns are consistent with incremental exposure.** Participation in hazardous materials and water-emergency responses showed small, positive correlations with higher PFAS burdens (statistically significant for hazmat), with suggestive trends for airport crash rescue/ARFF.

WHAT THIS MEANS FOR INDIANA: RECOMMENDED ACTIONS GUIDED BY FEDERAL INITIATIVES

This preliminary data establishes a necessary research foundation for Indiana, highlighting the immediate need for expanded testing and data collection to fully inform protective action aligned with the national EPA's PFAS Strategic Roadmap goals: research, restrict and remediate.

1. **Advance future testing and research.** Research is essential in understanding and combating PFAS. This continued collection of variable exposure data is important to support ongoing federal research efforts to better understand occupational exposure pathways and the long-term health implications for the fire service. This effort is guided by the national push to measure and monitor PFAS in humans.
2. **Protect.** PFAS are believed to reach firefighters mainly through ingestion (e.g., hand-to-mouth transfer of residues and dust, drinking-water contributions) and occupational inhalation of aerosols and dust. These exposure routes underpin the observed patterns in Indiana's data and point to consideration of practical controls, including implementing foam transition control, on-scene and post-incident decontamination and establishment of separated clean gear and clean quarters with separate ventilation from contaminated gear.
3. **Inform.** Implement a standardized biomonitoring program. PFAS blood tests are exposure measurements, not disease tests. While they cannot pinpoint a specific source, determine causation for an individual or predict a person's future health, testing can nonetheless guide exposure-reduction counseling and align follow-up with widely used clinical frameworks. A biomonitoring program could offer voluntary no-cost testing with targeted outreach, provide each participant with a plain-language results sheet, a clinician letter aligned with CDC/ATSDR and NASEM guidance and integrate PFAS exposure history into surveillance for continuous monitoring and improvement.

This report was prepared by Delineate, LLC, in collaboration with the Indiana Department of Homeland Security (IDHS).