Formosa Journal of Applied Sciences (FJAS)
Vol. 5, No. 4 2026: 1019-1032

PFAS in the Workplace: A Risk Manager's Framework for Occupational Exposure, Regulatory Compliance, and Total Cost of Risk in 2026

Kimberly Long Holt
Health and Safety Concepts – Environmental Health & Safety
Corresponding Author: Kimberly Long Holt ka3027@yahoo.com

A R T I C L E I N F O

Keywords: PFAS, Occupational Exposure, CERCLA, Total Cost of Risk (TCOR), Hierarchy of Controls

Received: 22, December
Revised: 24, February
Accepted: 26, April

A B S T R A C T

One of the most pressing regulatory and occupational health issues that the risk managers of 2026 will face is the presence of per- and polyfluoroalkyl (PFAS), the so-called forever chemicals. The article offers an ARM-congruent system of dealing with PFAS exposure prior to it being turned into claims, fines, or Superfund liability. The analysis will rely on NIOSH, EPA, peer-reviewed literature, and high-risk occupational exposure pathways of high-risk substances, as well as the rapidly changing federal and state regulatory framework, including current active TSCA Section 8(a)(7) reporting deadlines in 2026. A Hierarchy of Controls framework and Total Cost of Risk analysis are performed on one simple manufacturer with a history of AFFF application. Findings show that CERCLA cleanup liability and civil litigation costs are significantly higher than the workers' compensation exposure.

DOI prefik: https://doi.org/10.55927/fjas.v5i4.39
ISSN-E: 2962-6447
https://journalfjas.my.id/index.php/fjas

INTRODUCTION

Per- and polyfluroalkyl (PFAS) are a family of as many as 14,000 synthetic molecules, the carbon-fluorine bond, which is one of the strongest in the organic chemistry domain, a feature which characterizes this type of chemical bond. It is this diatomicity that contributes to the popularity that PFAS has found as an agent in industry: it provides unprecedented service in its ability to withstand heat, water, oil, and chemical degradation. It is also the one that leads to such a threat to the environment and organisms of PFAS. PFAS have found their way into soil, water, air, and living tissue since they are not eliminated through the normal environmental conditions- they have acquired the title of forever chemicals. According to the researchers, today, 97 percent of U.S. citizens are found to have at least some detectable concentration levels of PFAS in their blood (Agency for Toxic Substances and Disease Registry, 2024).

The exposure of PFAS can occur through polluted drinking water, food containers, and materials to the general population. The profile of exposure, however, is categorically different in the case of the workers at certain industries: more concentrated, more direct, and prolonged. NIOSH has outlined chemical manufacturing workers, firefighters, and ski wax technicians as the most reported PFAS burdens- though the literature on the high-risk groups is expanding to include metal plating, textile production, aerospace, construction, and healthcare.

PFAS will be a compound of three overlapping risks in the year 2026 to the risk manager that involve an accelerating regulatory environment with hard compliance dates in the current year, a growing repertoire of occupational health liability grounded on CERCLA hazardous substance listing, and an insurance sector that is busily weakening PFAS coverage. The following article is focused on providing a systematic ARM-oriented history of cognition and control of these threats before they serve to turn them into claims, fines, or Superfund liability.

LITERATURE REVIEW

PFAS in the Workplace: Exposure Pathways and High-Risk Industries

The first step in identifying the occupational PFAS hazard is the awareness of the places where the chemicals are found and the pathways through which they enter the employees. PFAS does not have a limited number of applications. They are buried in the products, operations, and personal protection of dozens of industries, and they are often not visible even in the surface of a common workplace hazard audit. There are four significant mechanisms through which occupational exposure to PFAS can occur that imply different approaches to designing the industry hygienic programs. These paths and the most affected industries are highlighted in Table 1.

Table 1. Occupational PFAS Exposure Routes, Mechanisms, and Primary Industries Affected

Route of Exposure	Mechanism	Primary Industries Affected
Inhalation	Airborne PFAS particles, aerosols, and thermal degradation products from heated surfaces or foam deployment	Firefighting, fluorochemical production, metal plating, textile finishing
Dermal Absorption	Direct skin contact with PFAS-containing foams, coatings, treated fabrics, and surface residues	Firefighting (AFFF, turnout gear), manufacturing, construction
Ingestion	Hand-to-mouth transfer from contaminated surfaces, tools, or PPE; contaminated drinking water at the worksite	All industries; the highest risk is in chemical manufacturing and fire stations
Ocular Contact	PFAS aerosols or splashes contacting mucous membranes during foam application or chemical handling	Firefighting, chemical manufacturing, and laboratory settings

Note: Most high-risk workers face concurrent exposure through multiple routes, compounding total body burden. Sources: Seacat et al. (2023); NIOSH (2024); OSHA (2024).

Interestingly, this observation brings about the fact that, even today, OSHA has not specified any federal permissible exposure limit (PEL) of any PFAS compound. There are three separate PFAS (perfluoroisobutyl (PFIB), perfluorobutyl ethylene (PFBE), and ammonium perfluorooctanoate (APFO)) that are recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) and may have some Threshold Limit Values (TLVs), though they are not legal limits. In any other case, in changed conditions wherein there is no PFAS-related OSHA standard, both parties will bear the liability under the General Duty Clause (Section 5(a)(1) of the OSH Act), under which employers have a responsibility to ensure a workplace without hazards known to cause death or serious bodily harm. Given the reported health outcomes, it is clear that PFAS exceeds this level in the workplace where there is high exposure (OSHA, 2024).

Occupational exposure literature establishes a firm hierarchy of industry PFAS burden. The PFAS is existing in high serum concentrations in the workers of the fluid used in making fluorochemicals, of up to 120ng/mL up to beyond 11 thousand nanograms per milliliter (ng/mL), by several orders of magnitude higher than the 1 to 3 ng/mL reference range of the general population (NIOSH, 2024). The second group to be in the most relatable danger is caused by the presence of two exposure routes of aqueous film-forming foam (AFFF), which incorporates concentrated PFAS and PFAS-treated structural firefighting equipment, the outer coating of which is composed of fluoropolymer-coated fabrics. Airport and aircraft rescue firefighters occupy the leading place in the firefighting group, as the level is approximately 2 times greater than in the municipal group (Rotander et al., 2015).

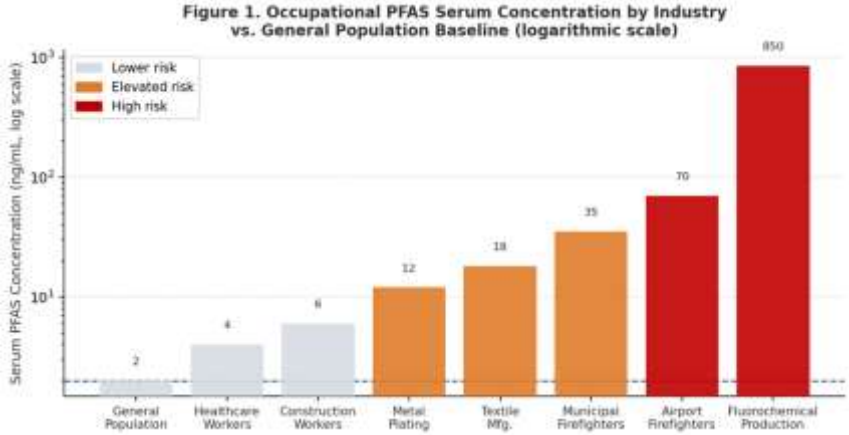

Figure 1. Occupational PFAS Serum Concentration Ranges By Industry Relative to The General Population Baseline (~2 Ng/Ml). Logarithmic Scale Reflects the Dramatic Differences in Exposure Magnitude Across Sectors

Sources: NIOSH (2024); Seacat et al. (2023); NHANES 2005–2014.

Health Effects: What the Science Says in 2026

The epidemiological evidence linking poor health conditions with exposure to PFAS has been reinforced in the past decade. Despite all that science has and is currently developing, particularly in terms of dose-response relations and selective toxicity of more recent compounds of shorter chain length PFAS, the signal that there is a case regarding precautionary action in high-exposure occupational settings is undeniable. PFAS is an endocrine disrupter and immunotoxicant, the most evident of which is concentrated in the following health areas.

The most common effect occurring is cholesterol increase, where occupational studies have shown an increase in the total and LDL cholesterol levels in fluid carbonherbal workers and firefighters with exposure to industrial levels. Weakening of the immune system, or rather antibody reaction towards vaccines, has been demonstrated in both children and adults at work, and there is a threat to occupational populations due to the factor, making citizens use vaccination to suppress infections, including that of healthcare employees. One of the PFAS compounds that is impaired is thyroid hormones, with the higher incidence of PFOA and PFOS, with hypothyroidism being an already occurring

condition amongst employees who are already exposed to demanding jobs in terms of physical exposure. As it has been recorded, the liver damage, which is manifested by high hepatic enzymes, has been recorded in the workers of fluorochemical production since the onset of the 2000s.

In 2023, the International Agency for Research on Cancer (IARC) categorized PFOA as a Group 1 human carcinogen. Most of the cancers of interest in the occupational population, such as kidney cancer and testicular cancer, are high in cohort studies involving high-exposure workers. Other cancers of the firefighter cancer literature include bladder cancer and non-Hodgkin lymphoma, with the attributed portion to PFAS rather than other occupational carcinogens, the topic of an ongoing study (IARC, 2023). The legal and workers' compensation ramifications of such commitments are enormous. As scientific views become harder, the barrier to the demonstration of causation in the claim of occupational diseases will continue to become smaller.

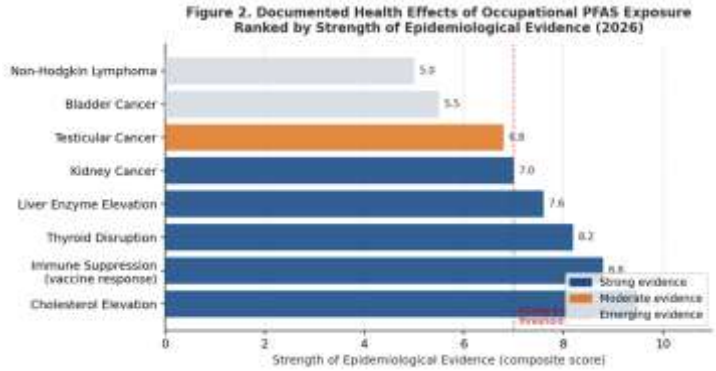

Figure 2. Documented Health Effects of Occupational PFAS Exposure Ranked By Strength of Epidemiological Evidence. Cholesterol Elevation and Immune Suppression Carry the Strongest Evidence; Kidney and Testicular Cancer Associations are Classified As Strong.
Sources: IARC (2023); NIOSH (2024); CDC (2025).

The Regulatory Landscape: What Employers Must Know in 2026

PFAS regulation has also been among the aspects of environmental and occupational health law that have been developing at a rapid pace in recent years. Risk managers who have a compliance posture for the year 2023 or 2024 are operating on dated data. The most important federal PFAS advantage to employers is the designation of perfluorooctanoic (PFOA) and perfluorooctanesulfonic acid (PFOS) as hazardous chemicals in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This title goes along with life-threatening legal repercussions. All entities that have disposed of, released, or are intended to dispose of any of the identified hazardous substances, either accidental or inadvertent passive receiver, may be held liable under CERCLA as a Potentially Responsible Party (PRP) to clean up expenses at any polluted site (EPA, 2024).

The EPA has acknowledged the issue of passive receiver, where the companies, which transferred passive receiver material that the companies had distributed without their consent, deserve the same severity as the producers, and appealed to Congress to redress the circumstances. As of early 2026, all the statutory exemptions have not been enacted, so passive receiver liability remains a potential active exposure to any company that engages in activities that generate waste streams with PFAS.

Under Section 8(a) (7) of the Toxic Substances Control Act (TSCA), all parties (during the period 2011-2022), including those manufacturing or importing PFAS chemicals or other articles containing PFAS, will be required to apply to the EPA with detailed information. A majority of manufacturers and importers have their reporting period according to April 13, 2026, and October 13, 2026, i.e., the given obligation will be effective at the moment of publication. Any infraction of the reporting requirements by TSCA would be subject to fines of up to $37,500 per day (EPA, 2026).

EPA has been gradually adding more quoted PFAS substances that shall be covered under the Toxics Release Inventory (TRI). In 2025, nine PFAS were added to the TRI and currently comprise 206 compounds on the PFAS subject to annual reporting in 2026. What is more important, the minimum exemption of the chemical in PFAS on the TRI list is no longer present; even a very small amount of the chemical can be considered a trigger to automatic reporting.

PFAS also find their way into food wrappings in twenty states that have banned them. Included are such states as Maine, Washington, Minnesota, Colorado, and New York, which issued prohibitions on PFAs in children's products, cosmetic products, fabrics, and cookware. The federal drinking water standards of PFOA and PFOS have been established by the state of California in the Assembly Bill 794 (2025). Therefore, they hold their position regardless of the changes that may follow after by the federal authorities. The compliance chart would require dynamic monitoring for employers in more than one state, an active requirement not only in terms of the legislative acts that will be active but also of the pipeline bills that are going to impact the areas of high concern (Source Intelligence, 2024).

Figure 3. Key PFAS Regulatory Milestones Affecting Employers From 2023 through 2027. The April–October 2026 TSCA Section 8(A)(7) Reporting Window is the Most Immediate Active Compliance Obligation for Most Manufacturers and Importers.

METHODOLOGY

The research is a qualitative, non-empirical, analytical review. No primary data collection was used; there are no human participants, no sampling process, no research tools, or pilot tests. Only secondary sources have been used in the analysis. The sources used are peer-reviewed literature and occupational health reports of epidemiology and occupational health, federal regulatory documents and agency guidance (EPA, NIOSH, OSHA, ATSDR), CERCLA and TSCA statutory texts, TRI reporting data, and industry loss statistics. These sources were discovered with the help of specific searching of academic databases and repositories of federal agencies by the use of such keywords as PFAS, occupational exposure, risk management, and regulatory compliance.

The framework of the analytical activity is based on the Associate in Risk Management (ARM) curriculum and is structured around four elements, namely: (1) occupational PFAS exposure pathways and industry-specific burden data; (2) synthesis of current epidemiological data on health effects; (3) regulatory compliance mapping of CERCLA, TSCA Section 8(a)(7), TRI, and state-specific requirements; and (4) Total Cost of Risk (TCOR) monitoring by integrating the industrial hygiene hierarchy of controls. There was no hypothesis testing since it is a descriptive and analytical, but not an inferential study. The mentioned regulatory timeframes and agency instructions are all in place as of the time the article was published.

RESEARCH RESULT

The Financial Exposure: PFAS and the Total Cost of Risk

The compliance with regulations is not the single point of the issue of PFAS that can be applied to the ARM-certified risk manager. The more strategic issue is that PFAS has been subjecting the company to different categories of the Total Cost of Risk (TCOR), whether such an exposure is snowballing or not. Arguably, the most crucial financial change that the risk manager must address immediately (perhaps the most crucial) is the volcanic drop in the insurance coverage of the PFAS. PFAS-related claims are targeted by aggressive actions of insurers in the general liability line, pollution liability, and workers' compensation line to such an extent that it attracts the attention of insurers. PFAS pollution exclusions on most commercial general liability (CGL) policies are absolute. The policies that were formerly protectionary against slow conditions of pollution that were once referred to as environmental impairment liability are undergoing reformation to not cover PFAS.

The workers' compensation line is more problematic: as the system of workers' comp is that of no-fault occupational diseases, the claims associated with PFAS-based occupational diseases, in particular, the claims associated with cancer due to firefighters, will go through the workers' comp system one way or the other. However, because the time lag between the exposure of PFAS and the subsequent diagnosis of cancer may take years or decades, a vast number of such assertions are being brought forward several years or decades after the exposure of the cause occurred, which is pushing the sufficiency of self-insured employers' reserves under captive programs.

The CERCLA cleanup liability is the worst possible financial liability of PFAS. The environmental remediation of the PFAS-contaminated sites is astonishing: PFAS belong to neither the typical systems of soil and groundwater treatment, nor the most effective ones will be high-temperature incineration technologies or other complex oxidation, which is even more costly in comparison with standard hazardous waste disposal. A precedent has been set in high-scale settlements in the PFAS civil lawsuit on the dimension of these expenditures. In 2023, 3M Company would spend up to $10.3 billion to compensate the claims of the PFAS contamination of the nearby water systems. Most of the employers would have no connection with the manufacturers of fluorochemicals. However, any company whose operations led to the contamination (or might have led to the contamination) of the site, the use of AFFF or PFAS-containing industrial chemicals, or PFAS-treated materials, would be at risk of being designated as PRP under CERCLA.

Fig 4 presents the TCOR profile of an average mid-size manufacturer, where the process chemicals, and PFAS-containing AFFF, and the history of AFFF and PFAS-containing process chemicals use are shown. The problem of critical understanding is the level of the indirect and uninsured cost relative to the direct and insured cost. CERCLA cleanup and civil litigation are the two greatest potential liabilities that are far too large to be covered by the conventional insurance programs offered on the current market.

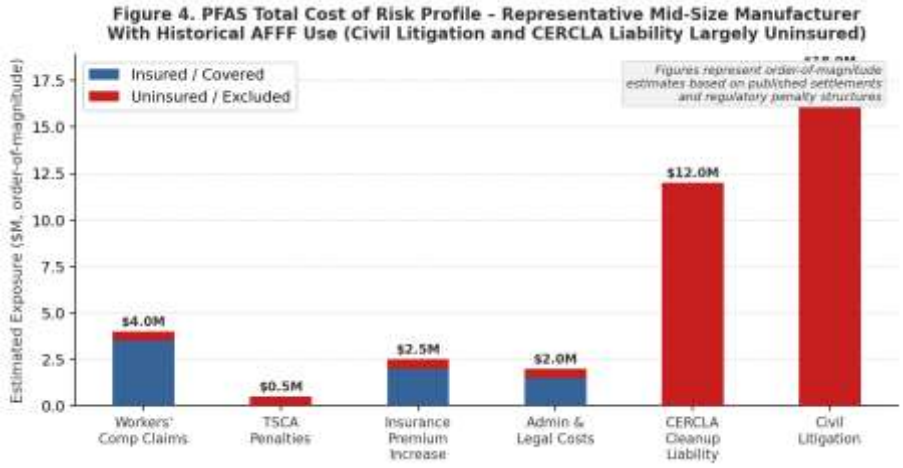

Figure 4. PFAS Total Cost of Risk Profile for a Representative Mid-Size Manufacturer with Historical AFFF Use. Civil Litigation and CERCLA Cleanup Liability Dwarf Traditional Workers' Compensation Exposure and are Increasingly Excluded from Standard Insurance Programs.

The Employer's Response: A Hierarchy of Controls Framework

Given that PFAS risk is multifaceted and could be connected to occupational health, environmental liability, regulatory compliance, and insurance, the most efficient organizational response can be designed. The PFAS mitigation has a rational design that combines the ARM Risk Management Process with the industrial hygiene Hierarchy of Controls into a logical framework. Table 2 produced the correspondence and mapping of each level of the Hierarchy of Controls and a specific PAS of a PFAS, which is regulated or controlled by a particular regulatory or professional standard.

Table 2. PFAS Hierarchy of Controls Framework Mapped to Workplace Applications and Regulatory Basis

Hierarchy of Control	PFAS-Specific Application	ARM / Regulatory Basis
Elimination	Phase out PFAS-containing AFFF; replace with fluorine-free foam (F3) alternatives; substitute PFAS-treated PPE with non-fluorinated alternatives where performance standards permit	NFPA 11 (2021 ed.); EPA TSCA new use review; CERCLA liability avoidance
Substitution	Replace PFAS-containing process chemicals with non-fluorinated alternatives; audit SDS inventory for PFAS under CAS registry and EPA CompTox database.	OSHA HazCom 29 CFR 1910.1200; TSCA Section 5 SNURs
Engineering Controls	Install local exhaust ventilation at thermal processing stations; implement closed-loop chemical handling systems; establish decontamination stations before break areas.	OSHA General Duty Clause; ACGIH TLV guidelines for PFIB, PFBE, APFO
Administrative Controls	Rotate workers to limit cumulative exposure; implement PFAS-specific written exposure control plan; establish biological monitoring program for high-exposure occupations.	NIOSH occupational exposure guidelines; ARM risk identification framework
PPE	Chemical-resistant gloves (butyl rubber or neoprene), splash goggles, Tyvek coveralls, and half-face respirators with P100/OV cartridges for AFFF handling; separate laundering of PFAS-contaminated gear	OSHA PPE standard 29 CFR 1910.132; NFPA 1971 turnout gear standard

Elimination And Substitution Remain the Preferred Approach where Operationally Feasible; PPE is the Last Line of Defense, not The First. Source: NFPA (2021); OSHA (2024); NIOSH (2024).

The most significant response development to be undertaken by the organizations that have not yet adopted the change of not using AFFF is the assessment and the adoption of foams that contain fluorine-free counterparts. The National Fire Protection Association (NFPA 11, 2021 edition) has steadily been able to accommodate F3 systems, and the Department of Defense has vowed to bring about a complete elimination of AFFF. From a CERCLA liability viewpoint, the single other instrument of avoiding the history of accounting liability accumulation is eliminating the source of PFAS generation. The ARM principle of risk avoidance can apply here: the more years an organization can continue working with AFFF, the more years of hypothetical PRP accumulation at the field where the training takes place, the drain systems, and the groundwater.

Since employees in high-exposure occupations are not yet able to exhaust lesions of PFAS exposures, particularly in the instance of municipal firefighters, whose access to alternative environments due to the use of work gear being treated with PFAS might be restricted by budgetary cycles, a biological monitoring arrangement offers the leading indicator functionality not available in its air monitoring counterpart. PFAS testing of serum is used to measure baseline body burden and time variation, and nurses and workers whose occupational routes suggest the necessity of using further controls or job rotation. Even though OSHA does not currently impose any legal requirement on employers to carry out biological monitoring of PFAS, a construction obligation is imposed on employers who are aware of the exposure and the associated health effects reported on the exposure. One of the ARM perspectives is that a written biological monitoring program offers some defensible documentation in case the occupational disease claimant surfaces in the future.

Employers in the Hazards Communication Standard stipulated by the OSHA (29 CFR 1910.1200) must maintain the complete chemical inventory and Safety Data Sheet (SDS) of all the hazardous chemicals present in the working environments. The requirement is more complicated in the case of PFAS, which, on the surface, might appear easier than it may seem, since, although the product might contain PFAS, treated fabrics, coating, lubricants, firefighting equipment, etc., the product or SDS label shall remain silent on the issue. TSCA reporting requirements of EPA are adding a reinforcing loop onto the problem: the information submitted under Section 8(a) (7) will provide insight into the extent to which PFAS is used within the supply chain, and employers who realize that they are holding PFAS in their inventory according to the process should be identified to become in the process of continually revising their HazCom programs.

Insurance Strategy and Risk Financing

Based on the rapid convergence of the PFAS insurance coverage, the insurance plans of the risk manager must be multi-layered and proactive. The first one is the general audit of all PFAS exclusion language insurance placements of the type CGL, pollution liability, workers' compensation, directors and officers (D&O), and Umbrella/excess. Endorsement has been made with numerous extensions on renewal without an express statement, particularly on the pollution liability line. The risk managers are suggested to request their brokers to provide written confirmation that PFAS covers the policy and save the record of any exclusions that have been added during the recent renewal.

PFAS is a challenge and an opportunity for organizations utilizing a captive insurance company. The challenge is reserve sufficiency: PFAS occupational disease claims are long-term, and CERCLA cleanup liability has no time limit, so it is difficult to determine the loss. The chance is: a well-capitalized prisoner and a high-risk loss-off initiative has the potential to become capable of providing coverage to the business market that is presumably uncovered, at a premium of the organization's improved risk profile, and not the market-wide rates of the PFAS panic. This is the captive advantage in the ARM risk financing curriculum that is implemented in a risk category that is undergoing.

Implementation Roadmap: The ARM Six-Step Approach

The frameworks above must be converted into practice within an organization using a systemic process. The roadmap below transforms the ARM six approach to Risk Management Process into a PFAS risk assessment and control program requirements. STEP 1-Scan the Environment: Find out if your industry, processes, or past operations fall in any of the high exposure categories. Make a comparison with the EPA CompTox database and TRI PFAS list. Under TSCA reporting requirements, Act Now Section 8(a) 7 TSCA reporting requirements, the April 2026 period of reporting has commenced. Step 2-Identifying the Risk: The Industrial hygiene assessment PFAS provided, testing the air of the likely sources of emission, wiping on the working surfaces of PFAS-containing material, and baseline testing of employees in the high exposure occupations defined. Identify all the PFAS products at the workplace and calculate their exposures.

Step 3: Risk Analysis: Risk evaluation. Evaluate the risk degree and probability of losses related to PFAS in the TCOR categories: workers' compensation, occupational disease, CERCLA cleanup, TSCA exposure to penalty, and civil action. Practice the CERCLA test to determine if your work has ever involved the use of AFFF at a single point in time. Step 4--Choose Techniques: The Hierarchy of Controls model in Table 2, with priority on the elimination and substitution ones, should be used. With respect to the AFFF case, in particular, consider F3 choices and prepare an exit schedule. Step 5-Implement: Amend HazCom programs, SDS inventory, and staff training to incorporate PFAS hazards. Implement a non-disciplinary biological monitoring program. Quickly orient top management on the lapses of CERCLA coverages and insurance coverage. Deliberate on environmental counsel to do the A Phase I/II evaluation if it is seen that AFFF was used in any of the facilities that the

company owns. Step 6- Monitor and Adjust- track the regulatory developments monthly. Monitor state legislation in all the countries where your organization is operating. Re-audit new PFAS insurance placements of the new language insurance on a renewal basis.

DISCUSSION

The fact that CERCLA of hazardous substances designation and active TSCA reporting matters coincide with narrowing insurance coverage is a compounding crisis to any employer that has in any manner worked on the usage of PFAS. That is why it is particularly true with the TCOR profile: the most vulnerable category of PFAS-related financial costs is covered by workers' compensation claims on occupational diseases, yet it could be compared to the CERCLA cleanup liability and civil litigation, which are not covered by traditional insurance. The settlement of 3M contaminating public water systems with the PFAS of up to 10.3 billion in 2023 gave rise to a precedent that was closely monitored by the litigation fraternity.

Particular attention is paid to the crisis of insurance coverage. The majority of commercial general liability cover is being revised and covers absolute PFAS pollution exclusions, and environmental impairment liability policies that were initially written to cover gradual pollution conditions are being changed to exclude PFAS. The issue of reserve adequacy that presents a difficulty to project using the traditional actual instruments is the long latency between exposure to PFAS and cancer diagnosis, which may take decades to manifest in self-insured employers and captive programs. This captive benefit is the one described in the ARM risk financing course. An aggressive PFAS risk removal scheme will have the capacity to cover the risk that the commercial market will not, at a premium, determined by the fact that the organization owns better risk rather than risk-phobia across the market (Bryan Cave Leighton Paisner, 2026).

The biological monitoring framework is also worth mentioning among the most prominent ones. Serum PFAS testing may be used to establish the baseline body burden, temporal variation in pattern, and workers who may need heightened controls or job rotation in high-exposure employees that cannot be eradicated by the interaction between PFAS and the workers. An approved biological surveillance program document in ARM terms will leave a defensible paper trail, in case future evidence of an occupational disease emerges, which will become increasingly more important as the scientific evidence on PFAS carcinogenicity consolidates. The causal control barrier in occupational compensation litigation continues to decline (CDC/NIOSH, 2024). Another point that should be mentioned is the equity component in biometric monitoring: the programs should be designed so as not to discriminate against anyone, and should be marketed as occupational health tools, but not as performance management ones.

CONCLUSIONS AND RECOMMENDATIONS

PFAS is not a future risk. To companies with high exposure, it is a current liability that is silently built up within the blood of workers, on the ground under ex old AFFF training sites, or even in supply chains in which the presence of PFAS has never been properly cataloged. The regulatory framework defining what the employer liability will be in the next decade is being penned down at the moment, with significant reporting timelines and deadlines within the April-October 2026 range.

The positive aspect of the proactive risk manager is that the response framework has been properly laid out. The TCOR analytical lens, the Hierarchy of Controls, and the ARM Risk Management Process offer a method by which one may control and manage risk through conscious awareness to action. Suggested short-term measures are: cross-referencing chemical stocks with the EPA CompTox database record and TRI PFAS list; carrying out a PFAS-related industrial hygiene assessment with biological monitoring thresholds of high-exposure jobs; assessing CERCLA responsibility wherever AFFF had been utilized at any single site in the past; a hierarchy of control implementation with a priority on removal and substitution; an audit of all insurance placements of PFAS exclusionary terms; and a monthly regulatory monitoring routine at the federal and state levels.

The organisations that will survive the PFAS epoch are the ones that respond to the present reporting effort when no regulatory fines are charged, no coverage exclusion is a blanket bomb, and the claims of occupational disease of its subjects who are today going to all claim in the 2030s are not yet being taken. PFAS is an irresistible professional dilemma to the ARM applicant and to the practicing risk manager: one must apply all the professional analytic tools to an issue that is both chemical, medical, legal, financial, and ethical simultaneously. It is something that is here to stay, and a permanent solution is needed.

ADVANCED RESEARCH

The same regulatory weaknesses of the article exist: too rapidly evolving a situation, the PFAS situation is undergoing, a fixed piece cannot sufficiently capture it, and dose-response curves of novel short-chain PFAS compounds are being investigated. The future research should examine: the actuarial modeling challenges of claims on long-tail occupational diseases on the application of using PFAS water in captive insurance companies; the effectiveness of using foam substitutes that contain no fluorine in different fire response scenarios and situations; the serum patterns of PFAS over time with biological surveillance programs following a gear change among fire fighting communities; the diversity aspect of biometric surveillance on occupational populations of a wide range of demography; and the justice of biometric surveillance of populationally diverse groups.

ACKNOWLEDGMENT

The Author is extensively thankful to the ARM curriculum body of knowledge and community of practitioners in the field of occupational health and safety, whose field practice and research publications contributed to this analysis.

REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR). (2024). *Per- and Polyfluoroalkyl Substances (PFAS) and Your Health.* U.S. Department of Health and Human Services.

American Conference of Governmental Industrial Hygienists (ACGIH). (2025). *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.* ACGIH.

Bryan Cave Leighton Paisner (BCLP). (2026). *Federal PFAS Regulation: 2025 Activities and 2026 Anticipated Actions.* BCLP Law.

Centers for Disease Control and Prevention (CDC) / NIOSH. (2024). *PFAS and Worker Health.* National Institute for Occupational Safety and Health.

Environmental Protection Agency (EPA). (2024). Designation of Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) as CERCLA Hazardous Substances. *Federal Register, 89 FR 32532.*

Environmental Protection Agency (EPA). (2026). Implementing Statutory Addition of Certain PFAS to the Toxics Release Inventory Beginning with Reporting Year 2026. *Federal Register, 91 FR 9729.*

International Agency for Research on Cancer (IARC). (2023). *PFOA Classified as Group 1 Human Carcinogen. IARC Monographs Volume 135.* World Health Organization.

Mastrantonio, M., Bai, E., Uccelli, R., Cordiano, V., Screpanti, A., & Crosignani, P. (2018). Drinking water contamination from perfluoroalkyl substances (PFAS): an ecological mortality study in the Veneto Region, Italy. *European Journal of Public Health, 28*(1), 180–185.

National Fire Protection Association (NFPA). (2021). *NFPA 11: Standard for Low-, Medium-, and High-Expansion Foam (2021 ed.).* NFPA.

Rotander, A., Toms, L. M., Aylward, L., Kay, M., & Mueller, J. F. (2015). Elevated levels of PFOS and PFHxS in firefighters exposed to aqueous film-forming foam. *Environment International, 82,* 28–34.

Seacat, A. M., et al. (2023). Occupational Exposure to Per- and Polyfluoroalkyl Substances: A Scope Review of the Literature from 1980–2021. *Environmental Health Perspectives.*

Source Intelligence. (2024). *New Global PFAS Regulations: How to Remain Compliant in 2026.* Source Intelligence Blog.

Texas Department of Insurance (TDI) / Division of Workers' Compensation. (2024). *Workplace Dangers of PFAS "Forever Chemicals."* TDI Occupational Health and Safety.

U.S. Occupational Safety and Health Administration (OSHA). (2024). Hazard Communication Standard. *29 CFR 1910.1200.* U.S. Department of Labor.