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NTN Submission

National Environmental Management Plan on PFAS Version 3.0
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National Toxics Network (NTN) is a non-government organization (NGO) working for pollution reduction, protection of environmental health and environmental justice. Established in 1993, NTN is a member of the International Pollution Elimination Network (IPEN) and is committed to a toxics free future.

As NTN's Senior Advisor, Mariann Lloyd-Smith has participated in the UN Stockholm Convention's technical working groups for PFOS and PFOA since 2004 and was a guest presenter at the 'OECD Workshop on Perfluorocarboxylic acids (PFCAs) and Precursors'. She was a member of the UN Expert Group on Climate Change and Chemicals and a coauthor of NTN's recent series on ocean contamination.

NTN's Senior Researcher, Lee Bell is a member of the Stockholm Convention BAT/BEP Expert Group and the Small Inter-sessional Working Group (SIWG) of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1992).

Summary of concerns

1. PFAS or per- and poly-fluoroalkyl substances (PFAS), referred to as the 'forever chemicals' due to their carbon-fluorine bond, do not degrade in the environment.

   The NEMP V3 supports the reuse of PFAS contaminated biosolids, which will inevitably result in compounding contamination of agricultural land, the wider environment and bioaccumulation in its inhabitants.

2. PFAS chemicals travel the globe via air and water and contaminate oceans and ecosystems, even in the most remote regions. In other words, they are global, transboundary pollutants.

   The NEMP V3 is predicated on the assumption that the risks of PFAS can somehow be managed once released into the Australian environment which ignores the global and persistent nature of PFAS pollution.

3. There are at least 4,700 PFAS chemicals in commercial use according to OECD, with more recent assessments identifying 10,000 PFAS CAS Registry Numbers. Australia

does not collect data on quantities of PFAS chemicals used; for example, fluorinated pesticides used in agriculture and the urban environment.

The NEMP V3 focuses on just three PFAS chemicals, albeit with reference to their direct and indirect precursors.

4. PFAS are used in a wide range of consumer and building products, including plastics, carpets, textiles, clothing, non-stick cookware, paints, and coatings, make up/mascara, dental floss, waxes and food packaging (moulded fibre, paper bags).

   The NEMP V3 makes no recommendations for restrictions or bans on PFAS in consumer and industrial products and ignores the impact of fluorinated pesticides despite their ubiquitous use throughout the Australian environment.

5. There are no facilities in Australia that have conducted successful trials to destroy PFAS using incineration.

   The NEMP V3 supports the incineration for PFAS contaminated materials and refers to unnamed Australian facilities capable of doing this.

6. PFAS have been shown to damage the endocrine, reproductive and immune system of humans and wildlife.

   The NEMP V3 reflects Australia's 'out of date' guidance on PFAS in drinking and recreational waters guidelines and daily tolerable intakes. These are completely out of step with our international partners and reflect past Australian government's denial of the human health impacts of PFAS. As such the NEMP does not adequately address the real risks and impacts of PFAS in the management of PFAS contaminated sites and their runoff.

Introduction

NEMP V3 is at odds with NEPC's commitment to intergenerational equity and the NEMP's aim to prevent PFAS contamination by supporting the ongoing reuse and distribution of PFAS contaminated materials. As an opportunity to address a growing class of priority intergenerational poisons, NEMP V3 fails thereby ensuring that PFAS will continue to do their damage throughout the generations of all life on the planet.

The Ban PFAS Manifesto signed by 112 European and international NGOs calls on EU Member States and the Commission to urgently ban PFAS in consumer products by 2025 and across all uses by 2030. Australian governments must follow suit.

Why PFAS must be banned:[1]

- Fact one: Widespread PFAS-use has created an irreversible toxic legacy of global contamination.
- Fact two: PFAS pollution is already affecting communities across Europe and beyond.

[1]A copy of the 'Manifesto for an urgent ban of 'forever chemicals' PFAS' is available at https://banpfasmanifesto.org/en/#ftnt1

- Fact three: PFAS are accumulating in our bodies and those of our children.
- Fact four: PFAS exposure poses an immediate threat to human health.
- Fact five: PFAS pollution is fuelling the biodiversity crisis.
- Fact six: PFAS pollution is a threat to our drinking water.
- Fact seven: PFAS in products creates a barrier to the circular economy and a waste problem, yet to be solved.
- Fact eight: PFAS-free solutions already exist, yet PFAS continue to be added unnecessarily to many consumer products.
- Fact nine: All PFAS must be restricted as one group to protect current and future generations.

National Environmental Management Plan PFAS Version 3.0

The NEMP Version 3 aims to provide guidance on the environmental management of per- and poly-fluoroalkyl substances (PFAS), with a focus on preventing and managing PFAS contamination.

The NEMP acknowledges the 2021 OECD criteria which defines PFAS as '*fluorinated substances that contain at least one fully fluorinated methyl or methylene carbon atom (without any H/Cl/Br/I atom attached to it), that is, with a few noted exceptions, any chemical with at least a perfluorinated methyl group (–CF3) or a perfluorinated methylene group (–CF2–) is a PFAS.'*

This broadened OECD criteria highlights that many thousands of PFAS are in commerce today, including up to 200 fluorinated pesticides. However, the NEMP focuses primarily on just three, historical PFAS, which are rapidly being replaced with other PFAS, which have little or no toxicology or eco-toxicology data.

These are: *perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorohexane sulfonate (PFHxS), and their direct and indirect precursors, as these are the most widely studied.*

Australian governments do not collect data on quantities of PFAS chemicals used; for example, fluorinated pesticides used in agriculture and the urban environment. While PFAS in consumer products are not clearly identified and a comprehensive assessment of all sources of PFAS to the Australian environment has not been undertaken. .

The NEMP must include guidance on all PFAS identified either in use or as contaminants in the Australian environment.

The limited number of PFAS in the NEMP does not specifically address the class of long chain perfluoroalkyl carboxylic acids (PFCAs) currently being assessed by the POPs Review Committee of the Stockholm Convention. In 2018, PFCAs were detected in more than 80% of the 30 surface seawater samples from the North Pacific to Arctic Ocean.[1] The NEMP does not consider novel perfluorinated chemicals identified as potential global surface water contaminants in 2018. Perfluoroalkyl ether carboxylic and sulfonic acids (PFECAs and PFESAs) have been found in surface waters in China, US, UK, Sweden, Germany, Netherlands and Korea, indicating ubiquitous dispersal and distribution in global surface waters.[2]

These PFAS groups require specific focus due to their widespread environmental contamination. Similarly fluoropolymers, used extensively in consumer products need a more targetted focus in the NEMP. Production of some fluoropolymers are linked to the use and emissions of legacy and novel PFAS as polymer processing aids. There are serious concerns regarding the toxicity and adverse effects of fluorinated processing aids on humans and the environment while the production and use of fluropolymers is increasing.[3]

NEMP V3 is based on a false assumption that the risks of PFAS can be managed once released into the environment.

Once released from waste sites, manufacturing facilities, sewerage treatment works, fire-fighting operations and from the use of fluorinated pesticides, PFAS are extremely persistent in the environment and mobile, travelling the globe via air and water currents. PFAS also migrate out of consumer products such as all-weather clothing, carpets and camping gear into the air and household dust.

In the air, volatile PFAS (eg polyfluorinated fluorotelomer alcohol (FTOH) and sulfonates) are transported thousands of kilometres and others are carried by suspended particulate matter, which is eventually washed out and deposited in rain and snow.

PFAS are now found in food, soil, ground and surface water, soil, as well as aquatic and terrestrial wildlife. PFAS contaminate ecosystems from the remote Arctic to the tropics to the Antarctic. In recent sampling of snow in remote locations and water from mountain lakes, PFAS were present in nearly all the samples.[4]

It is abundantly clear from the published literature that once released to the environment, PFAS cannot be managed or their movements controlled. It is therefore unfathomable that the NEMP is based on the premise PFAS risks can managed once released in the environment.

NEMP V3 does not address 'current use and management of PFAS-containing products.

The NEMP does not address current use and management of PFAS-containing products and articles, except in managing environmental and waste contamination. The NEMP makes no recommendations rather leaving it up to 'environmental regulators' who may take action to restrict the use and management of PFAS-containing products and articles under national or their jurisdictional legislation. As the NEMP's aim is to address PFAS environmental contamination, at the very least it should include a strong recommendation that action be taken as a priority to ban the class of PFAS chemicals. This would follow the lead from 5 EU national authorities (Netherlands, Germany, Denmark, Norway and Sweden) who have called to ban production, use and placement on the EU market of all per and polyfluoroalkyl substances. [5]

In addition, the impact of PFAS contained in Australian waste through its inclusion in materials production systems globally, has not been addressed. Waste management plays a major role in the spread of PFAS into the environment through disposal (i.e., landfill and incineration) and through the recycling and downcycling of recovered waste resources. PFAS is not being monitored in the waste stream nor consideration given to the many downstream uses of waste materials containing PFAS. In effect PFAS is concentrated into new products involving recycled textiles, plastic products and electronic waste. In addition, waste incineration has shown to generate PFAS contaminated waste ash and air emissions. The reuse of such ash therefore has potential to be a major route of PFAS to the environment.[6]

NEMP V3 is based on 'out of date' health-based guidance

NEMP V3 reflects Australia's health-based guidance on PFAS**.** Yet, the Australian guidelines for daily tolerable intakes, for drinking and recreational waters are clearly out of step with international assessments and reflect past Australian government's denial of the human health impacts of PFAS. As such the NEMP V3 does not adequately reflect or address the real risks and impacts of PFAS.

In 2021, researchers reviewed epidemiological studies[7] revealing associations between exposure to specific PFAS and a variety of health effects, including altered immune and thyroid function, liver disease, lipid and insulin dysregulation, kidney disease, adverse reproductive and developmental outcomes, and cancer. These findings were supported by experimental animal data for many of these effects. They also noted that health effects data existed for a relatively few PFAS compounds, while hundreds are used in commerce lacking any toxicity data. These findings were consistent with many international research bodies including the U.S. National Toxicology Program evaluation[8] of PFAS exposure and immune-related health effects that concluded both PFOA and PFOS are an immune hazard to humans.

PFAS exposure has also been linked with worse COVID-19 outcomes. [9] People with elevated blood levels of perfluorobutanoic acid (PFBA) had an increased risk of a more severe course of COVID-19 (e.g., hospitalisation, death)

NEMP V3 is out of step with international assessments and our trading partners.

In July 2022, in response to human epidemiology data, U.S. regulators updated lifetime health advisory (LHA) guidelines for four PFAS and concluded that for PFOA and PFOS, *some negative health effects may occur at concentrations that are near zero and below our ability to detect at this time*. [10]

The European Food Safety Authority (EFSA) reacted to the growing evidence and in 2020, lowered the recommended tolerable intake of PFOA by over 2,000-fold compared to 2008. They set a new safety threshold for PFAS accumulating in the human body which denotes that people should consume no more than 4.4 nanograms of PFAS per kilogram of body weight per week.

In comparison, Australians are told they can tolerate far more PFAS in their bodies, in fact 280 times more or 1260ng/ nanograms per kilogram of body weight per week.

In 2021, the US Environmental Protection Agency (EPA) reduced their PFOA-reference dose by over 13,000-fold compared to 2016. They significantly reduced their Health Advisory levels for PFAS in drinking water to parts per trillion range (PFOA 0.004 ppt, PFOS 0.02 ppt). A similar trend is seen for GenX (a PFAS commonly used as a replacement for PFOA), for which the EPA lowered the reference dose 26-fold in 2021 compared to 2018.

In comparison, Australian water guidelines remain at 70 nanograms per litre (ng/L) for combined PFOS/PFHxS and 560 ng /L of PFOA. Note 1 nanogram per litre = 1000ppt.

In defiance of the evidence of harm, Australian governments also increased the 'acceptable' levels for PFAS in recreational waters, rivers, creeks and lakes. Australia's Recreational Water Quality Value for PFOS/PFHxS levels were doubled to 2,000 ng/L and PFOA 10,000 ng/L. In comparison, the EU restrict PFOS in inland surface water to 0.65ng/L.

While the management guidance of NEMP V3 is based on 'out of date' health assessments, the community can have no confidence in the guidelines or the efficacy of the NEMP.

NEMP V3 fails to acknowledge and address intergenerational equity.

The NEMP is based on an acknowledgement of the principle of intergenerational equity - that the *'present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations'.* Yet, the NEMP provides guidance on how to reuse PFAS contaminated waste streams ensuring that the health and diversity of the environment is further degraded.

PFAS are found in human and animal blood, urine, breast milk and umbilical cord blood with many remaining in the human body for years, accumulating primarily in the blood, kidneys and liver. For women, residues are directly passed onto the next generation in utero and in breast milk.

PFOS, PFOA, PFHxS are endocrine disrupting chemicals,[11] mimicking estrogen and PFAS exposures were associated with altered pubertal timing in children, measured by age at menarche in females and serum testosterone concentrations in males.[12]

A 2023 study demonstrated that exposure to PFAS interferes with several critical biological processes including the metabolism of fats and amino acids in adolescents and young adults. The disruption of these processes can increase susceptibility to a variety of illnesses, such as developmental disorders, cardiovascular disease, cancer and metabolic diseases like diabetes.[13]

PFAS can also affect future generations via germ cells, the precursors to sperm and ova. When exposure occurs in a pregnant woman, her developing fetus is exposed, as are the germ cells within the fetus that become the grandchildren, thereby, three generations may be exposed. Mice exposed to PFOA during pregnancy developed problems with milk production. Their daughters, exposed during gestation, had stunted mammary gland development. [14] [15]

Changes in germ cells can result in epigenetic changes to DNA that alter the way DNA is regulated. These changes can be inherited over one or more generations.[16],[17] and the evidence of PFAS impacts on DNA methylation is growing.[18],[19]

A 2022 paper[20] critically reviewed current evidence from human epidemiological, in vitro, and animal studies, including mammalian and aquatic model organisms. Epidemiological studies identified the associations between PFOS or PFOA exposure and epigenetic changes in both adult populations and birth cohorts.

PFAS are clearly intergenerational poisons, yet the NEMP ignores this and fosters an approach based on the misapprehension that these chemicals and their impacts can be safely managed in the environment despite their extreme persistence, their ability to bioaccumulate and adversely affect future generations.

NEMP V3 fails to address PFAS in Australian drinking water and releases from wastewater treatment plants

PFAS have been found in drinking water collected from Australian capital cities and regional centres. PFOS and PFOA were the most commonly detected; 49% and 44% of all samples respectively. While the maximum concentration in any sample was for PFOS with a concentration of 16 ng /l, the second highest maximums were for PFHxS and PFOA measured at 13 and 9.7 ng/l.[21] A large proportion of drinking water is released directly to the environment via garden watering and other recreational uses.

Discharges from wastewater treatment plants (WWTPs) are point sources for PFAS to the aquatic environment. PFAS can be in the wastewater coming into a WWTP due to personal and consumer product use and will the exit the WWTP via treated wastewater or in biosolids (sludge). National loads of PFOA and PFOS in effluent were estimated at 65 kg and 26 kg per annum respectively.[22]

Drinking water and wastewater treatment are both significant sources of PFAS to the environment including waterways and the ocean. The NEMP must comprehensively address PFAS inputs and emissions.

NEMP V3 supports the reuse of PFAS contaminated biosolids and ongoing contamination of agricultural land

The NEMP recognises the '*importance of managing PFAS contamination, including beneficial reuse of PFAS-70 contaminated materials and wastes, in a way that maintains environmental values including future land use options.'* Despite this and the NEMP's focus on preventing and managing PFAS contamination, the NEMP provides guidance for authorities to continue to provide PFAS contaminated biosolids and 'soil enhancers' to farms and other land owners, ensuring ongoing contamination of agricultural land and the broader environment..

Biosolids are a by-product of the wastewater treatment facilities. While treatment reduces pathogens, it does not remove PFAS chemicals. Australia produces almost 400,000 dry tonnes of biosolids per year, [23] the majority of which is applied to agricultural land or used in landscaping and land rehabilitation. Melbourne Water alone provides biosolids that are used on 30,000ha of farmland per year.

A 2022 Victorian Friends of the Earth Freedom of Information request [24] revealed that the vast majority of biosolids in Victoria exceeded Victorian EPA Guideline levels and would require *"dilution"* to achieve compliance. The highest PFOA levels were detected in a 2016 biosolid sample at 550 times over the 0.004mg/kg EPA Guideline level. PFOS was found at 250 times.

It is extremely difficult to understand how the NEMP could provide guidance on and off-site use of PFAS containing waters (e.g. for irrigation and groundwater recharge) and solid waste (e.g. biosolids) while the NEMP acknowledges PFAS chemicals like PFOS, PFOA and PFHxS are unlikely to ever break down.

The results of degradation tests and field monitoring data support the conclusion that no biodegradation of PFOA or PFOS occurs, and they do not undergo any abiotic or biotic degradation under any relevant environmental conditions. Releases of PFAS can only add to the current unsustainable burden of PFAS environmental contamination.

The use of bio solids and irrigation water contaminated with PFAS has led to considerable land and groundwater contamination in European countries. By including these unsound and unsafe disposal practices the aim of the NEMP is undermined and also builds an expectation that dilution is an acceptable solution to PFAS pollution, seriously risking further contamination and breaching Stockholm Convention guidance on POPs destruction.

NEMP V3 supports incineration for PFAS contaminated materials.

The NEMP V3 states that high temperature destruction is available in a number of facilities in Australia. Yet trials of solid and liquid wastes containing PFASs, PFOS and PFOA in particular, conducted in February 2019 in a high temperature hazardous waste incinerator in South Australia were not successful.[25]

During a representative trial burning liquid PFASs waste, PFBA, PFOA and PFPeA were detected in the stack, Some PFAS was detected in the bottom ash and leached into the quench waters. The DRE calculated on concentration for all PFAS compounds was 93.06% and 95.77% on mass, well below the destruction requirements of the Stockholm and Basel Conventions.

During the solid waste burning trial, PFBA and PFPeA were found in the stack emissions. A very high number of PFAS compounds were found in the bottom ash and leached into the quench waters. In the Cement kiln PFAS burn trials, relatively low destruction and removal efficiency for some of PFASs suggested that significant quantities of PFAS compounds were released to atmosphere. On this basis, considering the DRE results for all PFASs measured, the trial of PFAS incineration was not successful.

The authors concluded:

"Pilot tests of PFOA and PFOS incineration at the Veolia Dry Creek high temperature hazardous waste incinerator in South Australia (2019) detected some PFAS in emissions but could not calculate a DRE as the concentration of PFAS in the bottom ash following treatment, was higher than the waste input PFAS concentrations. This suggests incineration may be a source rather than a sink for PFAS in incineration residues including PFOA and PFOS. Trial burning of AFFF at the Cement Australia's Fisherman's Landing cement kiln in Gladstone, Queensland (2017) did not reach the minimum target DRE of 99.9999% for many PFAS compounds, suggesting PFAS compounds were released to atmosphere. Comparing this data with the existing literature supports the hypothesis that high temperatures alone are not an accurate predictor of PFAS destruction in combustion facilities. Finally, comparison of the trial burn outcomes with the POPs waste destruction requirement of the Basel and Stockholm conventions suggests that these combustion processes may not be suitable for PFAS waste destruction."

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