

NT PFASs Investigation

**NORTHERN TERRITORY PER- AND POLY-  
FLUORINATED ALKYL SUBSTANCES  
(PFASs) LEGACY SITE INVESTIGATION**

## Acknowledgements

The Northern Territory Per- and poly-fluorinated alkyl substances Interagency Working Group (PFASIWG) acknowledges the NSW EPA for its document entitled '*NSW EPA Perfluorinated Chemicals Legacy Site Investigation*' on which much of the content of this document is based.

June 2016

## Further Information

Australian Department of Health

<http://www.health.gov.au/internet/main/publishing.nsf/Content/health-publth-publicat-environ.htm>

CRC Care

<http://www.crccare.com/publications/technical-reports>

Ministry of Health website regarding contamination at Williamtown RAAF Base:

<http://www.health.nsw.gov.au/factsheets/Pages/RAAF-site-contamination.aspx>

Victorian EPA web page on Fiskville and other Country Fire Authority sites:

<http://www.epa.vic.gov.au/our-work/current-issues/water-quality/cfa-regional-training-centres>

NICNAS top-level chemical fact sheet for PFASs:

<http://www.nicnas.gov.au/chemical-information/information-sheets/existing-chemical-info-sheets/perfluorinated-chemicals-PFASs-factsheet>

NICNAS detailed fact sheet covering individual compounds:

<http://www.nicnas.gov.au/chemical-information/information-sheets/existing-chemical-info-sheets/PFAS-derivatives-and-chemicals-on-which-they-are-based-alert-factsheet>

## Background

Per- and poly-fluorinated alkyl substances (PFASs) also known as Perfluorinated chemicals (PFASs) have been used in a wide variety of industrial and commercial products such as textiles, leather, carpets, furniture, paper, cardboard, food packaging, inks, paints, sealants, floor waxes, impregnating agents, fire-fighting foams, metal plating, the photographic industry, photolithography, semi-conductors, coating additives, cleaning products, and pesticides.

These chemicals have been identified worldwide as emerging contaminants of concern due to their toxicity, highly persistent nature, mobility in the environment and significant potential for bioaccumulation and biomagnification. The perfluorocarbon PFOS (perfluorooctanesulfonic acid) is one of the eleven chemicals which were added to the annexes of the Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention) since 2009.

PFAS use since the mid-20th century has resulted in a number of high profile sites across Australia where contamination issues need to be managed. In addition, the Commonwealth has advised an estimated 42,000kg of PFOS aqueous film forming foams (AFFFs) were present in Australia as of 2012, which are mostly in large facilities such as refineries, ports and airports. At the national level, actions to ensure PFOS and related PFASs are not used in articles (e.g. upholstery, carpets etc.), industrial production or new uses will also be needed.

In April 2016 the Northern Territory Per- and poly-fluorinated alkyl substances Interagency Working Group (PFASIWG) agreed on a program of coordinated action to address potential risks posed by PFASs in the NT. The objectives of this Legacy Investigation are to reduce risks posed by PFOS, PFOA and other hazardous PFASs at sites that may be adversely affected by these chemicals. Potential sites with a risk of PFAS contamination will be identified by a risk-based process, stakeholders notified and, if needed, sites subject to regulatory action.

A stocktake of current PFAS stocks and usage will inform NT risk reduction actions by government and industry. Information will be gathered across industry (and the community) to inform risk management practices including substitution of lower risk alternatives.

The investigation will be supported by parallel engagement in broader policy issues, including liaison with the Commonwealth, engagement with national standards development and working with industry bodies.

Uncertainty regarding management criteria and endpoints will be reduced and communication products will be developed and/or adopted to reflect contemporary scientific understanding of risks to human health and the environment.

Targeted information, communication and guidance will be developed and disseminated appropriately to stakeholders. The information will be based on contemporary scientific and technical research on PFASs and provide guidance material on how to manage and reduce risks to human health and the environment.

Members of the PFIASIWG have commenced work to identify and investigate sites with current and previous use of PFASs in fire-fighting foam.

## **NT PFAS Legacy Investigation**

The NT PFAS Legacy Investigation is intended to identify sites with significant releases of PFASs to the environment.

This assessment will include review of the NT EPA contaminated sites database as well as identifying other sites where significant quantities of PFASs were used, stored or disposed.

An investigation program will prioritise screening assessment of PFAS legacy sites according to quantities of PFAS used or released to the environment and the nature of exposure pathways relating to water supplies, water recreation and fisheries.

Management actions and regulatory responses (including further investigation work) will be determined on a site-by-site basis.

### **PFAS Legacy Site Categorisation**

#### **Category 1 Sites – Fire Fighting Foam Users**

The initial focus is on sites where there has been known significant use of PFAS containing fire-fighting foams, this is primarily where fire training exercises were conducted by:

- i. Defence sites – 3 sites
- ii. Airservices Australia - 3 sites (1 joint civil-military airport)
- iii. NT Police Fire and Emergency Services Rescue & NT Bushfires Council sites
- iv. Other airports

#### **Category 2 Sites – Fire Fighting Foam Deluge Systems**

Sites that have or may have had PFAS containing fire-fighting foam deluge installations or that have had significant use in fire training exercises or incidents will be assessed, including:

- i. Former power stations
- ii. Former large petrochemical facilities
- iii. Currently operating facilities such as:
  - a. Power generation facilities.
  - b. Petrochemical facilities
  - c. Other fire-fighting foam installations involving PFASs
- iv. Major hydrocarbon fire incident sites

#### **Category 3 Sites – Point source users and handlers of other PFASs**

The amount of PFASs of concern currently held and used in NT will be characterised by including assessment of the types, amounts and potential risks.

This will include requesting data from the Commonwealth Department of Environment collected for the Stockholm Convention ratification process, engaging with industry to better understand current usage patterns locations and volumes of PFASs and examining information provided by PFASIWG members on PFAS legacy stocks and current use in NT. Sites that are identified as users or handlers of other significant quantities of PFAS containing materials may include:

- i. Major Hazard Facilities
- ii. Other facilities performing identified high risk scheduled activities including:
  - a. Metal plating works
  - b. Port facilities
  - c. Bulk fuel storage and chemical storage
  - d. Mine facilities
- iii. Other contaminated sites
- iv. Other premises, subject to ongoing research

#### **Category 4 Sites – Potential diffuse sources of PFAS contamination**

Sites which receive wastes and process them for disposal or reuse will be investigated to determine the risk from PFAS contamination; this may include sources such as:

- i. Mixed Waste Organic Outputs (MWOO) - Alternative Waste Treatment (AWT) facilities and organic waste stream re-use sites
- ii. Landfill leachate – landfill facilities
- iii. Sewage Treatment Plants (STPs) – influent and effluent from wastewater treatment
- iv. Biosolids use sites
- v. Other identified premises

#### **Desktop Assessment**

Initial contact is to be made with the licensee/landowner/occupier (relevant entity) in the first instance to determine whether PFASs, such as fire-fighting foams, were ever used at the site under investigation. This will assist with the prioritisation process for further investigation. The relevant entity may receive a request to provide details and records of any historical use of PFASs including quantities held on site and where these were stored and/or used.

The desktop assessment will be conducted generally in accordance with the concept of a preliminary contaminated site assessment and will include consideration of:

- a. Nearby groundwater use and sensitivity
- b. Nearby surface water use and sensitivity
- c. Nearby agriculture, aquaculture

- d. Proximity to residential land use
- e. Nature of geology and soil type.

The desktop assessment will include a review of the historical land-use, a review of storage practices (drums or bulk storage of PFASs) and uses of PFASs such as in manufacturing, training or actual incidents.

Category 1 Sites – Fire Fighting Foam Users, have been identified as potential contamination sources, therefore the Desktop Assessment has been omitted for these sites.

### **Inspection and Screening Sampling**

If a site is identified through the desktop assessment as having potential for significant releases to the environment of PFASs then inspection and screening sampling will be undertaken by the NT EPA or relevant authority, using the desktop assessment to inform the screening sampling and inspection including:

- a. Site visit and interviews with relevant staff
- b. Walk around and identification of potential preferential pathways and sensitive receptors which may include identification of local topography, drainage, soil type and presence of water bodies (recreational/drinking etc.)
- c. Where there has been PFAS containing fire-fighting foam training, use or installation the following should be identified:
  - i. Location/s on site where training was conducted.
  - ii. Is the training ground soft stand or hard stand.
  - iii. Where the training ground/system drains to.
  - iv. When the training grounds/systems have been in operation. When they were first used on the site and for how long.
  - v. An outline of the general fire training practices.
  - vi. If the system's design has changed over time.
  - vii. Quantity of PFAS containing fire-fighting foam used on site per annum.
  - viii. Where PFAS containing fire-fighting foam were being stored and the quantity.
  - ix. If there is any PFAS fire-fighting foam storage currently on site and the quantity.
  - x. How spent PFAS containing fire-fighting foam has been disposed of and the quantity.
- d. Site photographs taken
- e. Collection of readily accessible soil samples in the source area and near the site boundary where overland flow may be a contaminant migration pathway (guidance on sampling depth and minimum number of composite samples to be collected in accordance with National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM))
- f. Collection of readily accessible water samples from any onsite pondage or stormwater, and from nearby downgradient water bodies

- g. GPS all sampling points to aid in the preparation of a conceptual site model in the event that elevated concentrations of PFASs are found
- h. Analysis of samples for PFASs and hydrocarbons. Soil samples to be processed with Australian Standard Leaching Procedure (ASLP); the soil matrix is not to be analysed. Be aware that sample analysis may take many weeks.

### **PFAS Screening Decision Tree**

The results from the analysis of screening samples will be compared against the relevant guidelines and the PFAS Screening Decision Tree (Appendix A). The PFAS Screening Decision Tree has been based on the NSW EPA decision tree prepared by Environmental Risk Sciences Pty Ltd (enRisks) for the prioritisation of sites potentially contaminated with PFASs. Relevant draft or actual Australian environmental guidelines will be used to assess environmental contamination by PFASs.

How to apply the PFAS screening decision tree:

1. Compare the ASLP soil leachate results against the guidelines. Divide the site into sectors if warranted and/or use a 95% UCL if warranted. Aim to identify hot spots and to delineate the site of the hot spots. If groundwater results are available then these are a better indicator of potential harm than the soil leaching results, but the soil leaching results will better inform the need for remediation.
2. Compare surface water results against relevant environment and public health guidelines. Where there are clear linkages to offsite surface water then the site boundary results are the best to compare against the guidelines. Where there is uncertainty about overland flow and/or soil leaching results are elevated then groundwater testing is required.
3. Compare downgradient groundwater results against environment and public health guidelines. Source zone results will be elevated but may attenuate subject to the geology of the site.

### **Further Investigation**

Results from the screening samples will trigger correspondence with recommendations to be sent from the NT EPA or relevant authority in consultation with the PFASIWG. Subject to the results of the above, a site will be allocated for *high priority investigation*, *lower priority investigation* or *no further investigation warranted*. Where test results do not warrant further investigation by the site the NT EPA may publish results of screening samples. If test results warrant further investigation by the site but at a lower priority, as levels are not a high risk as there is no obvious exposure pathway, then assessment will be undertaken when further results are received. Where test results warrant further investigation by the site as high priority because of an exposure pathway then the NT EPA may publish the results of screening samples and work with Department of Health to issue appropriate health advice.

Any investigation would be along the lines of a detailed site investigation in accordance with the ASC NEPM. It would be carried out by the polluter or land owner depending on the circumstances and include the following:

- a. Lateral and vertical soil sampling with ASLP analysis for PFASs and hydrocarbons with the objective of delineating the extent of soil contamination and assessing whether soil contamination may present an ongoing source of contamination to waters
- b. Installation and sampling of groundwater wells with the objective of delineating the extent of PFAS contamination in the unconfined aquifer
- c. Sampling of any receiving waters including assessing background levels
- d. Identification of any sensitive receptors and preferential pathways
- e. Construction of a written and visual conceptual site model
- f. Recommendations for further investigation including Human Health Risk Assessments
- g. Note: biota sampling is not recommended for the first detailed site investigation but may be warranted subject to the results.

### **Management Planning**

If further investigation and additional testing is undertaken it may take 12-14 weeks before the NT EPA or relevant authority receives the results. Once the results are received the determined level of risk will require a site specific management plan to be produced. The PFASIWG will determine protocols for these management plans to reflect NT specific guidance on assessment and/or remediation of PFAS contaminated land and groundwater criteria currently being developed at the national level. Management plans could include:

- a. Management criteria
- b. Notices and regulatory action
- c. Substitution of lower risk alternatives to reduce potential harm to the environment and human health
- d. Amendments to relevant statutory approvals (e.g. Environment Protection Licences issued by the NT EPA) if warranted
- e. Appropriate processes to treat (immobilise) the waste prior to disposal
- f. Waste management measures to ensure that remaining PFAS stocks or waste containing PFASs are disposed of in accordance with national and international requirements
- g. Reviewed and/or updated waste regulatory criteria for PFASs
- h. Implementation of treatment technologies for PFAS wastes, contaminated soils, groundwater and sediments.