

# Firefighting Foam Policy

## Waste disposal plan advisory

### (Fluorinated organic compounds)

*This advisory provides guidance on how to manage the disposal of firefighting foam wastes and the development of a disposal plan for waste fluorinated foam concentrate as required by the Operational Policy Environmental Management of Firefighting Foam (Department of Environment and Heritage Protection 2016). Section 6.2.3 of the Operational Policy requires a disposal plan to be developed as soon as is practical but no later than 6 months from the date of approval of the policy (being January 2017).*

## 1 BACKGROUND

The *Operational Policy on the Environmental Management of Firefighting Foam* requires that firefighting foam wastes be managed appropriately as regulated wastes as required under the provisions of the *Environmental Protection Act 1994* and *Environmental Protection Regulation 2008 (Schedule 7, organohalogenes)*. Firefighting foam wastes include foam concentrates, firewater and any other wash-waters or wastewaters containing firefighting foam or residues from mobile, fixed or hand-held systems.

All firefighting foams have the potential to cause adverse environmental effects if released to waterways which are particularly sensitive to pollutants. Some foams contain persistent toxic compounds that can also cause long-term adverse effects to health and environmental values when released to land or waterways. Similarly, if disposed to land, they may contaminate the land, generate contaminated runoff and result in costly clean-up requirements.

Firefighting foams and associated wastes can be divided into two groups for the purposes of waste management:

- Non-persistent firefighting foams that do not contain highly persistent organic compounds and are fully biodegradable (including fluorine-free foams).
- Persistent firefighting foams that contain highly persistent organic compounds including long-chain ( $\geq C7$ ) and short-chain ( $\leq C6$ ) fluorinated organic compounds or their precursors. In other words, foam or related wastes that contain any and all fluorinated organic compounds.

Wastes that contain any organo-halogens including fluorinated organic compounds have particular handling and disposal requirements under the above legislation due to the presence of toxic, persistent organic pollutants that have limited options for appropriate treatment and destruction.

The producer of regulated wastes must ensure that the waste is appropriately disposed of or treated at a facility that is properly licensed and equipped for that particular waste (e.g. high temperature destruction). If this is not done the producer of the waste remains liable for any mishandling, releases, inappropriate disposal and/or harm or consequential damage caused.

Note that the regulated waste facility must be specifically licensed to transport, store and/or dispose of organo-halogens including fluorinated organics. It is the waste generators responsibility to ascertain that the receiving facility is appropriately authorised.

Regulated waste is also subject to waste tracking requirements, which means that waste producer, waste transporter and person receiving the waste need to complete and submit waste tracking forms to the Department. These regulated waste requirements also apply to the containers that have held the waste unless they can be demonstrated to have been thoroughly cleaned of any residues.

This advisory provides guidance on the production of a practical waste management plan so as to meet the Policy requirements.

## 2 WASTE CHARACTERISATION AND DISPOSAL

Before considering what options are appropriate for foam waste disposal and putting in place a plan the identity and composition of the foam waste must be clearly established.

Identification of the foam may be through reference to the original purchase or acquisition documentation and consideration of other available product information. Note that in some instances SDS/MSDS have been found to be unreliable, for example inadequate composition information such as no mention of fluorosurfactants in a fluorinated foam. Additionally over the history of the fire system at a particular facility several different brands of foam may have been decanted or mixed together in the system making characterisation difficult.

Where there is doubt about the foam identity or composition, the primary issue is to establish whether there are persistent fluorinated organic compounds present. For the purposes of waste characterisation or determining the level of fluorinated organic compound contamination there are two suitable analytical methods:

- The total organic fluorine assay (TOF) which will provide an indication of the overall levels of fluorinated organics present (as fluorine) but will not discriminate on the basis of carbon-chain length. This method is adequate for simple determination that the waste contains significant levels of organo-fluorine (PFAS) compounds.
- The total oxidisable precursor assay (TOPA C4-C14) is appropriate to characterise the waste in terms of what long and short-chain PFCs are present. The sum of the results also indicates the overall levels of organo-fluorine compounds present.

Note that the standard analytical suite of 20 to 28 PFAS is not a reliable or suitable measure for the overall fluorinated organic compounds present as up to 90% of compounds are hidden or precursor compounds that are not detected within this suite.

### 2.1 Non-persistent (fluorine-free) foams and associated wastes

Foams and associated wastes that are fully biodegradable and do not contain any persistent organic compounds (e.g. fluorine-free foams) can be considered for treatment and/or disposal on-site or off-site according to their composition. Options may include disposal to sewer with the agreement of the service provider, on-site-treatment in ponds or by irrigation to land under conditions agreed to with the regulator.

The key components affecting method of treatment and disposal of non-persistent foams are the synthetic detergents (surfactants), organic solvents (e.g. glycol ether) and organics such as saccharides and carbohydrates. Biochemical oxygen demand (BOD) for all firefighting foam concentrates is very high (~400,000 mg/L for concentrates) and a significant consideration for wastewater treatment plants, regulated waste treatment or biodegradation of wastewater in ponds. Due to the high BOD, care needs to be taken to avoid discharge or runoff to waterways or creating offensive odours that may be dispersed to any adjacent odour sensitive place.

Various options may be available for treatment and disposal of non-persistent foams. The most appropriate needs to be determined in consultation with the relevant service provider and or agency. Foam concentrates are generally unsuitable for disposal directly to sewer due to foaming so disposal via a regulated waste facility may be more appropriate.

## 2.2 Fluorinated foam and associated wastes

All fluorinated foams are of concern if released to the environment including disposal to land, waterways or the sewer. Fluorinated foams are those that contain any fluorinated organic compound including perfluorinated compounds (e.g. PFOS, PFOA, PFHxS, PFHxA, PFBS, PFNA, etc.) their precursors (e.g. PFOSA, N-Et-FOSA) and higher and lower homologues as well as polyfluorinated compounds such as fluorotelomers (e.g. 8:2 FtS, 6:2 FTS) and fluoropolymers which are all precursors of perfluorinated compounds.

In relation to fluorinated foams and associated wastes it should be clearly understood that that PFOS and PFOA are only two compounds of hundreds of similar fluorinated organic compounds of concern in foam formulations, wastewaters or releases. Assertions in SDS/MSDS and other product information that fluorinated foams are “biodegradable” and can be disposed of to sewer, municipal water treatment or by composting are not valid and do not negate the end-users’ obligations under the Policy requirements.

All wastes containing fluorinated organic compounds must either be disposed of by high temperature incineration or be treated to remove the fluorinated organic compounds for separate incineration.

## 3 WASTE HANDLING FOR DISPOSAL

While existing methods are available for treatment and disposal of non-persistent (fluorine-free) foam wastes based on their detergent, solvent and organic content, fluorinated foams require very specific disposal treatment via high temperature destruction at about 1,100 degrees Celsius with a residence time of 2 seconds.

In producing a foam waste disposal plan for fluorinated foam wastes essential components need to be addressed so that the foam waste is identified correctly, handled properly, stored securely and managed properly until passed to an appropriately licensed facility for final treatment and disposal. A waste disposal plan for non-persistent (fluorine-free) foam wastes is not necessary provided the waste is handled responsibly and appropriately.

It is acknowledged that disposal of fluorinated foam wastes presents logistical and economic challenges for end-users that need to be met. The firefighting foam Operational Policy requires that the waste generator produce a waste disposal plan for foams containing fluorinated organics. The waste disposal plan must meet the following objectives:

- Identify the quantity, type and general composition of the foam waste with respect to the persistent fluorinated organic compounds content.
- Ensure that wastes are collected, labelled and stored securely so that there is no potential for accidental release.
- Identify the person(s) responsible for management of the wastes until disposed.
- Identify the timeframes over which waste collection and disposal would occur. For example, it may be necessary to stage disposal over financial periods for budgeting to spread costs or over a period of system re-engineering with staged collection of wastes for bulk disposal.
- Identify appropriate review periods where particular timelines cannot be initially defined. For example, disposal options may depend on commissioning of new treatment or disposal facilities.
- Prevent stockpiles of foam waste being misidentified, misplaced and/or disposed of inappropriately if disposal is to be staged over a significant period.
- Ensure that the foam waste does not get diverted or repurposed to inappropriate use.
- Identify a person with the appropriate authority and equipment to transport the waste.

- Identify a final disposal option and facility licensed to take the wastes.
- Identify a procedure for reporting to the department on the progress of waste disposal under the plan.

### **3.1 Foam type, composition and quantity**

The foam waste needs to be characterised in regard to quantity, type and general composition of the foam waste with respect to the presence of persistent fluorinated organic compounds.

If accurate purchasing or other product information is available then this may be sufficient to identify the likely composition of the foam waste as to its fluorinated organic content. Exact composition information is not necessary once it has been identified as containing any fluorinated organic compounds. It is sufficient to identify the foam as one of the types below:

- AFFF (aqueous film-forming foam)
- FP (fluoro-protein foam)
- FFFP (film-forming fluoro-protein foam)
- -AR/ATC variants of the above (alcohol resistant foams, e.g., AR-AFFF).

The Department can assist with establishing whether or not a particular foam contains fluorinated organic compounds if it is not clear from product information.

The quantity of foam waste, size and types of containers must be recorded to ensure an accurate record of what waste is held to be handed over for transport and tracked for ultimate disposal.

### **3.2 Waste collection, labelling and secure storage**

Foam and foam wastes containing fluorinated organic compounds have a high potential to cause extensive and costly contamination on-site and off-site if not handled and secured properly. Activities such as removal of foam from fixed systems, decanting and system cleaning needs to be done carefully to avoid spillage and contamination of equipment, soils, drains, groundwater and waterways. Foam wastes must be stored in/with:

- Containers that are appropriate and in good condition.
- Containers that are properly labelled as to the contents (e.g. "AFFF, FP, FFFP foam wastes containing fluorinated organic compounds").
- Containers held in secondary containment such as impervious bunding.
- Secure location under cover protected from accidental damage e.g. by traffic or forklift.
- Location that has access limited to authorised personnel.
- Signage warning that waste is not to be handled or disposed of without authority.
- Contact details placed on the waste containers for the person(s) responsible for the wastes.

### **3.3 Responsibility for management of the wastes**

The foam waste disposal plan must provide details of the person(s) responsible for ensuring that wastes are held securely and managed properly until disposed of. This includes provision for continuity of this responsibility in the case of the initially designated responsible person becoming unavailable. Key responsibilities are to prevent stockpiles of foam waste being misidentified, misplaced and/or disposed of inappropriately if disposal is to be staged over a significant period.

### **3.4 Timeframes for waste disposal**

Provided wastes are stored and managed securely to prevent inappropriate, use, disposal or accidental release to the environment extended timeframes for collection and disposal are

acceptable. For example, to take into account staging of system decanting, clean-out, re-engineering, disposal of waste over several budget periods, etc. Key milestones in the waste management plan should include:

- Initial timeline for collection of waste and storage in a secure location.
- Review period for disposal or other activities/options where timelines are unclear and the determining factors in establishing clearer timelines. E.g., anticipation of appropriately licensed disposal options due to come online.
- Anticipated timeline for final disposal.

Timeframes in the waste disposal plan must not be open-ended with at least a review period for milestones where external influences such as new disposal methods coming on-line may not be accurately known. The review period should be no longer than six months.

### **3.5 Final disposal**

The waste disposal plan must identify the final disposal option for the foam wastes including likely facility or facilities or agent(s) licensed to take fluorinated organic wastes for treatment and destruction. This must also include reconciliation of the types and quantities of wastes disposed of. Proof should be sought that the person carrying out the final treatment/disposal of the waste holds the appropriate environmental authority for transport, treatment and/or disposal.