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OCE.policy@des.qld.gov.au

Department of Environment and Science
GPO Box 2454,
BRISBANE QLD 4001

RE: Submission on the Review of the Regulated Waste PFAS Values in the EP Regulation 2019

The Australian Sustainable Business Group (ASBG) welcomes the opportunity to comment on [The Review of the Regulated Waste PFAS values in the Environmental Protection Regulation 2019 Consultation Paper](#) (the Paper).

The [Australian Sustainable Business Group](#) (ASBG) is a leading environment and energy business representative body that specializes in providing the latest information, including changes to environmental legislation, regulations and policy that may impact industry, business and other organisations. We operate in NSW and Queensland and have over 100 members comprising of Australia's largest manufacturing companies and other related businesses.

1 Overview

In general, ASBG welcomes the replacement of a zero limit on the threshold for per- and poly-fluoroalkyl substances (PFAS) with the levels shown in Table 1. The proposed classifications of certain contaminated soils as non-regulated wastes are also welcomed. While the main thrust of the proposed changes are supported, but there are some issues requiring consideration:

1. What is meant by Other PFASs?
2. The thresholds levels given for Category 1 Regulated Waste compared to EoW levels
3. The removal of PFAS from the dictionary

2 Definition of PFAS

It appears, reading the paper, the terms PFAS relates to mainly to PFOS, PFOA and PFHxS and their salts, but then extends to *other PFAS (sum of PFAS, excluding PFOS, PFHxS, PFOA)* (See Table 1). The term PFAS has a number of definitions internationally, but none are cited as being applicable to the Environmental Protection Regulation 2019 (EA Reg) or even the Department of Environment and Science's (DES) use.

An example of internationally used definitions is the [OECD definition of PFAS](#). This is considered very broad, as it captures around 7 million different compounds, including refrigerant gases, liquids and solid fluorinated plastics, e.g. Teflon.

Under Table 1 where the term 'Other PFAS (sum of PFAS, excluding PFOS, PFHxS, PFOA)' means a laboratory and or waste generators must guess what PFAS substances to analyse for. Perhaps a measure of total organic fluorine maybe useful, but this result does not identify which PFASs of concern are present nor their concentrations. For example, the presence of solid polytetrafluoroethylene (e.g. Teflon) would give a high reading, but a poor indication of the PFASs of environmental problematic concern, as this solid is hydrophobic, hence is virtually insoluble in water and immobile. Regardless, without a clear definition of what are the PFASs of concern, a laboratory, generator or the consignor has to guess what testing DES requires for waste classification.

ASBG considers, the definition for PFAS for the purposes of waste classification should be limited to PFASs of concern. PFASs of concern should relate to PFAS which are generally present at environmentally concerning levels in the environment and perhaps from certain sources. For example, fire-fighting foams which contain PFOS, PFOA, PFSxH and other known PFASs of concern.

Many PFASs, under such a broad definition, can be considered not of concern (at this time) depending on the environment where they are found. For example, a Food Standards Australia & New Zealand paper titled *PFAS health-based guidance values*, presented at the ALGA PFAS Symposium 2024, made the following points:

- The study found that levels of PFAS in the general Australian food supply are very low.
- PFOS was the only congener detected of 30 different PFAS for which analysis was conducted.
- PFOS was detected in five of 112 food types and in less than 2% of all samples.
- The overall dietary exposure to PFOS for the general Australian population is lower than the TDI.
- No need to establish MLs for PFAS in the Australia New Zealand Food Standards Code

Here the FSANZ indicates human food intake risks from PFASs are very low, with only PFOS being detected, even then well below a concerning level, hence is not listed in food standards by them. It is noted that PFAS in food is only one environmental area of issue.

It seems the main PFASs of concern, to DES and other many environmental agencies, are those which are soluble, mobile in water and are persistent, i.e. have a very long half-life in soils. This would seem to rule-out PFAS compounds, for example, having properties:

- Above a melting point of say $> 60^{\circ}\text{C}$, which is used in the [NSW Waste Classification Guidelines](#) to determine if it's a liquid waste. This would eliminate polymerised fluorinated solids.
- Below a boiling point of 0°C as exposing such PFAS in groundwater or soils to air, such PFASs would generally quickly evaporate. This would eliminate refrigerant gases.
- Has a low value of solubility in water, such as $< 0.01\text{ mg/L}$ maximum (1 ppm) in a saturated PFAS compound environment in water. Note, many PFAS limits are in the ppb, which is far lower than this solubility, however, this limit would be at the point of saturation and it is an example only. This eliminates hydrophobic PFASs.

In addition, the main PFASs of concern would not include:

- Polymerised fluorinated compounds, which are generally solid at room temperature and have high molecular weights e.g. $>1,000$. Such compounds are generally solid with very low water solubility and mobility.

- Pharmaceutical drugs which are captured under the OECD definition, even if they are liquids and water soluble. This is required to avoid any bans or ng/L (ppt) type limits being applied on needed pharmaceutical drugs.

R1 ASBG recommends the DES:

- **Define what is meant by PFAS**
- **Include a category of PFAS compounds which reflects the PFASs of concern limited to generally water soluble liquids.**

3 EoW Codes Differences

A key issue here is why are Cat 1 and Cat 2 Regulated Wastes given a similar or lower PFAS limits than materials, which are permitted, via EoWs, to be directly or indirectly applied to land? This issue is explained in detail below. It also raises the issue of EoW materials, which can contain PFAS, how would they then be managed and treated at their end of life, especially their recyclability within the circular economy?

3.1 Regulated Waste and EoW PFAS Limits

The proposed limits for PFASs in Schedule 9, Part 3, Division 2 Non-regulated thresholds for tested waste EP Reg are listed below in Table 1:

Substance	Solid waste threshold mg/kg	Liquid waste threshold µg/L
PFOS and PFHxS	0.002	0.002
PFOA	0.001	0.001
Other PFAS (sum of PFAS, excluding PFOS, PFHxS, PFOA)	0.004	0.01

Table 1: Proposed thresholds for PFAS in the EP Regulation

There are two End of Waste Codes, which also list PFAS contamination:

- Coal Combustion Products ENEWO07359717
- Biosolids (ENEWO7359617)

The limits for application to land for Biosolids and for Coal Combustion Products, also in bound and unbound applications.

First look at the PFAS thresholds for Biosolids:

Media	Contaminant	Trigger value
Soil	PFOS	0.001 mg/kg
	PFOS + PFHxS	0.002 mg/kg
	PFHxS	0.003 mg/kg
	PFOA	0.004 mg/kg
	PFBA, PFPeA, PFHxA	0.001 mg/kg
	Sum C ₉ -C ₁₄ Perfluoroalkyl carboxylic acids	0.01 mg/kg
	Perfluoroalkyl sulfonamides	0.001 mg/kg
	N:2 Fluorotelomer Sulfonic acids	0.004 mg/kg

Table 2: EoW PFAS trigger values for biosolids

For Biosolids EoW, if the trigger values for PFAS are exceeded, then the Chief Executive of DES must be notified within 24 hours. Conversely, if below the trigger values then the biosolids can continue to be land applied provided the application meets the other EoW criteria.

Coal Combustion Product EoW in Table 3 lists its PFAS limits. Note they permit three forms:

- Bound; meaning they are encapsulated or chemically transformed in a matrix, such as in the making of a concrete or asphalt type products, where usually > 10% of the mix is the coal combustion products, generally ash.
- Unbound; meaning the direct use of coal combustion products as engineering fill, such as pipe bedding, subsurface draining etc. Unbound applications are limited by their proximity to groundwater, surface waters, pH and other conditions.
- Soil conditioner; this means the direct application to land of the coal combustion products, provided they meet certain conditions.

Quality characteristics	Limits for specific uses *		
	Total Maximum Concentration (mg/kg dry weight unless otherwise specified)		
	Bound applications	Unbound applications	Soil conditioner, soil product and direct land application
	Analysis of the compounds below is only required if the resource is generated from the use of biosolids containing PFAS contamination		
Sum of PFOS and PFHxS	0.01	0.002	0.0002***
PFOA	0.02	0.004	0.0002***
PFOS (PFHxS not detected)	NS	0.001	0.0002***
PFHxS (PFOS not detected)	NS	0.003	0.0002***
PFBA, PFPeA, PFHxA	NS	0.001	0.0002***
Sum C ₉ -C ₁₄ Perfluoroalkyl carboxylic acids	NS	0.01	0.0002***
Perfluoroalkyl sulfonamides	NS	0.001	0.0002***
N:2 Fluorotelomer Sulfonic acids	NS	0.004	0.0005***
Sum of PFAS	0.1	0.01	0.0002***

*** or the limit of reporting (LOR), whichever is smaller

Table 3: EoW PFAS limits for Coal Combustion Products

The PFAS limits on Coal Combustion Products are somewhat different from those in biosolids. However, there is a link in that biosolids and biomass can be co-combusted with coal in certain combustion processes. These are identified as a possible source of PFAS, hence such testing for PFAS is only required where biomass, including biosolids are co-combusted with coal in such a process.

3.2 Discussion

With the Biosolids EoW it is clear the PFAS trigger values are similar to higher than for the proposed triggers on a Cat 1 Regulated waste. This permits PFAS concentrations in biosolids to be applied to land as a soil conditioner.

A similar issue arises for coal combustion products, where they are blended in bound or used directly as unbound products, but not as a soil conditioner. Here it is important to point out that the blending process in bound processes will dilute the concentration of coal combustion products and their PFAS levels, more likely between 4 to 10 times. Even at this dilution the end PFAS levels in the bound product would be classed as Cat 1 or Cat 2 Regulated Waste, depending on the blend. Nevertheless, such coal combustion products when used in various concrete blends, are acceptable in or on land at PFAS levels higher than the proposed Cat 1 Regulated Waste thresholds.

When coal combustion products are used as engineered fill, there are limits on proximity to waters and soil pH. However, this method permits similar, if not higher levels of certain PFASs that Cat 1 Regulated Waste, in and on land anywhere in Queensland where the criteria is met. A well-made landfill would provide much higher containment provisions than for what is permitted under this EoW. Again the issue is why are Cat 1 Regulated Wastes given a similar to lower PFAS limits than materials which are permitted to be directly applied to land or in products, which are applied to land? Why are wastes with PFAS below the threshold given Cat 2 Regulated Waste when this and other EoWs permit application to land anywhere in Queensland?

If Cat 1 Regulated Waste level PFAS materials can be used in many places other than a landfill, what happens at the end of life? As a consequence, while bound materials are permitted for direct use at these PFAS levels, if they are dug up, their PFAS levels could flag them as PFAS Cat 1 or Cat 2 Regulated Wastes. This could considerably restrict their recyclability and increase their disposal costs in the future. Similarly, where biosolids are applied to land, then that land would have the presence of PFAS. Consequently, any waste soils from that land would be classed as at least PFAS Cat 2 Regulated Waste. Direct classification as a waste is not automatic, due to compliance with the End of Waste Code and therefore are consequently not waste.

R2 ASBG recommends:

- ***The Solid Waste PFAS threshold values be reconsidered given their apparent conflict with EoWs, such as for Biosolids and Coal Combustion Products EoWs.***
- ***The DES consider how to manage permitted PFAS in EoW products at the end of their life, even when blended, their reuse and recyclability at this time in the future and disposal classification.***

4 Removal from Dictionary

As discussed in section 2, commonly used definitions of PFAS can be so broad that application to the PFASs of concern becomes buried under millions of other compounds, which meet that PFAS definition. Removal of the definition of PFAS, to then rely on this being a subset the more general term of Persistent Organic Pollutant (POP), has some merit.

ASBG considers that referring to a Persistent Organic Pollutant would be referring to the POP list under the [Stockholm Convention](#), which is the internationally recognised listing of such. As a consequence, if one were to refer to PFAS, it could be argued, due to PFASs being removed from the definition, should refer to the list

of POPs under the Stockholm Convention. This approach would limit the PFASs of concern to those under the Stockholm Convention, and not to other PFASs as defined under other far broader definitions. However, this could limit PFAS to a current small group of fluorinated organic compounds¹, where new PFASs of concern may arise, which are not currently listed.

ASBG notes is that certain organo-bromine compounds POPs², used as fire retardants in plastics are also captured and are listed in Schedule 19, part 1 Item 5. This captures products such as old plastics with these fire retardants—up to [pre-2021 plastics](#) used in electrical products, also generally banned from 1 July 2025—classing them as Regulated Waste as well. However, the policing of such compounds is not evident across Australia, unlike PFASs of concern in Queensland.

Additionally, why only remove the two PFOS compounds; perfluorooctane sulfonic acid and its salts, perfluorooctane sulfonyl fluoride, from the list of Persistent Organic Pollutants in Schedule 19, Part 1 Item 5? If this list is to reflect the Stockholm Convention's list for PFAS, why not use it to refer to all POPs? This would mean deleting all entries in the Schedule, with a reference to the Stockholm Convention POPs list.

ASBG considers the DES could make a new guideline document referring or even defining what it currently considers are PFASs of concern. As a consequence of removing PFOS from the definition in the Regulation, this action would defer definitions of PFAS to the POPs list under the Stockholm Convention, with the backup being the DES guideline with its definition of additional PFASs of concern. This can extend to other POPs, currently not listed under the Stockholm Convention, but are considered a POP of concern to the DES. The reason for doing this is that PFAS, POPs and other emerging chemicals of concern are subject to change. The Guideline can also include explanations and any scientific justification as to why new PFASs and POPs have been added in addition to the POPs listing in the Stockholm Convention. Changing a guideline is far easier than changing a Regulation, resulting in swifter changes as the science becomes available.

R3 ASBG recommends:

- ***The Environmental Protection Regulation's definition of all persistent organic pollutants (POPs) be replaced by reference to the POPs listing under the Stockholm Convention.***
- ***A guideline level document be prepared by the DES to permit the listing of additional POPs, by compound and CAS, which will include DES's PFASs of concern, and other POPs of concern, to enable quick updates.***
- ***The guideline also to include explanations of the additional POPs listed and where possible their scientific justification for listing.***

¹ Stockholm Convention PFASs include: PFOA, PFHxS, PFOS and PFOSF and their salts where applicable.

² Including [HBCDD](#), c-decaBDE, Hexabromobiphenyl, Hexabromodiphenyl ether, heptabromodiphenyl ether, Tetrabromodiphenyl ether and pentabromodiphenyl ether

Should you require further details and clarification of the contents of this submission please contact me.

Yours Sincerely

A handwritten signature in black ink, appearing to read "Andrew Doig". The signature is fluid and cursive, with the first name "Andrew" written in a larger, more prominent script than the last name "Doig".

Andrew Doig

CEO

Australian Sustainable Business Group (ASBG)

M. 0407 238 258

A. 31 Lady Penrhyn Dr, Beacon Hill

E. andrew@asbg.net.au

W. www.asbg.net.au