一次用食品包材中的PFAS
17國聯合調查報告

2023年12月

IPEN
for a toxics-free future

Přírodovědecká fakulta UK
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銘謝： IPEN and participating organizations gratefully acknowledge the financial support provided by the Government of Sweden, Swedish Society for Nature Conservation, Tides Foundation, Global Greengrants Fund and other donors that made the production of this document possible. The views herein do not necessarily reflect the official opinion of any of the institutions providing financial support. Responsibility for the content lies entirely with IPEN.

引用此篇報告須附上以下完整描述：Straková, J., Brosché, S., Grechko, V., et al., 2023. Forever Chemicals in Single-use Food Packaging and Tableware from 17 Countries. IPEN. 57p.

ISBN 978-80-11-04248-6

一次用食品包材中的PFAS：17國聯合調查報告

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名詞縮寫

CAS	Chemical Abstracts Service	化學文摘社[1]
CIC	Combustion ion chromatography	燃燒離子層析法[2]
EE	Eastern Europe	東歐
ECHA	European Chemicals Agency	歐洲化學品管理局
EOF	Extractable organic fluorine	可萃取有機氟
ESM	Environmentally sound management	環境友善管理[3]
EU	European Union	歐盟
FTOHs	Fluorotelomer alcohols	含氟調聚醇
H11	Delayed or chronic toxicity	延遲或慢性毒性[4]
MENA	Middle East and North Africa	中東和北非地區
NGO	Non-governmental organization	非政府組織
OECD	Organisation for Economic Co-operation and Development	經濟合作暨發展組織
PAPs	Polyfluorinated alkyl phosphate esters	多氟烷基磷酸酯
PFAS	Per- and polyfluoroalkyl substances	全氟／多氟烷基物質
PFCAs	Perflurocarboxylic acids	全氟羧酸
POPs	Persistent organic pollutants	持久性有機污染物
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals	歐盟化學品註冊、評估、授權和限制法規
SA/EA/SE	South, East, and South-East Asia	南亞／東亞／東南亞
SFPs	Side-chain fluorinated polymers	支鏈氟化聚合物
SVHCs	Substances of very high concern	高度關注物質[5]
PRC	People's Republic of China	中國
TOF	Total Organic Fluorine	總有機氟
US	United States	美國

本研究報告中所檢測的58種PFAS物質，其化學名稱、CAS編號和定量極限值（LOQs）均列於附件1中。

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[1]美國化學會的下設組織。化學文摘社負責為每一種出現在文獻中的物質分配一個CAS編號，其目的是為了避免化學物質有多種名稱的麻煩，使資料庫的檢索更為方便。如今幾乎所有的化學資料庫都允許用CAS編號檢索。

[2]燃燒離子層析法通常用於分析檢測物質中鹵素（氟、氯、溴、碘）化合物和硫化物的含量。

[3]環境友善管理指為了確保任何產品的使用和最終廢棄階段不會對環境或人類健康造成任何傷害、而採行的方法策略。

[4]巴塞爾公約（Basel Convention）中將生化危害性質區分為11類，其中第11類（H11）為延遲或慢性毒性。

[5]高度關注物質：由歐盟REACH法規定義：泛指會對環境和人體健康造成重大危害的化學物質，例如致癌、致基因突變、生殖毒性、持久性併生物累積和毒性（PBT）。

目錄

摘要

PFAS（全氟/多氟烷基物質）是一大群化學物質的通稱，雖然其對健康及環境的影響令人憂心，卻已廣泛使用於消費品和專業用品中。PFAS常被造紙業、紙漿業及模塑植纖產業用來生產可防油防水的拋棄式食品包材（泛指食品包裝紙、包裝袋、容器、和餐具等會接觸食物的用具）。由於PFAS可防油，而被大量用於烘培紙、杯子蛋糕的杯子、烘培食品的包裝袋、速食和外帶容器、微波爆米花的內裝袋以及可堆肥的餐具中。通常，關於這類產品中的PFAS含量，資訊是不公開透明的。

這份研究的目的，是為了評估世界各地以紙、紙板及植物纖維製造的食品包材中使用PFAS及受到PFAS非刻意污染的情形，調查對象包括來自亞、非、歐、拉丁美洲及加勒比海的十七個國家，希望能促成全球全面性禁用所有PFAS。本計畫檢驗了119個食品包材樣本的PFAS含量，樣本品項包括速食包裝紙、外帶用的硬紙盒、微波爐爆米花的包裝袋、一次用的植纖外帶餐具及餐盒、烘培紙、咖啡杯以及用於非油膩食品的再生紙包裝。本研究以「可萃取有機氟」（Extractable organic fluorine；下稱EOF）的檢測方法來判定樣品中可萃取出來的PFAS總含量；並檢測58種特定PFAS的含量，結果其中有21種PFAS被檢測到。

結果顯示119個樣本中有64個（54%）含有PFAS，包括大型速食連鎖業者的速食包裝。已知PFAS可從食品包材轉移到食物中，而且已有研究證實，吃下裝在經PFAS處理過的紙包材中的食物（例如微波爆米花及速食/披薩餐廳的餐點），與人體血液中的PFAS含量有關。速食消費的盛行，尤其是在年輕人之中大行其道，讓人不得不擔憂這些食品包材讓處於發育關鍵期的年輕族群吃下多少PFAS；拋棄式及一次用物品的大量生產與大量消費，也令人不得不關注它們對環境可能造成的污染。

如今已有替代品能夠取代經PFAS處理的紙製食品包材，且已被使用中。在這份研究中，每個受測產品類別都有若干樣本並未含有本研究檢測目標的特定PFAS物質（下稱「標的PFAS」）或不含任何EOF。

針對少數幾類PFAS訂定法規上的限值，並不足以管控食品包材中的這些有害物質。只有全面禁止PFAS，包括聚合物類別的PFAS物質，才能阻止PFAS透過食品包材進入人體或釋出到環境中。因此，要減少PFAS釋出到環境並避免有害（所謂「令人遺憾」的）PFAS替代品，最有效的管制作為是在2030年前讓所有的PFAS在全球範圍內被斯德哥摩爾公約及各國政府全面禁止。

關鍵發現

- PFAS是受到廣泛使用的一群高毒性化學物質，會對生育能力、胚胎發育及甲狀腺功能造成負面影響。越來越多證據顯示，PFAS是內分泌干擾素，會模仿或干擾體內天然的荷爾蒙。
- 本研究從位於亞、非、歐、拉丁美洲和加勒比海的17個國家中採集一次用食品包材的樣本，並檢測其中119個樣本。
- 含有PFAS的樣本來自世界各地，並以中東和北非地區最多。
- 119件受測樣本中有64件（54%）含有PFAS。
- 含有PFAS的樣本中有四件超過歐盟的PFOA限值（25 ppb）及（或）長鏈PFCAs限值（C9-C14 PFCAs總和不得超過25ppb）。
- 含有可萃取有機氟（EOF）或標的PFAS物質的樣本中，有53件超出目前正在依據REACH提議討論並將適用歐盟全體的草案限值。
- PFAS濃度最高者仍舊是那些標榜可生物分解或可堆肥的植纖模塑產品（如碗盤和餐盒）。
- 微波爆米花的內裝袋被檢測出含有PFAS的機率最高（28件中就有24件含PFAS）。
- 在12件以再生紙製成、用來包裝非油膩食物的紙包材中，有4件受到PFAS的污染。是故，以PFAS處理過的紙品若被回收，將造成人們無法掌控暴露於PFAS這些永久化學品的風險，因為根本不可能去追蹤再生料中是否含有這些物質。
- 在這些受測樣本中檢測到的21種PFAS物質中，6:2 FTOH是最常出現且濃度最高者。發現FTOHs就意味著這些產品使用了聚合物類別的PFAS物質（亦即「支鏈以氟調聚物為基的聚合物」（side chain fluorotelomer-based polymers））。
- 這些樣本的PFAS含量中，有高達98%以上未能得知是來自那些PFAS物質，因為可從「標的PFAS」的檢測結果中判定出來的特定PFAS物質，其含量最多只佔2%。

背景說明

PFAS問題

PFAS（全氟/多氟烷基物質）是一大群化學物質的通稱，雖然其對健康及環境的影響令人憂心，卻已廣泛使用於消費品和專業用品中；從OECD2018年的全球資料庫中統計出來、已存在全球市場的PFAS物質，總共超過4,700種 [1]。PFAS**可用來讓產品具備防水、防油、抗污的特性，常用於食品包材、不沾鍋具以及防水雨具及消防泡沫。然而，**PFAS**的大部分用途對於社會運作並非必要，或者已有安全替代品** [2]。

已有證據顯示，PFAS**與許多負面健康影響有關，包括生育能力、胚胎發育** [3]**及甲狀腺功能** [4, 5] **都有可能受到**PFAS**的負面影響。越來越多證據顯示，**PFAS**（包括用於食品包材的**PFAS**）是內分泌干擾素，會模仿或干擾體內天然的荷爾蒙** [6]。甲狀腺荷爾蒙的正常運作，對生命的某些階段是很重要的；比如，它是胚胎和新生兒腦部發育的重要因子，也是女性停經後產生更年期症狀的重要因子。PFAS對免疫系統的負面衝擊以及可能造成疫苗效果較差的問題更因新冠疫情而突顯出來 [7-9]。此外，血液中PFAS濃度越高，就越有可能感染症狀較為嚴重的新冠肺炎 [10]。

所有PFAS物質都含有強烈鍵結的碳氟鍵，這讓它們非常穩定，不容易被分解，因此它們有時被稱為「永久化學品」。研究指出，PFAS在其生命週期的每個階段裡都會釋出到環境中，包括生產階段[11-13]、使用階段[14]以及廢棄處理階段[15, 16]。這個問題加上它們的持久性，造成PFAS在環境中的濃度越來越高[17, 18]。在空氣中 [19]、土壤裡 [20]、水體裡 [21]（包括飲用水源 [22]）以及住家的灰塵中[23, 24]，都曾經檢測到PFAS。一旦釋出到環境，PFAS會散布到遙遠的地方外，

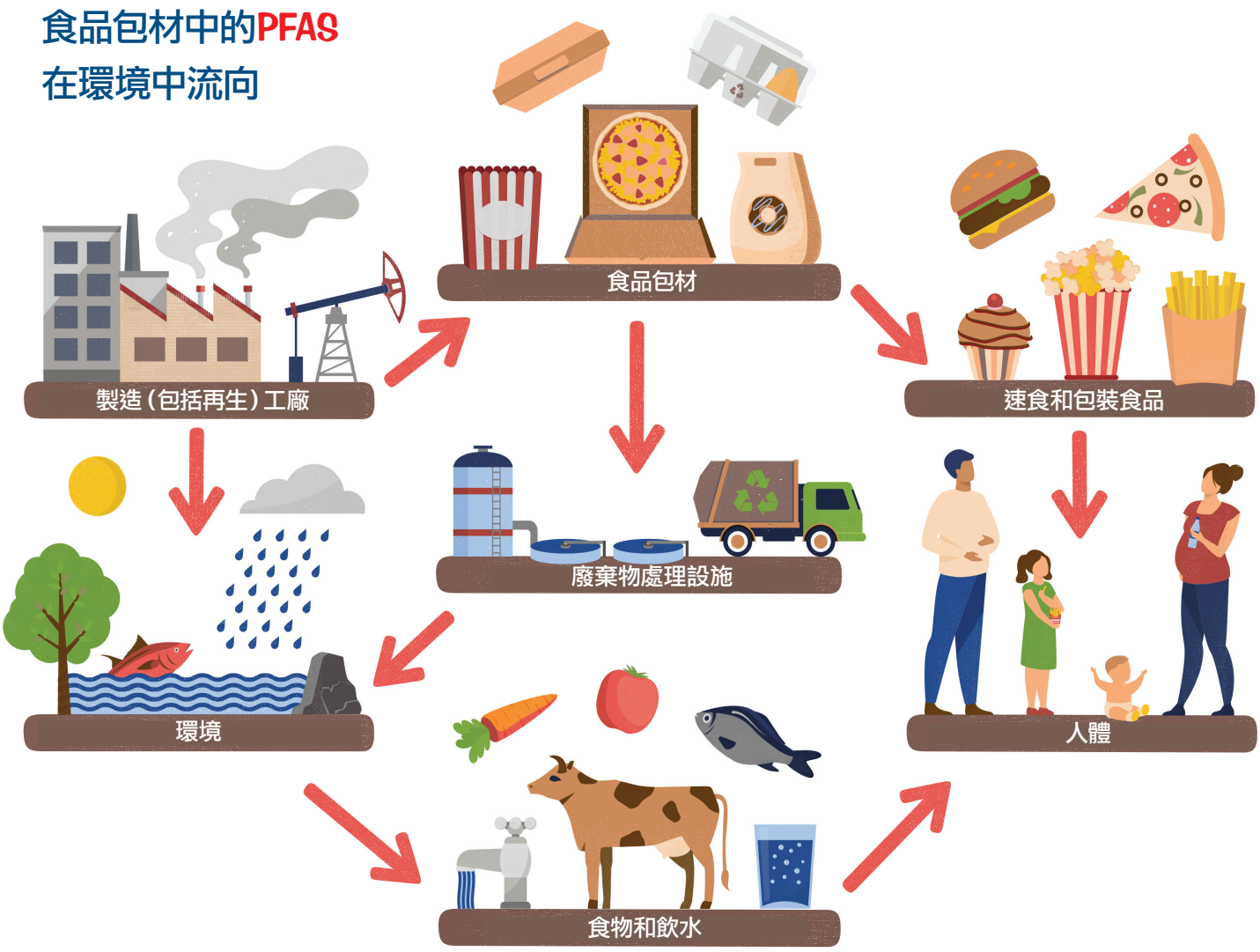
因此在遠離其排放源的地方（包括北極 [25, 26]）都可發現它的蹤跡。

PFAS在紙張、硬紙板及模塑植纖製品的運用

PFAS常被造紙業、紙漿業用來生產可防油防水的拋棄式食品包材。這些業者可能把PFAS加入紙漿中或塗布在紙張或硬紙板的表面上[27, 28]。另外，PFAS也用於模塑植纖包裝的生產 [29, 30]。這些業者認為PFAS的附加價值在於其可在包材表面形成一道化學屏障，阻卻來自食物中的油脂 [31]。由於PFAS可防油，而被大量用於烘培紙、杯子蛋糕的杯子、烘培食品的包裝袋、速食和外帶容器、微波爆米花的內裝袋以及可堆肥的餐具中。

然而，關於這些食品包材使用了哪些PFAS及其含量，可得資訊相當有限，而不利於評估其毒性、暴露以及對人類的風險 [6, 32]。

使用PFAS的紙製或模塑植纖製的食品包材，其生命週期的每個階段都可能排放PFAS；而這些速食包材與拋棄式餐具的消費量又那麼大，不得不令人為之憂心。據報導，植物性羊皮紙或者澱粉類物質，都可取代PFAS來處理拋棄式紙製食品包材且又具成本效益 [28, 33, 34]。



從食物遷移出來的PFAS：人類暴露途徑及其健康影響

人類不斷地暴露於從各種來源而來的PFAS；目前已證實食物和飲用水是人類暴露於PFAS的主要途徑。PFAS已被發現存在於許多種食物中，包括魚類、海鮮、肉類與肉製品以及微波爆米花[35-37]。灰塵、室內環境、個人護理用品以及消費品都是人類暴露於PFAS的重要途徑[38]。最近研究證實，從食品包材遷移出來並污染食物的PFAS，對人體暴露量有重大貢獻 [39-41]。

PFAS從食品包材遷移出來並污染食物的量，與食品包材溫度、包材與食物接觸時間以及食物是否有用乳化劑呈正相關[39, 42]。然而，即使是長期貯存的乾糧（穀類加工品、米、奶粉），也曾有研究指出會被從其包材遷移出來的PFAS污染[42]。

吃下裝在經PFAS處理過的紙包材中的食物（例如微波爆米花及速食/披薩餐廳的餐點），與人體血液中的PFAS含量有關。速食消費的盛行，尤其是在年輕人之中大行其道，讓人不得不擔憂這些食品包材讓處於發育關鍵期的年輕族群吃下多少PFAS；況且我們吃的食物、喝的水都已受到PFAS和其他持久性污染物的污染，這既有的飲食暴露量加上來自食品包材的暴露量，簡直是雪上加霜 [41-44]。

PFAS**可以輕易地被腸道吸收進入循環系統，或者就直接累積在腸道裡，進而與腸道交互作用，造成腸道屏障的破壞**[45]。

關於食品包材中的PFAS：法規現況

PFAS逐漸受到各國、各區與國際上的管制。目前PFOS（及其鹽類與PFOSF）、PFOA（及其鹽類及與PFOA相關的物質）以及PFHxS（及其鹽類及與PFHxS相關的物質）已列於斯德哥爾摩公約的清單中，進行全球性的限制與消除。美國有12個州，包括加州、科羅拉多州、康乃狄克州、夏威夷州、馬里蘭州、緬因州、明尼蘇達州、紐約州、奧勒岡州、羅德島、佛蒙特州以及華盛頓州，已經頒布州的禁令，禁止PFAS使用於食品包材。歐洲方面，目前丹麥已經禁止PFAS用於食品包材。

關於PFAS的禁限用及其在消費品與食品包材中含量的法規限值，請參見附件2。

由於長鏈PFAS逐漸受到法規的管制，因而日漸被短鏈PFAS所取代。雖然短鏈PFAS的生物累積潛勢較低，但由於在環境中到處都可發現它們，包括極為偏遠的地區，因此日受關注 [46]。短鏈PFAS在水中的持久性與移動能力甚至比長鏈PFAS更強，因此可能對環境與人類健康帶來更大的危險 [47]。

研究目的和範疇

本研究評估了PFAS在全球五大區域（亞洲、非洲、中東和北非、東歐、拉丁美洲和加勒比海地區等）的紙製及植纖製的食品包材上的使用及非刻意污染，希望能對於是否有需要全球禁用所有PFAS的討論有所貢獻。本研究由IPEN和以下組織協力完成：AEEFG（突尼西亞）、CARPIN（牙買加）、CEPHED（尼泊爾）、CZWDA（尚比亞）、Ecowaste Coalition（菲律賓）、FECC（埃及）、LPD（貝南）、Green Home（蒙特內哥羅）、Ayadi（約旦）、IDIS（菲律賓）、JVE（喀麥隆）、KWA（科威特）、AMSETox（摩洛哥）、OUSANEG（墨西哥）、看守台灣協會（台灣）、Taller Ecologista（阿根廷）、Together（伊拉克）和 Toxics Link（印度）。

研究方法

樣本收集和選擇

每個參與團體被要求收集至少十個紙製或植物纖維製的一次用食品包材的樣本，來源為在其國內或國際上具有代表性（後者如全球性的速食連鎖店）的業者。樣本分成以下五個類別，調查人員必須在每個樣本類別中收集至少兩個不同的品項： 1)**速食包裝紙**； 2)**微波爆米花的內裝袋**；3)**植纖外帶餐盒或拋棄式餐具**；4)**包裝油膩餐點的硬紙板包材**；5)**包裝非油膩食物的再生紙包材**。如若收集不到某個樣本類別的品項，參與團體可增加其他類別中的樣本數，或是購買其他有可能具有防油特性的食品包材。

在2022年七月到十月間，我們從17國的食品店家和速食餐廳採購了233項紙製及植纖製的食品包材和一次用餐具。這17個國家包括突尼西亞、埃及、約旦、科威特、摩洛哥、伊拉克、蒙特內哥羅、牙買加、墨西哥、阿根廷、貝南、尚比亞、喀麥隆、菲律賓、台灣、尼泊爾、印度。所有的樣本都運到捷克非政府組織Arnika的布拉格辦公室。在Arnika辦公室，使用油滴試驗方法檢測這些樣本的防油特性[48]。油滴試驗方式是將橄欖油滴到紙製或植纖包材的表面，觀察其形成油珠或擴散鋪開、滲透包材的情形並記錄之。

送往實驗室檢驗分析的品項，是從橄欖油滴下後形成油珠和擴散開來的那些樣本中挑選出來，以盡量增加送驗樣本中具有防油抗膩特性的樣本數。形成油珠和油滴擴散開來的樣本，可能其表面有使用PFAS或其他化學品或採取非化學方式處理過。為達到地理區域上的平衡，每個國家最少選取三個品項送實驗室分析；因此，若該國樣本未有形成油珠或油滴擴散開來的情形，則選擇能吸

油的樣本送驗。此外，有些以再生紙製造且並非為了包裝油膩食品的包材，即使會吸油，也被選出送往實驗室，以評估PFAS對包材的非刻意汙染情形。被挑出來送往實驗室分析的樣本數，詳見附件3A。

送實驗室分析的食品包材樣本的品項說明與照片，請見附件3B和附件3C。

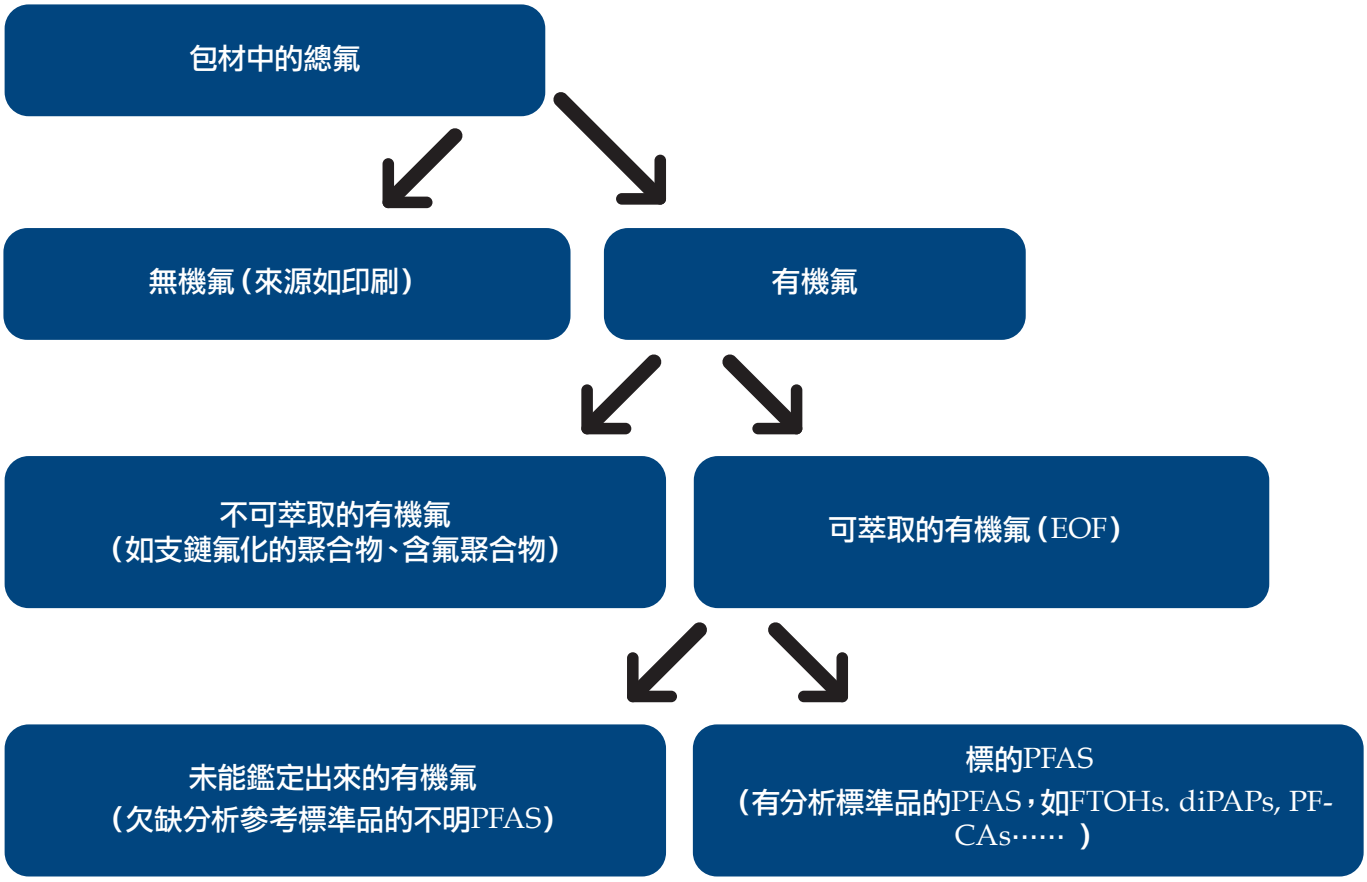
樣本分析

從每個送驗品項切取100cm²下來作為樣本，並以混合了甲醇和乙酸乙酯的溶劑萃取樣本中的PFAS，然後針對該萃出液進行檢驗分析。樣本準備和檢驗分析工作是在捷克的查理大學科學院環境研究所（Institute for Environmental Studies, Faculty of Science, Charles University, Czech Republic）進行。

EOF是透過燃燒離子層析法進行檢測。此程序乃是將樣本在含有氧及氫的氣體中、1000°C 的温度下燃燒，如此與有機物鍵結的氟會氣化，並以氟化物的型態被一過氧化物水溶液捕捉下來。最後透過離子層析儀量測氟化物的濃度，然後將之轉換成以樣本單位面積為分母的濃度。

樣本萃出液中58種標的PFAS的檢測，是採用「高效能液相層析電噴灑游離串連質譜儀」

示意圖1. 食品包材中含氟物質/PFAS的分門別類



（HPLC-ESI-MS/MS）的方法，其中電噴灑游離是在負離子模式下操作（標的PFAS的完整名單，包括其CAS編號及偵測極限，請參見附件1）。標的PFAS定量後，再把其在萃出液中的濃度，轉換成以樣本單位面積為分母的濃度。

氟的質量平衡計算

氟的質量平衡（未能鑑定出的有機氟以及透過標的PFAS分析鑑定出的氟兩者的比例），是根據Schultes等人（2019）論文中說明的方法進行計算 [49]，但有下列些微修正 ：透過氟的質量平衡計算，將一樣本萃出液中檢測到的特定PFAS濃度，轉換成氟的當量，然後將檢測到的PFAS之氟當量總和，與在該樣本中測到的可萃取有機氟總濃度比較。

示意圖1說明氟在樣本中可能存在的不同型態

和法規限值的比較

由於本研究調查的國家皆未限制PFAS在食物包裝或其他消費品項中的使用，因此檢測出來的標的PFAS和EOF濃度，是和歐盟的法規限值（請參見附件2中「歐盟對PFAS的管制」一節）進行比較。

結果摘要

實驗室檢測結果顯示，在以EOF及針對標的PFAS的檢驗法進行分析的所有119件包材品項中，有64件（54%）有經PFAS處理或被PFAS污染（完整結果參見附件4A）。含有PFAS的品項包括全球連鎖速食品牌的食品包材（包括麥當勞、肯德基、漢堡王、Subway、星巴克和Dunkin’s Donuts），植纖餐盒和餐具，微波爆米花的內裝袋，及再生紙製食品包材。PFAS檢出率最高的產品類別是微波爆米花的內裝袋（詳見表2）。各大洲皆有樣本被檢測出含有PFAS，並以來自中東及北非的樣本檢出率最高（各地理區域的結果摘要請見附件4B）。

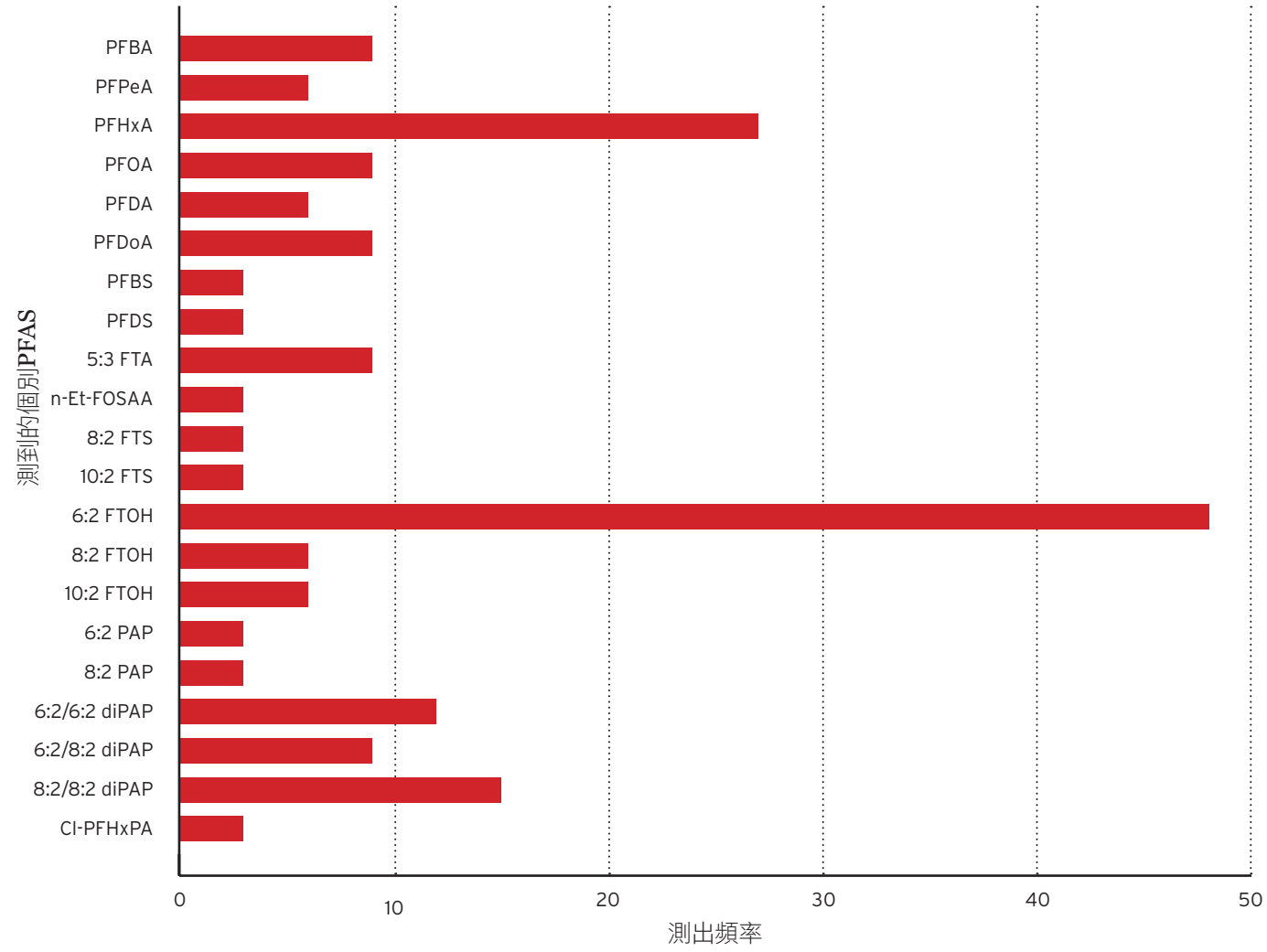
在58種標的PFAS中（參見附件1），有21種在送驗的食品包材樣本中被檢測到（各個PFAS在這些樣品中被檢測到的頻率請參見統計圖1），其中含氟調聚醇之一的6:2 FTOH 是送驗樣本中最常被檢測到且濃度最高的PFAS。

EOF以及標的PFAS總含量的最高檢測值，總是出現在被標榜為可生物分解或可堆肥的拋棄式模塑植纖（甘蔗或玉米澱粉）餐具（如碗、盤與餐盒）。各樣本類別的檢測結果摘要，請參見表2；至於在紙包材的三種樣本類別中，EOF檢測值範圍的比較，請參見統計圖2。

在12件以再生紙製成、用來包裝非油膩食物的紙包材中，有4件受到PFAS的污染。

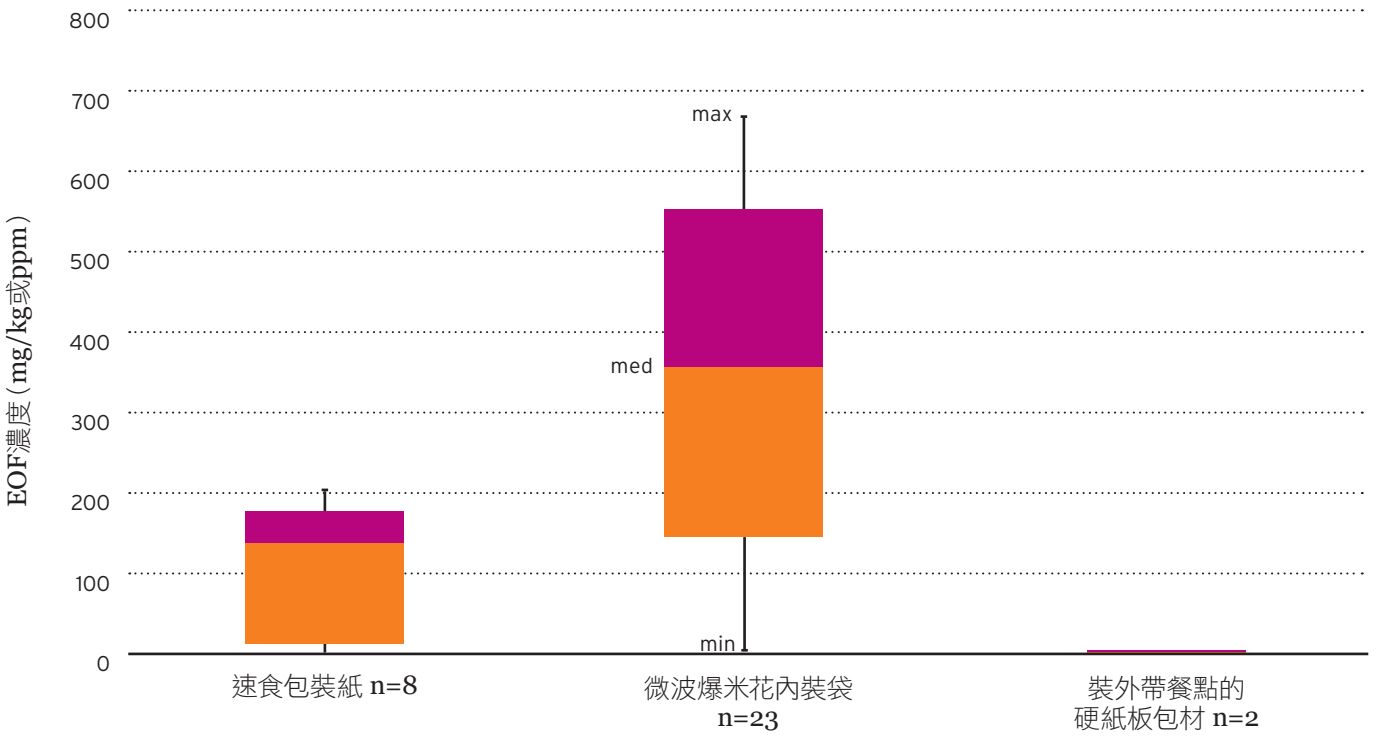
樣本萃取液中檢測到的有機氟（EOF）中，只有0-2%可以經由標的PFAS的分析確定是那些PFAS物質；這表示至少有98%的有機氟未能鑑定出是來自哪些PFAS。

統計圖1. 個別PFAS在測到含有PFAS的樣本中出現的頻率



統計圖2. 三種紙包材樣本類別下的送驗品項測到的EOF濃度範圍

（單位：mg/kg或ppm；只針對測到EOF的樣本進行統計）



PFAS濃度檢測值與既有法規限值的比較

用來比較的既有法規限值：

- 歐盟持久性有機污染物法規：PFOA不得超過25ppb
- 歐盟REACH的PFAS限制提案：採取標的PFAS分析法所測得的任何PFAS不得超過25ppb
- 歐盟REACH的PFAS限制提案：標的PFAS濃度總和不得超過250ppb（該REACH提案建議採用「總可氧化前驅物檢驗法」（Total Oxidizable Precursors；TOP assay），而本研究是採用「高效能液相層析電噴灑游離串連質譜儀」（HPLC-ESI-MS/MS）檢測樣本的萃出液，會低估樣本中PFAS的濃度，因為其在沒有事先讓前驅物降解的情形下量測標的PFAS濃度。）
- 歐盟REACH的PFAS限制提案：總有機氟不得超過50ppm（該REACH提案建議採用「總有機氟分析」（Total Organic Fluorine；TOF analysis），而本研究是採用燃燒離子層析法（CIC）檢測樣本萃出液中的EOF，排除了含氟聚合物，也因此某種程度上排除了支鏈氟化的聚合物。）
- 丹麥動物醫療暨食品管理署（Danish Veterinary and Food Administration）的規定：總有機氟（TOF）指標值為20ppm；超過表示刻意使用PFAS處理紙製食品包材（相對於丹麥法規指定TOF為參考方法，本研究量測樣本萃出液中EOF的方法低估了有機氟的濃度。）

有4個樣本的PFAS濃度，超出歐盟PFOA及/或長鏈PFCAs的限值。

有43個樣本的PFAS濃度或EOF的濃度，超出歐盟REACH全面禁用PFAS提案中至少一項的限值。

根據丹麥的指標值，119個樣本中有39個（33%）有刻意使用PFAS進行表面處理。

各樣本類別的PFAS檢測濃度和既有法規限值的比較，請參見表2。各地區的檢測結果摘要及其和既有法規限值的比較，請參見附件4B。

表2. 各樣本類別的檢測結果摘要及其和法規限值的比較

比較標準	法規限值	速食包裝紙 (35個樣本)	微波爆米花內裝袋 (28個樣本)	植纖外帶餐盒或拋棄式餐具 (8個樣本)	裝油膩食物的硬紙板包裝 (19個樣本)	裝非油膩食物的再生紙包裝 (12個樣本)
有測到PFAS的樣本數 (及佔比)	EOF > 0 或個別的標的 PFAS > 0	15 (43%)	24 (86%)	6 (75%)	5 (26%)	6 (50%)
*EOF**濃度中間值/最大值**(ppm)	-	139/204	358/670	6 619/27 551	160/162	56/82
***標的PFAS總濃度中間值/最大值** (ppb)	-	181/777	756/7 182	4 829/61 206	620/1 847	203/826
刻意使用PFAS進行表面處理的樣本數 (及佔比) **	丹麥針對刻意使用PFAS進行表面處理的食品包材制定的指標值：總有機氟 (TOF) >20ppm	5/8 (63%)	21/23 (91%)	4/4 (100%)	2/2 (100%)	2/2 (100%)
PFOA**濃度超出**25 ppb**的樣本數**	歐盟持久性有機污染物指令中訂定的25 ppb限值	0	2	1	0	0
長鏈PFCAs的總濃度超出25ppb**的樣本數**	歐盟REACH法規中針對長鏈PFAS總濃度訂定的限值25 ppb	0	2	1	0	0
超出至少一項限值的樣本數	歐盟REACH全面禁用PFAS提案中訂定的限值： I) 總有機氟 (TOF) 或EOF濃度限值 50 ppm； II) 任何個別PFAS濃度限值25 ppb； III)個別PFAS濃度總和限值 250 ppb	10	20	6	5	6
各產品類別中最常測到的PFAS	-	PFHxA	6:2 FTOH	6:2 FTOH	6:2 FTOH	6:2/6:2 diPAP
各產品類別中測到濃度最高的PFAS	-	6:2 FTOH	8:2 FTOH	6:2 FTOH	6:2 FTOH	6:2 FTOH

** 檢測濃度的中間值與最大值，乃是針對超出偵測極限的樣本進行的統計。*

*** 「刻意使用PFAS進行表面處理的樣本數」一列的表達方式是：分子為「EOF濃度超出20ppm的樣本數」，分母為「有測到EOF的樣本總數」。*

討論

一次用的外帶包裝容器器具是PFAS污染的源頭之一

直接污染

本研究在送驗的食品包材樣本中共測得21種PFAS物質，包括含氟調聚醇（FTOHs）、多氟烷基磷酸酯（PAPs）和全氟羧酸（PFCAs）。在我們之前的研究調查中也測到這幾類物質[30]，顯示出這些PFAS物質已經是食品包材中的常客。PAPs會被代謝形成FTOHs，然後再進一步被代謝成PFCAs。與這類PFAS物質相關的疾病風險包括：肝臟毒性、乳腺癌、對生殖系統的負面影響以及發育異常 [50-55]。與本研究檢測的樣本類似的食品包材，在過去的研究中也被發現有干擾甲狀腺運作的效應 [30]。

過去也有報告指出，本研究測到的這些PFAS物質有可能從食品包材移動到食物中 [39, 41, 42, 56]。值得一提的是常吃微波爆米花的消費者，「血清中PFOA、PFNA、PFDA和PFOS的濃度明顯偏高」；「過去12個月期間，每天都吃爆米花的人，體內PFDA的濃度上升」[57]。常吃微波爆米花的人，血液中PFAS的濃度比正常人高出許多[58, 59]。

更值得注意的是，由質量平衡分析（EOF和標的PFAS的比例）所得出的結果顯示，樣本中測到的PFAS濃度有很大一部份無法確定來自哪些PFAS，而這些不明的PFAS物質尚潛藏著未知的健康和環境風險。

結論是，這些PFAS物質會從食品包材跑到食物上，再進一步污染危害消費者，而當消費者越常使用這類包材，受到PFAS污染的風險越大。現代年輕人對於速食的喜好，讓人不得不擔憂到底有多少PFAS經由食品包材危害這些正處於成長發育重要階段的年輕族群。況且我們吃的食物、喝的水都已受到PFAS和其他持久性污染物的污染，這既有的飲食暴露量加上來自食品包材的暴露量，簡直是雪上加霜[32, 36, 57, 60, 61]。

間接污染

拋棄式的外帶包材是讓你在吃完其裝盛的食物後、隨即丟棄它的一次用物品。為了滿足速食產業和餐飲外帶的市場需求，這些一次用包材被大量生產、大量丟棄。因此這些被過量生產並大量丟棄的包材，透過其生產階段及廢棄處理階段所排放的PFAS，污染了環境，並間接地污染了人類[13, 16, 62, 63]。

當工廠在生產這些塗佈PFAS的紙品時，會排放PFAS物質到空氣和廢水中，污染週邊環境 [13, 62, 63]。當這些塗佈PFAS的包材變成垃圾、送進城市焚化爐後，最終還是會將PFAS物質、氟化的溫室氣體和其他因不完全燃燒而產生的物質，排放到周遭環境 [16, 64-66]。有些PFAS會殘留在焚燒後的飛灰 [66-68]，然後跟著飛灰被送到掩埋場或被再利用做為建材，而進一步造成環境污染[69]。

再者，標榜可堆肥的植纖模塑包裝容器器具，會導致PFAS污染堆肥，進而污染施用堆肥的土壤及從土壤長出的作物。使用含有一次用植纖包材的廚餘為料源的堆肥，可能因為含有高濃度的PFAS，而成為有害物質[70-72]。

支鏈氟化聚合物對不明PFAS的含量貢獻

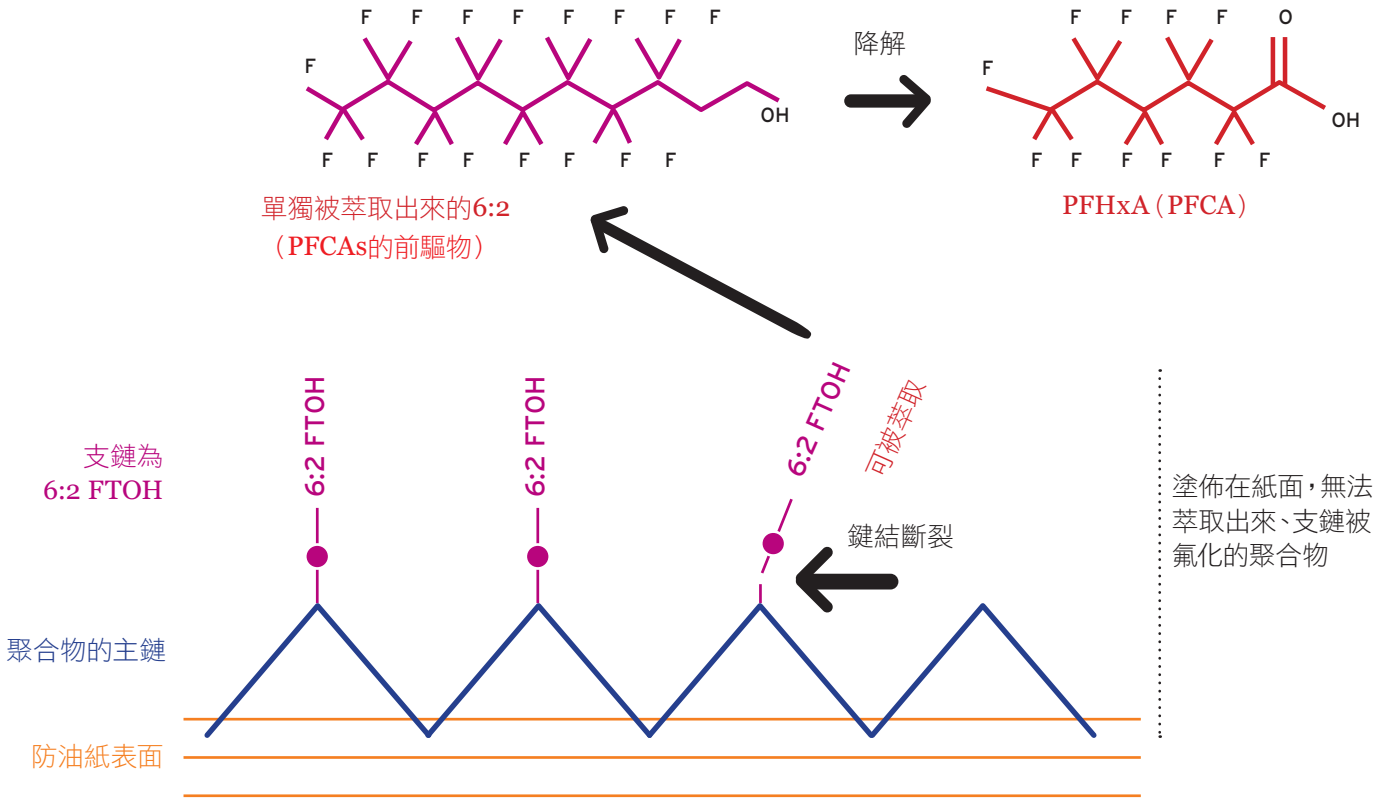
根據質量平衡的計算，所檢測樣本中的EOF含量頂多只有2%可透過針對58種PFAS的標的分析，確認是來自那些PFAS物質。食品包材中所含的PFAS能被鑑定出標的PFAS的數量如此有限，突顯出兩個重大問題：一是標的PFAS分析方法目前是有侷限的；二是欠缺商業可得的標準品來鑑定與量化用於處理食品包材的所有相關PFAS的種類與含量[73-75]。**這意味著不只是難以鑑定這些存在於食品包材的其他不明PFAS，也難以管控它們。儘管未能個別鑑定出這些PFAS物質，但整個PFAS家族共同具有的持久性與在環境中累積的能力，仍使人不得不擔憂這些不明PFAS所帶來的風險危害。**

EOF的檢測結果及從標的PFAS檢測結果得出的氟含量總和之間是有落差的，其原因可能和業者使用「支鏈氟化聚合物」（side-chain fluorinated polymers ；SFPs）來處理食品包材有關 [76-78]。這類聚合物類別的PFAS是無法被萃取出來的，也就是本研究所使用的檢驗方法並未涵蓋到它們；然而，已知它們會降解並釋出非聚合物類別且可萃取的PFAS物質，例如，支鏈為6:2 FTOH的聚合物會降解形成PFHxA[14, 76, 79]（參見示意圖2）。因此，本研究使用的檢驗方法能夠間接偵測到這類聚合物的存在，這樣的結果可用來推斷業者有使用支鏈以氟調聚物為基的聚合物。換句話說，**本研究所檢測樣本中測到的含氟調聚醇（fluorotelomer alcohols；FTOHs）及全氟羧酸（PFCAs），可能來自於支鏈以氟調聚物為基的聚合物。**

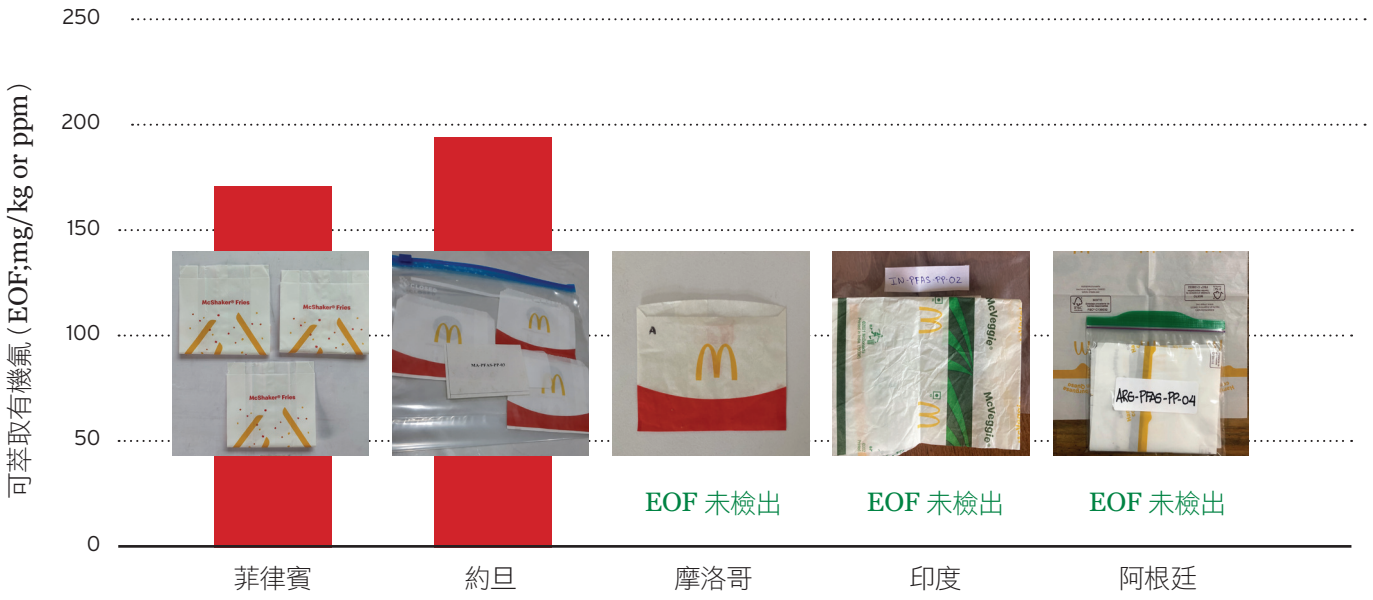
大型速食連鎖業者的因地而異

本研究也顯示，包裝油膩餐點的食品包材，也可以不用經PFAS處理。本研究調查的每個樣本類

示意圖2. 可萃取的6:2 FTOH的存在，代表著食品包材樣本中含有無法萃取出來、支鏈被氟化的聚合物（SFPs）。



統計圖3. 麥當勞的速食包裝紙有的有用PFAS處理，有的沒有，顯示該公司在不同國家的PFAS使用政策不一。



別，都包含了經PFAS處理的產品和沒有PFAS的產品，顯示不含PFAS的替代品已經存在市面中。由於已經有可以替代PFAS處理的替代品，更重要的是，由於安全、耐用、可重複使用的包裝材到處都有，因此用PFAS處理拋棄式用品的作法，是典型的非必要、可避免為之的PFAS用途。

和我們先前針對歐洲地區食品包材的研究調查結果一致 [30]，本研究發現，包括麥當勞、肯德基、漢堡王、Subway、 Dunkin's Donuts與星巴克等主要速食連鎖業者所使用的食品包材，有的有用PFAS而有的沒有。例如，麥當勞在丹麥所使用的漢堡包裝紙，根據有機氟含量檢測的參考值，其有機氟含量相當於背景污染值，顯示其沒有刻意使用PFAS處理，而丹麥是限制PFAS用於食品包材的國家。然而，麥當勞在德國和捷克用來包漢堡的包裝紙，其檢測結果顯示有刻意使用PFAS處理，而這兩國都還未有法規限制PFAS用於食品包材。儘管麥當勞能夠遵守丹麥限制PFAS用於食品包材的法規，卻承諾最遲於2025年前停用經PFAS處理的食品包材。同樣的，本研究的檢測結果可讓我們比對麥當勞在不同國家所使用的包裝紙：來自印度、摩洛哥與阿根廷的包裝紙，沒有檢測到PFAS或EOF；而來自菲律賓與約旦的包裝紙，其EOF含量相當高，顯示刻意使用了PFAS處理其表面（參見圖3）。這案例顯示麥當勞的PFAS政策因地而異，該公司可以找到沒有PFAS的替代品，卻沒有在該公司所有營運據點都使用。

被污染的再生紙

本研究調查的再生紙品項所檢測到的PFAS污染，很可能是來自有用PFAS進行表面處理的廢紙來源 [80-82]。經PFAS處理的紙品一旦回收再利用，就會進一步污染再生品。在以清潔與安全為原則的循環經濟架構下，這些被PFAS污染的再生紙品，將對紙製食品包材的回收可行性形成阻礙 [83]。

結論

本研究的結果顯示，各大州的拋棄式食品包材仍持續使用PFAS。這些產品是為了非常短暫的使用且用後迅即被拋棄，與所有PFAS化學品極為持久的特性有著相當大的反差。另一方面，本研究證實了所有的樣本類別都有可行的替代品。本研究也突顯了主要速食連鎖業者的作法與政策不一，在某些國家使用經PFAS處理的包裝紙，在其他國家則使用不含PFAS的包裝紙。這些發現證實了這些公司已準備好淘汰用於速食包材的PFAS，但需要政策誘因與大眾壓力以加速其改變。

此外，我們的研究結果指出，回收經PFAS處理的廢紙，會導致不受控制的暴露風險，且不可能去追蹤PFAS在這些使用受污染廢料的再生消費品中的含量。因此，使用PFAS將阻礙循環經濟，降低回收信譽。

考量「永久化學品」對健康與環境的影響，而食品包材並非PFAS必要用途，且替代方案已經存在，業者也已準備好淘汰PFAS，因此應該禁止PFAS使用，讓不含PFAS的安全替代方案取而代之。只有全球禁止整個PFAS家族，採用可篩出全部PFAS物質的檢驗方法（比如説總有機氟），才能有效減少人類暴露於PFAS這種極為持久的化學品家族，防止它們釋出到環境中。

建議作為

綜合本研究發現與結論，我們呼籲：

各國政府：

1. 立即禁止所有PFAS用於食品包材及其他消費品。
2. 支持全面禁用PFAS（涵蓋所有PFAS物質，包含氟化聚合物、支鏈氟化聚合物）的目標，並全力落實之。在某些國家（如：丹麥），已採取可篩出整個PFAS家族的檢測分析方法（如：總有機氟）。
3. 要求產品的化學與材料資訊應公開透明，也就是說，應立法要求製造業者向監管單位、零售業者、社會大眾揭露自家產品的成分。
4. 規劃並祭出經濟誘因、財政援助與補助，協助業界轉型，改採無PFAS的替代方案，同時在公正轉型前提下，保障受影響員工與社區的權益與生計。
5. 提供海關部門必要資源，提升其檢測分析能力，讓其能夠判斷進口品是否含有PFAS或被PFAS污染。

《斯德哥摩爾公約》簽署方：

1. 批准該公約列管PFOS、PFOA、PFHxS的修正案，支持終止所有豁免條款與許可用途。
2. 將該公約針對PFOS、PFOA、PFHxS的禁令納入國內法規。
3. 支持將長鏈PFCAs及其相關物質列入該公約附件A清單（要求全球消除，不提供豁免）。

4. 採取針對所有同類物質的作法，將所有PFAS納入《斯德哥摩爾公約》的全球消除物質清單。

《巴塞爾公約》簽署方：

1. 基於PFAS具備符合有害特性代碼H11（延遲或慢性的毒性）的特性，將所有含PFAS的廢棄物定義為有害廢棄物。
2. 批准「巴塞爾禁令」修正案（Basel Ban amendment），確保含有PFAS的有害廢棄物不會輸出或輸入到非OECD國家。
3. 在《關於廢塑膠的鑑定、環境友善管理及其處置之技術準則》（Technical guidelines on the identification and environmentally sound management (ESM) of plastic wastes and for their disposal）中，將支鏈以氟調聚物為基的聚合物（支鏈氟化聚合物）以及遭PFAS汙染的產品認定為無法回收，因此不能加以循環利用。
4. 在訂定廢棄物PFAS含量上限（所謂的「低POP含量」）時，採取針對所有PFAS的作法，將PFAS總含量限值訂在10mg/g（ppm）。

《全球化學品框架——打造無化學品與廢棄物危害的地球》利害關係人：

1. 加大力道，推進產業轉型改採無PFAS的安全替代方案，包含制訂積極的時限，全面淘汰所有PFAS，僅允許使用於對社會運作有必要的用途。同時，大幅提高相關資訊的可得性，包括：檢驗分析方法、PFAS的危害資料、無PFAS的替代方案等。
2. 努力讓產品的PFAS含量資訊完全透明，支持消費者知情及選擇不含PFAS產品的權利。提供充分資訊，讓大眾了解產品、廢棄物、再生料中含有PFAS的情形，能使得在既有法規體系下生產的物品與再生料符合相關規範的情形，得到更好的監督。

連鎖速食店與食品零售商：

1. 制定並實施淘汰PFAS使用的公共政策，搭配明確可量化的目標與時程，讓PFAS如期地在其供應鏈、店面或餐廳所使用的食品包材中減少並消失。
2. 展現企業向有害化學品說不的決心。
3. 確保用來取代PFAS的物質是更安全的。
4. 為內用顧客提供安全、可重複使用的環保餐具，訓練員工將這類餐具作為內用的預設選項。
5. 公開報告執行進度，並於其食品包材達到無PFAS目標時對外宣告。

社會大眾：

1. 盡量避免使用一次用的食品包材。前往速食連鎖店消費或到店家外帶餐點時，記得自備可重複使用的環保容器，以避免接觸到可能含有PFAS的包裝紙袋、紙盒及模塑植纖餐具。
2. 請「不要」將號稱可堆肥的模塑植纖餐具丟入堆肥桶，也不要當作自家堆肥使用，因為這類產品通常會塗布大量的PFAS。

附件1：本研究檢測分析的58種PFAS物質的化學名稱、CAS編號及偵測極限（LOQS）

PFAS	名稱	CAS編號	液相層析質譜儀分析方法的偵測極限（ng/ml萃出液）	整套分析方法的偵測極限（ng/100cm²樣本表面）
PFBA	perfluoro-n-butanoic acid	375-22-4	1	15
PFPeA	perfluoro-n-pentanoic acid	2706-90-3	1	15
PFHxA	perfluoro-n-hexanoic acid	307-24-4	0.25	3
PFHpA	perfluoro-n-heptanoic acid	375-85-9	0.1	1
PFOA	perfluoro-n-octanoic acid	335-67-1	0.1	1
PFNA	perfluoro-n-nonanoic acid	375-95-1	0.2	3
PFDA	perfluoro-n-decanoic acid	335-76-2	0.1	1
PFUnDA	perfluoro-n-undecanoic acid	2058-94-8	0.1	1
PFDoDA	perfluoro-n-dodecanoic acid	307-55-1	0.1	1
PFTrDA	perfluoro-n-tridecanoic acid	72629-94-8	0.1	1
PFPrS	perfluoropropanesulfonic acid	423-41-6	0.25	3
PFBS	perfluorobutane sulfonate	375-73-5	0.5	7
PFPeS	pentanesulfonic acid	2706-91-4	0.1	1
PFHxS	perfluorohexane sulfonate	355-46-4	0.25	3
PFHpS	perfluoroheptane sulfonate	375-92-8	0.1	1
PFOS	perfluorooctane sulfonate	1763-23-1	0.1	1
PFNS	perfluorononane sulfonic acid	68259-12-1	0.25	3
PFDS	perfluorodecane sulfonic acid	335-77-3	0.1	1
PFDoDS	sodium perfluoro-1-dodecanesulfonate	1260224-54-1	0.1	1
n-Met-PFBSA	n-methyl-perfluoro-1-butane sulfonamide	68298-12-4	0.5	7
PFOSA	perfluorooctane sulfonamide	754-91-6	0.1	1
n-Et-PFOSA	n-ethyl-perfluoro-1-octane sulfonamide	4151-50-2	0.1	1
n-Met-PFOSA	n-methyl-perfluoro-1-octanesulfonamide	31506-32-8	0.25	3
3:3 FTA	fluorinated telomer acid (3:3)	356-02-5	1	15
5:3 FTA	fluorinated telomer acid (5:3)	914637-49-3	0.5	7
7:3 FTA	fluorinated telomer acid (7:3)	812-70-4	0.25	3
9-Cl-PF3ONS	potassium-9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	73606-19-6	0.1	1
11-Cl-PF3OUdS	potassium-11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	83329-89-9	0.1	1

PFAS	名稱	CAS編號	液相層析質譜儀分析方法的偵測極限（ng/ml萃出液）	整套分析方法的偵測極限（ng/100cm²樣本表面）
NaDONA	sodium dodecafluoro-3H-4, 8-dioxanonanoate	958445-44-8	0.1	1
GenX	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy) propanoic acid	13252-13-6	0.1	1
FOSAA	perfluoro-1-octanesulfonamidoacetate	2806-24-8	0.5	7
n-Met-FOSAA	n-methyl-perfluoro-1-octanesulfonamidoacetate	2355-31-9	0.5	7
n-Et-FOSAA	n-ethyl-perfluoro-1-octanesulfonamidoacetate	2991-50-6	0.5	7
4:2 FTS	fluorinated telomer sulfonate (4:2)	27619-93-8	0.5	7
6:2 FTS	fluorinated telomer sulfonate (6:2)	27619-94-9	0.25	3
8:2 FTS	fluorinated telomer sulfonate (8:2)	27619-96-1	0.25	3
10:2 FTS	fluorinated telomer sulfonate (10:2)	108026-35-3	0.25	3
4:2 FTOH	2-perfluorobutyl ethanol	2043-47-2	25	350
5:2 FTOH	1-perfluoropentyl ethanol	914637-05-1	10	150
6:2 FTOH	2-perfluorohexyl ethanol	647-42-7	15	200
7:2 FTOH	1-perfluoroheptyl ethanol	24015-83-6	2.5	35
8:2 FTOH	2-perfluorooctyl ethanol	678-39-7	2.5	350
10:2 FTOH	2-perfluorodecyl ethanol	865-86-1	1	15
6:6 PFPi	sodium bis(perfluorohexyl) phosphinate	70609-44-8	0.1	1
6:8 PFPi	sodium perfluorohexylperfluorooctyl phosphinate	2361298-14-6	0.1	1
8:8 PFPi	sodium bis(perfluorooctyl) phosphinate	500776-69-2	0.1	1
6:2 PAP	sodium 1H,1H,2H,2H-perfluorooctyl phosphate	150033-29-7	0.25	3
8:2 PAP	sodium 1H,1H,2H,2H-perfluorodecyl phosphate	438237-75-3	1	15
6:2/6:2 diPAP	sodium bis(1H,1H,2H,2H-perfluorooctyl) phosphate	407582-79-0	0.25	3
6:2/8:2 diPAP	sodium (1H,1H,2H,2H - perfluorooctyl-1H,1H,2H,2H-perfluorodecyl) phosphate	N/A	0.5	7
8:2/8:2 diPAP	sodium bis(1H,1H,2H,2H-perfluorodecyl) phosphate	114519-85-6	0.25	3
PFHpPA	perfluoroheptylphosphonic acid	N/A	0.25	3
PFECHS	potassium perfluoro-4-ethylcyclohexane-sulfonate isomeric mix	335-24-0	0.25	3
PFHxPA	perfluorohexylphosphonic acid	40143-76-8	0.25	3
Cl-PFHxPA	6-chloroperfluorohexylphosphonic acid	N/A	0.25	3
PFOPA	perfluorooctylphosphonic acid	40143-78-0	0.25	3
Cl-PFOPA	8-chloroperfluorooctyl-phosphonic acid	N/A	0.25	3
PFDPA	perfluorodecylphosphonic acid	52299-26-0	0.25	3

附件2：PFAS的禁限制及其在消費品與食品包材中的濃度限值

斯德哥爾摩公約對PFAS的管制

目前PFOS（及其鹽類與PFOSF）、PFOA（及其鹽類及與PFOA相關的物質）以及PFHxS（及其鹽類及與PFHxS相關的物質）已列於斯德哥爾摩公約的附件黑名單中，進行全球性的限制與消除。列入該公約黑名單的PFOS，於2010年被大部分國家正式列管，並於2020年增修列管內容；列入該公約黑名單的PFOA，則於2020年被大部分國家正式列管。被納入該公約附件A黑名單管制的PFHxS、其鹽類及與PFHxS相關的物質，將於2024年被大部分國家正式列管。長鏈的PFCAs（perfluorocarboxylic acids；全氟羧酸）、其鹽類與相關物質，則被提議於2025年召開的下一次斯德哥爾摩公約會員國大會中列入該公約附件A（全球須予以消除的黑名單）。

歐盟對PFAS的管制

歐盟是透過編號2019/1021的法規對持久性污染物進行管制。該法規已將斯德哥爾摩公約的禁限要求納入，並對被列管的PFAS物質在消費品（包括紡織品）中的使用訂定濃度限值：

- PFOA與PFHxS（包括其鹽類）：個別物質濃度不得超過0.025mg/kg（等於25ng/g或25ppb）。
- PFOA相關物質：總和濃度不得超過1mg/kg。
- PFHxS相關物質：總和濃度不得超過1mg/kg。
- PFOS及其衍生物：在物質或混合物中的濃度不得超過10mg/kg。
- PFOS：在經表面處理的材料之表面的含量不得超過1μg/m2。

2023年2月，歐盟一項涵蓋200種長鏈PFCAs（9-14個碳的全氟羧酸）及其前驅物（即會降解產生這些PFCAs的化學品）的限制令生效。該規範要求這些9-14個碳的PFCAs及其鹽類在物質、混合物或物品中的總和濃度不得超過25ppb；其相關物質的總和濃度則不得超過260ppb。

還有幾種PFAS（如GenX及PFBS）被歐盟依據REACH法規認定為高度關注物質（substances of very high concern；SVHCs）。產品若含有超過0.1%的任何高度關注物質，其製造商、供應商與零售商必須將該產品含有這些物質的相關訊息，沿著產品供應鏈傳遞出去。然而，0.1%這個限值太過寬鬆，不具保護效果，且只附帶要求資訊傳遞責任而無採取額外措施。

2023年，歐洲化學總署（ECHA）發布一項適用全歐盟的提案，要限制整個PFAS家族使用於所有非必要用途；若該項提案通過，將禁止PFAS在非必要用途方面的製造、上市與使用，並限制其他物質、混合物與物品中的PFAS含量不得超過一定限值。該提案對於紡織品沒有提供多少豁免權或寬限期，畢竟在歐盟市場上已經有可行的替代品存在（該提案只針對一些防護性的專業用紡織設備提出一些次要的豁免）。該提案也認定整個紡織產業（涵蓋紡織品、傢俱裝飾織物、皮革、服飾與地毯）是第二大的PFAS排放源。

歐洲化學總署發布的這項限制提案提出下列限值：

1. 透過標的PFAS分析所測得的任何PFAS（但不包括聚合物類別的PFAS），個別濃度不得超過25ppb。
2. 透過諸如「總可氧化前驅物檢驗法」（Total Oxidizable Precursor assay）所測得的PFAS總濃度（可選擇是否事先讓前驅物降解）不得超過250ppb。
3. 涵蓋所有PFAS（包括聚合物類別的PFAS）的總有機氟，濃度不得超過50ppm。

此外，自2020年6月起，丹麥已經禁止PFAS用於紙製食品包材。該禁令涵蓋PFAS的直接使用（添加PFAS讓材料變得防油又防水）及間接使用（PFAS的添加來自油墨或再生紙的使用），並訂定總有機氟含量的指標值為20ppm（乾重），以用來判斷所含PFAS是刻意添加還是源自紙製食品包材的污染背景值。

附件3A：各國收集及送驗的樣本數

地區	國家	收集樣本數	送驗樣本數					
			速食包裝紙	微波爆米花內裝袋	外帶植纖餐盒或拋棄式餐具	裝油膩餐點的硬紙板包裝	裝非油膩食物的再生紙包裝	其他
中東與北非	突尼西亞	9		1		2		3
	埃及	14		10		1		
	約旦	15	3	2	1		1	
	科威特	9	3	2	1			
	摩洛哥	15	4				1	1
	伊拉克	16	2	2		1	3	
東歐	蒙特內哥羅	9	1	2			2	
拉丁美洲與加勒比海地區	牙買加	9	1	1		2		1
	墨西哥	26	3	1		3	4	1
	阿根廷	6	3					
非洲	貝南	17	1			2		1
	尚比亞	4	1			1		2
	喀麥隆	24	2					3
南亞、東亞與東南亞	菲律賓	21	4	2	4	1		1
	台灣	17	2	2	1		2	1
	尼泊爾	22	1	1	1	4		2
	印度	12	4	2		1		

附件3B：送驗的食品包材器具之樣本品項說明

REGIONS

SA/EA/SEA...South, East, and South-East Asia
Africa.....Anglophone and Francophone Africa
MENA.....Middle East and North Africa
EE.....Eastern Europe
LAC.....Latin America and Carribean

FAST FOOD CHAINS/COMPANIES

- Burger King
- KFC
- Subway
- McDonald's
- ACT II
- Burger Singh
- JOLLY TIME
- DUNKIN' DONUTS
- STARBUCKS

照片編號	樣本 ID	國家	地區	樣本類型	取樣分類	包裝內容物	速食品牌	標示
1	ZM-PFAS-PP-01	Zambia	Africa	Paper wrapper	Fastfood paper wrapper	French fries	Hungry Lion	Made of Recycled paper
2	ZM-PFAS-PP-02	Zambia	Africa	Cupcake	Baking paper/ cup	Muffin	Shoprite East Park Mall	Made of Recycled Paper
3	ZM-PFAS-CB-03	Zambia	Africa	Cardboard pizza box	Takeaway card-board box	Pizza	Debonairs Pizza	Made of Recycled card box
4	ZM-PFAS-MFP-04	Zambia	Africa	Paper plate	Paper tableware	Takeaway meal	Twinsaver paper plates	Recycled moulded paper
5	TN-PFAS-PP-02	Tunisia	MENA	Baking paper	Baking paper/ cup	Pastry	Pastry shop	-
6	TN-PFAS-PP-05	Tunisia	MENA	Cardboard box for fries	Takeaway card-board box	French fries	O'potatos	-
7	TN-PFAS-PP-06	Tunisia	MENA	Cardboard box	Takeaway card-board box	Chicken Snacker	KFC	Recycling box
8	TN-PFAS-PP-07	Tunisia	MENA	Coffee cup	Paper cup	Coffee, tea	Coffee shop	Recycling cup
9	TN-PFAS-PP-08	Tunisia	MENA	Cupcake	Baking paper/ cup	Pastry	Pastry shop	-
10	TN-PFAS-PP-09	Tunisia	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn	Céréalis	c-4436D
11	TW-PFAS-PP-03	Taiwan	SA/EA/ SEA	Paper wrapper for fried food	Fastfood paper wrapper	Red bean pie	Mos Burger	-
12	TW-PFAS-PP-04	Taiwan	SA/EA/ SEA	Paper wrapper for fried food	Fastfood paper wrapper	French fries	T.K.K Fried Chicken	-
13	TW-PFAS-PP-05	Taiwan	SA/EA/ SEA	Paper wrapper	Bakery	Cookie	Subway	-
14	TW-PFAS-MFP-03	Taiwan	SA/EA/ SEA	Box for takea-way meal	Plant-based	Takeaway meal	Local restaurant	-
15	TW-PFAS-MPB-01	Taiwan	SA/EA/ SEA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn	Jolly Time, 7-11	-
16	TW-PFAS-MPB-02	Taiwan	SA/EA/ SEA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn	Kirkland Signature, Costco	-
17	TW-PFAS-RPP-01	Taiwan	SA/EA/ SEA	Egg packaging	Recycled paper	Eggs	Homemakers Union Consumers Co-op	
18	TW-PFAS-RPP-02	Taiwan	SA/EA/ SEA	Egg packaging	Recycled paper	Eggs	PX Mart	
19	PH-PFAS-PP-07	Philip-pines	SA/EA/ SEA	Cardboard pizza box	Takeaway card-board box	Pizza	Greenwich, Toril, Davao City	-
20	PH-PFAS-MFP-08	Philip-pines	SA/EA/ SEA	Box for takea-way meal	Plant-based	Takeaway meal	SM City, Ecoland, Davao City	Made from constarch; Recyclable

照片編號	樣本 ID	國家	地區	樣本類型	取樣分類	包裝內容物	速食品牌	標示
21	PH-PFAS-MFP-09	Philip-pines	SA/EA/SEA	Box for takea-way meal	Plant-based	Takeaway meal	SM City, Ecoland, Davao City	Cornstarch Lunch Box; Recyclable
22	PH-PFAS-PP-11	Philip-pines	SA/EA/SEA	Box for takea-way meal	Plant-based	Ham and Cheese Crepe	Starbucks, Jazz Mall, Makati City	The compostable con-tainer is not labeled; the plastic lid bears recy-cling symbol #1 (PET)
23	PH-PFAS-PP-12	Philip-pines	SA/EA/SEA	Box for takea-way meal	Plant-based	Takeaway meal	"Eco Innovators Meal Tray - SM Hypermar-ket, Jazz Mall, Makati City"	Made from sugarcane starch
24	PH-PFAS-PP-13	Philip-pines	SA/EA/SEA	Paper wrapper	Bakery	Cookie	Starbucks, Jazz Mall, Makati City	Made with 100% un-bleached paper
25	PH-PFAS-PP-14	Philip-pines	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	French Fries	Burger King, Matalino St., Quezon City	-
26	PH-PFAS-PP-15	Philip-pines	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	McShaker Fries	McDonald's, Matalino St., Quezon City	Mix. Packaging from responsible sources
27	PH-PFAS-PP-16	Philip-pines	SA/EA/SEA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter licious	Jolly Time, Shopwise, Cubao, Quezon City	-
28	PH-PFAS-PP-17	Philip-pines	SA/EA/SEA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter Overload	Popperoo, 7-Eleven, EAC, Manila City	-
29	PH-PFAS-PP-18	Philip-pines	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	Donuts	Dunkin' Donuts, Manila	Biodegradable
30	PH-PFAS-PP-19E	Philip-pines	SA/EA/SEA	Paper wrapper	"Bakery Fastfood paper wrapper"	Takeaway meal	Armada lunch bags Araneta Center, Cu-bao, Quezon City	Made from recycled material
31	NP-PFAS-PP-01	Nepal	SA/EA/SEA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn	American Garden, Bhatbhateni Super Market	Made of recycled paper
32	NP-PFAS-PP-02	Nepal	SA/EA/SEA	Cardboard box	Takeaway card-board box	Fastfood	KFC	Disposable
33	NP-PFAS-PP-04	Nepal	SA/EA/SEA	Cardboard box	Takeaway card-board box	Donuts	Swastik Sweets and Snacks Pvt Ltd	Disposable
34	NP-PFAS-PP-05	Nepal	SA/EA/SEA	Coffee cup	Paper cup	Coffee, tea	Bishnu Store	Disposable
35	NP-PFAS-PP-06	Nepal	SA/EA/SEA	Cardboard box	Takeaway card-board box	Burger	KFC	Disposable
36	NP-PFAS-PP-07	Nepal	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	French fries	KFC	Recycabale
37	NP-PFAS-PP-08	Nepal	SA/EA/SEA	Cardboard box	Takeaway card-board box	French fries	KFC	Made of recycled paper
38	NP-PFAS-PP-09	Nepal	SA/EA/SEA	Coffee cup	Paper cup	Coffee	Bishnu Store	Recycabale
39	NP-PFAS-PP-10	Nepal	SA/EA/SEA	Moulded Fibre Plate	Plant-based	Takeaway meal	Bhatbhateni Super Market	Compostable and Bio-degradabale
40	MA-PFAS-PP-03	Marocco	MENA	Paper wrapper for fried food	Fastfood paper wrapper	French fries	McDonald's Interna-tional fast-food chain brand	-
41	MA-PFAS-PP-04	Marocco	MENA	Paper wrapper for fried food	Fastfood paper wrapper	French fries	Burger King	-
42	MA-PFAS-PP-05	Marocco	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Chicken burger	Burger King	-
43	MA-PFAS-PP-09	Marocco	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Donuts	Dunkin' Donuts	-
44	MA-PFAS-PP-13	Marocco	MENA	Paper wrapper	Bakery	Cookie	Starbucks	Made with 100% Recy-cled fiber
45	MA-PFAS-PP-14	Marocco	MENA	Napkins	Recycled paper		Dunkin' Donuts	Made from Recycled fiber

照片編號	樣本 ID	國家	地區	樣本類型	取樣分類	包裝內容物	速食品牌	標示
46	JO-PFAS-PP-01A	Jordan	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Happy meal - Fries bags	McDonald's	FSC- paper from re-sponsible resources
47	JO-PFAS-PP-01B	Jordan	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Happy meal - Chicken Burger wrapper	McDonald's	FSC- paper from re-sponsible resources
48	JO-PFAS-PP-02	Jordan	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Twister Sandwish	KFC	FSC
49	JO-PFAS-MFT-01	Jordan	MENA	Box	Plant-based	Takeaway meal	RZ-AL Hadaf INTL CO. for importing & industry L.L.c	ECO friendly, Biode-gradable food container with lid
50	JO-PFAS-RPP-01	Jordan	MENA	Paper box	"Recycled paper Other"	Freekeh (a cereal food made from green durum wheat that is roasted and mashed to create its flavour.)	El Basha	Recycled material
51	JO-PFAS-MPB-01	Jordan	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour	KSIH	
52	JO-PFAS-MPB-02	Jordan	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Extra Butter	American Garden	-
53	MNE-PFAS-PP-03	Podgorica	EE	Paper wrapper for fried food	Fastfood paper wrapper	Gyros/French fries	Home of gyros	-
54	MNE-PFAS-MPB-01	Podgorica	EE	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn	Berny	-
55	MNE-PFAS-MPB-02	Podgorica	EE	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn	Mogyi	-
56	MNE-PFAS-RPP-01	Podgorica	EE	Egg packaging	Recycled paper	Eggs	Kovacevic	-
57	MNE-PFAS-RPP-02	Podgorica	EE	Egg packaging	Recycled paper	Eggs	Farma Martinici	-
58	EG-PFAS-CB-01	Egypt	MENA	Cardboard box	Takeaway cardboard box	Grand Chicken	McDonald's	FSC- packaging from respisible sources
59	EG-PFAS-MPB-01	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour	Freshly	-
60	EG-PFAS-MPB-02A	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour, Honey	Top of the POP	-
61	EG-PFAS-MPB-02B	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour, Salt	Top of the POP	-
62	EG-PFAS-MPB-02C	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter fla-vour, Salted caramel	Top of the POP	-
63	EG-PFAS-MPB-02D	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour, Hot pepper	Top of the POP	-
64	EG-PFAS-MPB-02E	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter fla-vour, Choco a caramel	Top of the POP	-
65	EG-PFAS-MPB-03A	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour	POPZ	-
66	EG-PFAS-MPB-03B	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter fla-vour, Sweet a salty	POPZ	-
67	EG-PFAS-MPB-04A	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour, Sweet	POPCorn	-
68	EG-PFAS-MPB-04B	Egypt	MENA	Popcorn paper bag	Microwave pop-corn paper bag	Popcorn - Butter flavour, Cheese	POPCorn	-
69	IQ-PFAS-PP-03	Iraq	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Shawrma chicken	Mishaltet House	-
70	IQ-PFAS-PP-04	Iraq	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Roll up burger	KFC	-
71	IQ-PFAS-CB-05	Iraq	MENA	Cardboard box	Takeaway card-board box	French fries	Burger King	FSC MIX packaging from responsible sources

照片編號	樣本 ID	國家	地區	樣本類型	取樣分類	包裝內容物	速食品牌	標示
72	IQ-PFAS-RPP-03A	Iraq	MENA	Paper box	Recycled paper	Cereals (Special)	Activity	Recycled Paper
73	IQ-PFAS-RPP-03B	Iraq	MENA	Paper box	Recycled paper	Cereals (Chocoshell)	Activity	Recycled Paper
74	IQ-PFAS-RPP-03C	Iraq	MENA	Paper box	Recycled paper	Cereals (Choco Cereals)	Activity	Recycled Paper
75	IQ-PFAS-MPB-01	Iraq	MENA	Popcorn paper bag	Microwave popcorn paper bag	Popcorn - Butter flavour	KASIH	-
76	IQ-PFAS-MPB-02	Iraq	MENA	Popcorn paper bag	Microwave popcorn paper bag	Popcorn - Lite Butter	American Garden	-
77	CMR-PFAS-PP-01	Cameroon	Africa	Paper wrapper	Fastfood paper wrapper	Hamburger	Acropole	-
78	CMR-PFAS-RPP-06	Cameroon	Africa	Tray	Paper tableware	Takeaway meal	-	-
79	CMR-PFAS-RPP-03	Cameroon	Africa	Tray	Paper tableware	Takeaway meal	-	-
80	CMR-PFAS-PP-07	Cameroon	Africa	Paper wrapper	Fastfood paper wrapper	Hamburger	Idole Sarl	-
81	CMR-PFAS-RPP-04	Cameroon	Africa	Paper wrapper	Paper packaging	Sucre blond	Princesse Tatie, Sosucam	-
82	KW-PFAS-PP-02	Kuwait	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Meat kebab sandwich/ meat shawarma sandwich/ chicken shawarma sandwich	Shawarma Sharaf	-
83	KW-PFAS-PP-04	Kuwait	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Wild zaatar multicereal/zaatar oat dough/ smoked beef &cheese oatdough/kashkawan oat dough	Zaatar&Zeit	-
84	KW-PFAS-PP-05	Kuwait	MENA	Paper wrapper for fried food	Fastfood paper wrapper	Wagyu burger box/ row meat	The butchery	-
85	KW-PFAS-MFT-01	Kuwait	MENA	Bowls	Plant-based	Wagyu burger box/ frech tomatoes, lettuce,onions, cheddar	The butchery	Compostable(115)/eg-0.8/registred deseign compostable en13432 / compostable tray *10 / compostable tray *21
86	KW-PFAS-MPB-01	Kuwait	MENA	Popcorn paper bag	Microwave popcorn paper bag	Popcorn - Natural flavor	Jolly Time	GENB4-2111
87	KW-PFAS-MPB-02	Kuwait	MENA	Popcorn paper bag	Microwave popcorn paper bag	Popcorn - simply salted	Orville Rendenbacher's	PRS3
88	BN-PFAS-CB-01	Benin	Africa	Cardboard box	Takeaway cardboard box	Cake	Imprim'vert	cardboard recyclable, FSC C104473/www.fsc.org
89	BN-PFAS-PP-01	Benin	Africa	Cardboard box	Takeaway cardboard box	French fries	Hot Fries	-
90	BN-PFAS-MFP-01	Benin	Africa	Paper wrapper	Fastfood paper wrapper	Shawama	Shawama bag	-
91	BN-PFAS-CB-07	Benin	Africa	Coffee cup	Paper cup	Cofee	Cappuccino	-
92	BN-PFAS-CB-08	Benin	Africa	Cardboard box	Takeaway cardboard box	oasted peanuts	Imprim'vert	FSC C104473/ www.fsc.org
93	IN-PFAS-PP-01A	India	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	Burger	Burger Singh	-
94	IN-PFAS-PP-01B	India	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	Burger	Burger Singh	-
95	IN-PFAS-PP-02	India	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	Burger	McDonald's	-

照片編號	樣本 ID	國家	地區	樣本類型	取樣分類	包裝內容物	速食品牌	標示
96	IN-PFAS-PP-03	India	SA/EA/SEA	Paper wrapper for fried food	Fastfood paper wrapper	Burger	Burgerama	-
97	IN-PFAS-MFP-04	India	SA/EA/SEA	Cardboard box	Takeaway cardboard box	Rice biryani	KFC	-
98	IN-PFAS-MPB-08	India	SA/EA/SEA	Popcorn paper bag	Microwave popcorn paper bag	Popcorn	4700 BC Popcorn	-
99	IN-PFAS-MPB-09	India	SA/EA/SEA	Popcorn paper bag	Microwave popcorn paper bag	Popcorn	Act II	-
100	OUSANEG-PFAS-CB-01	Mexico	LAC	Cardboard box	Takeaway cardboard box	French fries	Burger King	-
101	OUSANEG-PFAS-CB-02	Mexico	LAC	Cardboard box	Takeaway cardboard box	Apple pie	McDonald's	-
102	OUSANEG-PFAS-PP-05	Mexico	LAC	Paper wrapper for fried food	Fastfood paper wrapper	Sandwich	Subway	-
103	OUSANEG-PFAS-MPB-6	Mexico	LAC	Popcorn paper bag	Microwave popcorn paper bag	Popcorn	ACT II	-
104	OUSANEG-PFAS-RPP-8	Mexico	LAC	Paper box	Recycled paper	Cereal	Kelloggs	Recycled paper packaging
105	OUSANEG-PFAS-RPP-9	Mexico	LAC	Tea pot	Recycled paper	Tea	Great Value	Recycled paper packaging
106	OUSANEG-PFAS-RPP-10	Mexico	LAC	Tea pot	Recycled paper	Tea	McCormick	Recycled paper packaging
107	OUSANEG-PFAS-PP-13	Mexico	LAC	Paper wrapper	Bakery	Coffee	Blasón-grupo Herdez	-
108	OUSANEG-PFAS-PP-18	Mexico	LAC	Paper wrapper for fried food	Fastfood paper wrapper	French fries	KFC	-
109	OUSANEG-PFAS-CB-20	Mexico	LAC	Cardboard box	Takeaway cardboard box	Hamburger	Carl's Jr	-
110	OUSANEG-PFAS-RPP-23	Mexico	LAC	Potato can	Other	Chips	Pringles-Kellogg's	Recycled paper packaging
111	OUSANEG-PFAS-RPP-24	Mexico	LAC	Paper wrapper for fried food	Fastfood paper wrapper	Nuggets	Burger King	Recycled paper packaging
112	JM-PFAS-PP-01	Jamaica	LAC	Sandwich paper wrap	Fastfood paper wrapper	Sandwiches e.g., Chicken, fish, and beef	Burger King	-
113	JM-PFAS-PP-03	Jamaica	LAC	Cup for drinks	Paper cup	Drinks	Burger King	-
114	JM-PFAS-PP-05	Jamaica	LAC	Cardboard box	Takeaway cardboard box	Rice and chicken with vegetables	Island Grill	-
115	JM-PFAS-PP-06	Jamaica	LAC	Cardboard box	Takeaway cardboard box	Chicken with biscuits	KFC	-
116	JM-PFAS-PP-08	Jamaica	LAC	Popcorn microwavable bag	Microwave popcorn paper bag	Popcorn	ACT II	Give directions to cook. Give nutritional information. Give caution warning on steam and oil.
117	ARG-PFAS-PP-01	Argentina	LAC	Paper wrapper for fried food	Fastfood paper wrapper	Ruster BBQ	KFC Degasa S.A./ Av. Cabildo 2224 C.A.B.A.	-
118	ARG-PFAS-PP-04	Argentina	LAC	Paper wrapper for fried food	Fastfood paper wrapper	Cheeseburger	Mc Donalds - Arcos Dorados Argentina Sociedad Anónima Vera Mújica 732 Rosario, Santa Fe	Label: Mixed Packaging from responsible sources FSC C139032 2020 McDonalds Made in Argentina (34832) WRIN: 07626-042
119	ARG-PFAS-PP-05	Argentina	LAC	Paper wrapper for fried food	Fastfood paper wrapper	Whopper	Burger King - Fast food sudamericana S.A. / Córdoba 1628 Rosario, Santa Fe	-

附件3C：送驗的食品包材器具之樣本照片

1 ZM-PFAS-PP-01

2 ZM-PFAS-PP-02

3 ZM-PFAS-CB-03

4 ZM-PFAS-MFP-04

5 TN-PFAS-PP02

6 TN-PFAS-PP-05

7 TN-PFAS-PP-06

8 TN-PFAS-PP-07

9 TN-PFAS-PP-08

10 TN-PFAS-PP-09

11 TW-PFAS-PP-03

12 TW-PFAS-PP-04

13 TW-PFAS-PP-05

14 TW-PFAS-MFP-03

15 TW-PFAS-MPB-01

16 TW-PFAS-MPB-02

17 TW-PFAS-RPP-01

18 TW-PFAS-RPP-02

19 PH-PFAS-PP-07

20 PH-PFAS-MFP-08

21 PH-PFAS-MFP-09

22 PH-PFAS-PP-11

23 PH-PFAS-PP-12

24 PH-PFAS-PP-13

25 PH-PFAS-PP-14

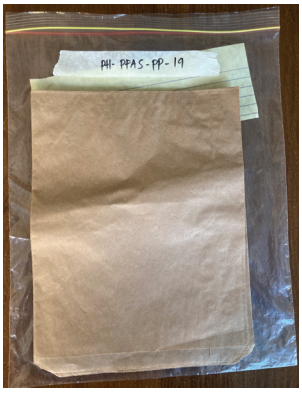
26 PH-PFAS-PP-15

27 PH-PFAS-PP-16

28 PH-PFAS-PP-17

29 PH-PFAS-PP-18

30 PH-PFAS-PP-19E



31 NP-PFAS-PP-01

32 NP-PFAS-PP-02

33 NP-PFAS-PP-04

34 NP-PFAS-PP-05

35 NP-PFAS-PP-06

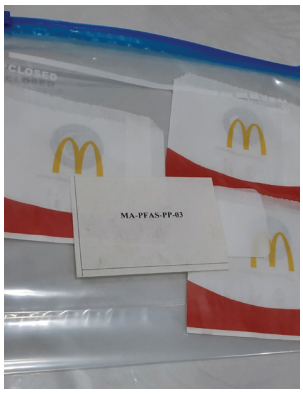
36 NP-PFAS-PP-07

37 NP-PFAS-PP-08

38 NP-PFAS-PP-09

39 NP-PFAS-PP-10

40 MA-PFAS-PP-03

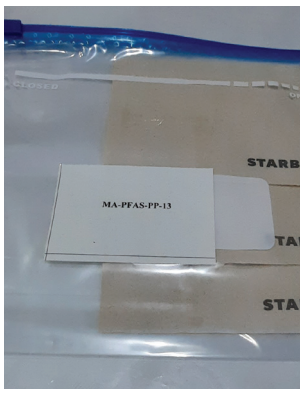


41 MA-PFAS-PP-04

42 MA-PFAS-PP-05

43 MA-PFAS-PP-09

44 MA-PFAS-PP-13



45 MA-PFAS-PP-14

46 JO-PFAS-PP-01A

47 JO-PFAS-PP-01B

48 JO-PFAS-PP-02

49 JO-PFAS-MFT-01

50 JO-PFAS-RPP-01

51 JO-PFAS-MPB-01

52 JO-PFAS-MPB-02

53 MNE-PFAS-PP-03

54 MNE-PFAS-MPB-01

55 MNE-PFAS-MPB-02

56 MNE-PFAS-RPP-01

57 MNE-PFAS-RPP-02

58 EG-PFAS-CB-01

59 EG-PFAS-MPB-01

60 EG-PFAS-MPB-02A

61 EG-PFAS-MPB-02B

62 EG-PFAS-MPB-02C

63 EG-PFAS-MPB-02D

64 EG-PFAS-MPB-02E

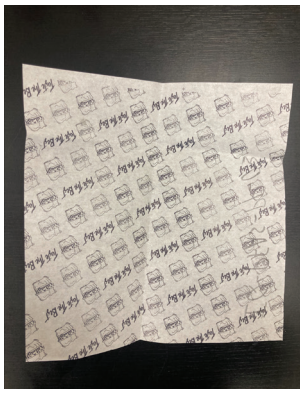
65 EG-PFAS-MPB-03A

66 EG-PFAS-MPB-03B

67 EG-PFAS-MPB-04A

68 EG-PFAS-MPB-04B

69 IQ-PFAS-PP-03



70 IQ-PFAS-PP-04

71 IQ-PFAS-CB-05

72 IQ-PFAS-RPP-03A

73 IQ-PFAS-RPP-03B

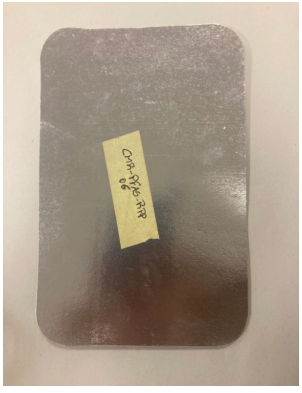
74 IQ-PFAS-RPP-03C

75 IQ-PFAS-MPB-01

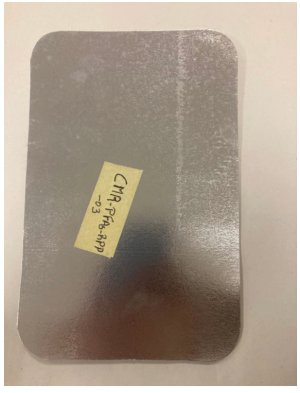
76 IQ-PFAS-MPB-02

77 CMR-PFAS-PP-01

78 CMR-PFAS-RPP-06



79 CMR-PFAS-RPP-03



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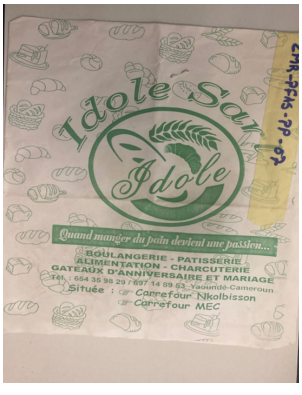

81 CMR-PFAS-RPP-04

82 KW-PFAS-PP-02

83 KW-PFAS-PP-04

84 KW-PFAS-PP-05

85 KW-PFAS-MFT-01

86 KW-PFAS-MPB-01

87 KW-PFAS-MPB-02

88 BN-PFAS-CB-01

89 BN-PFAS-PP-01

90 BN-PFAS-MFP-01

91 BN-PFAS-CB-07

92 BN-PFAS-CB-08

93 IN-PFAS-PP-01A

94 IN-PFAS-PP-01B

95 IN-PFAS-PP-02

96 IN-PFAS-PP-03

97 IN-PFAS-MFP-04

98 IN-PFAS-MPB-08

99 IN-PFAS-MPB-09

100 OUSANEG-PFAS-CB-01

101 OUSANEG-PFAS-CB-02

102 OUSANEG-PFAS-PP-05

103 OUSANEG-PFAS-MPB-6

104 OUSANEG-PFAS-RPP-8

105 OUSANEG-PFAS-RPP-9

106 OUSANEG-PFAS-RPP-10

107 OUSANEG-PFAS-PP-13

108 OUSANEG-PFAS-PP-18

109 OUSANEG-PFAS-CB-20

110 OUSANEG-PFAS-RPP-23

111 OUSANEG-PFAS-RPP-24

112 JM-PFAS-PP-01

113 JM-PFAS-PP-03

114 JM-PFAS-PP-05

115 JM-PFAS-PP-06

116 JM-PFAS-PP-08

117 ARG-PFAS-PP-01

118 ARG-PFAS-PP-04

119 ARG-PFAS-PP-05

附件4A：實驗室檢測結果 (ng/g)

REGIONS

SA/EA/SEA...South, East, and South-East Asia
Africa.....Anglophone and Francophone Africa
MENA.....Middle East and North Africa
EE.....Eastern Europe
LAC.....Latin America and Carribean

FAST FOOD CHAINS/COMPANIES

- Burger King
- KFC
- Subway
- McDonald's
- ACT II
- Burger Singh
- JOLLY TIME
- DUNKIN' DONUTS
- STARBUCKS

#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
1	ZM-PFAS-PP-01	Zambia	Africa	<LOQ	21.4	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	14.8	6.6	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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5	TN-PFAS-PP-02	Tunisia	MENA	26 409	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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7	TN-PFAS-PP-06	Tunisia	MENA	157 545	619.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	619.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
8	TN-PFAS-PP-07	Tunisia	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
9	TN-PFAS-PP-08	Tunisia	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
10	TN-PFAS-PP-09	Tunisia	MENA	330 397	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
11	TW-PFAS-PP-03	Taiwan	SA/EA/SEA	133 432	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
12	TW-PFAS-PP-04	Taiwan	SA/EA/SEA	10 047	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
13	TW-PFAS-PP-05	Taiwan	SA/EA/SEA	68 044	174.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	174.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
14	TW-PFAS-MFP-03	Taiwan	SA/EA/SEA	2 864 047	2 213.3	<LOQ	<LOQ	<LOQ	27.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	2 185.5	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
15	TW-PFAS-MPB-01	Taiwan	SA/EA/SEA	505 469	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
16	TW-PFAS-MPB-02	Taiwan	SA/EA/SEA	38 275	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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18	TW-PFAS-RPP-02	Taiwan	SA/EA/SEA	82 382	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
19	PH-PFAS-PP-07	Philip-pines	SA/EA/SEA	<LOQ	90.5	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	90.5	<LOQ
20	PH-PFAS-MFP-08	Philip-pines	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
21	PH-PFAS-MFP-09	Philip-pines	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
22	**PH-PFAS-PP-11**	**Philip-pines**	**SA/EA/SEA**	**27 550 809**	**61 205.5**	**590.6**	**316.9**	**868.6**	**<LOQ**	**<LOQ**	**293.9**	**<LOQ**	**<LOQ**	**157.0**	**<LOQ**	**<LOQ**	**<LOQ**	**58 978.5**	**<LOQ**	**<LOQ**	**<LOQ**	**<LOQ**	**<LOQ**	**<LOQ**	**<LOQ**	**<LOQ**
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26	PH-PFAS-PP-15	Philip-pines	SA/EA/SEA	171 795	311.0	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	311.0	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
27	PH-PFAS-PP-16	Philip-pines	SA/EA/SEA	154 832	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
28	PH-PFAS-PP-17	Philip-pines	SA/EA/SEA	206 414	797.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	797.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
29	PH-PFAS-PP-18	Philip-pines	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
30	PH-PFAS-PP-19E	Philip-pines	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
31	NP-PFAS-PP-01	Nepal	SA/EA/SEA	45 274	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
32	NP-PFAS-PP-02	Nepal	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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35	NP-PFAS-PP-06	Nepal	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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38	NP-PFAS-PP-09	Nepal	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
39	NP-PFAS-PP-10	Nepal	SA/EA/SEA	<LOQ	80.4	<LOQ	<LOQ	80.4	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
40	MA-PFAS-PP-03	Marocco	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
46	JO-PFAS-PP-01A	Jordan	MENA	196 960	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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49	JO-PFAS-MFT-01	Jordan	MENA	10 373 773	3 771.2	<LOQ	<LOQ	220.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	3 550.5	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
50	JO-PFAS-RPP-01	Jordan	MENA	71 134	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
51	JO-PFAS-MPB-01	Jordan	MENA	668 407	7 181.5	<LOQ	<LOQ	11.0	50.7	31.8	16.6	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	4 978.2	2 093.2	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
52	JO-PFAS-MPB-02	Jordan	MENA	580 780	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
53	MNE-PFAS-PP-03	Podgorica	EE	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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55	MNE-PFAS-MPB-02	Podgorica	EE	211 453	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
56	MNE-PFAS-RPP-01	Podgorica	EE	29 901	825.9	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	768.8	<LOQ	<LOQ	<LOQ	17.5	<LOQ	<LOQ	39.5	<LOQ
57	MNE-PFAS-RPP-02	Podgorica	EE	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
58	EG-PFAS-CB-01	Egypt	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
59	EG-PFAS-MPB-01	Egypt	MENA	670 555	714.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	714.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
60	EG-PFAS-MPB-02A	Egypt	MENA	375 140	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
61	EG-PFAS-MPB-02B	Egypt	MENA	411 461	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
62	EG-PFAS-MPB-02C	Egypt	MENA	468 971	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
63	EG-PFAS-MPB-02D	Egypt	MENA	353 059	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
64	EG-PFAS-MPB-02E	Egypt	MENA	520 845	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
65	EG-PFAS-MPB-03A	Egypt	MENA	374 536	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
66	EG-PFAS-MPB-03B	Egypt	MENA	137 100	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
67	EG-PFAS-MPB-04A	Egypt	MENA	395 226	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
68	EG-PFAS-MPB-04B	Egypt	MENA	358 397	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
69	IQ-PFAS-PP-03	Iraq	MENA	16 159	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
70	IQ-PFAS-PP-04	Iraq	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
71	IQ-PFAS-CB-05	Iraq	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
72	IQ-PFAS-RPP-03A	Iraq	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
73	IQ-PFAS-RPP-03B	Iraq	MENA	<LOQ	62.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	62.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
74	IQ-PFAS-RPP-03C	Iraq	MENA	<LOQ	47.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	47.3	<LOQ	<LOQ
75	IQ-PFAS-MPB-01	Iraq	MENA	3 056	4 851.3	<LOQ	<LOQ	9.5	44.2	35.6	14.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	3 497.4	1250.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
76	IQ-PFAS-MPB-02	Iraq	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
77	CMR-PFAS-PP-01	Cameroon	Africa	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
78	CMR-PFAS-RPP-06	Cameroon	Africa	<LOQ	422.9	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	115.5	193.1	114.3	<LOQ
79	CMR-PFAS-RPP-03	Cameroon	Africa	<LOQ	427.2	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	135.7	136.8	154.7	<LOQ

#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
80	CMR-PFAS-PP-07	Cameroon	Africa	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
81	CMR-PFAS-RPP-04	Cameroon	Africa	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
82	KW-PFAS-PP-02	Kuwait	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
83	KW-PFAS-PP-04	Kuwait	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
84	KW-PFAS-PP-05	Kuwait	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
85	KW-PFAS-MFT-01	Kuwait	MENA	<LOQ	5 887.2	<LOQ	<LOQ	228.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	5 658.9	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
86	KW-PFAS-MPB-01	Kuwait	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
87	KW-PFAS-MPB-02	Kuwait	MENA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
88	BN-PFAS-CB-01	Benin	Africa	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
89	BN-PFAS-PP-01	Benin	Africa	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
90	BN-PFAS-MFP-01	Benin	Africa	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
91	BN-PFAS-CB-07	Benin	Africa	<LOQ	173.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	173.3
92	BN-PFAS-CB-08	Benin	Africa	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
93	IN-PFAS-PP-01A	India	SA/EA/SEA	<LOQ	286.7	31.9	34.2	210.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	9.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
94	IN-PFAS-PP-01B	India	SA/EA/SEA	<LOQ	76.2	48.3	<LOQ	23.9	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	4.0	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
95	IN-PFAS-PP-02	India	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
96	IN-PFAS-PP-03	India	SA/EA/SEA	<LOQ	29.3	<LOQ	<LOQ	29.3	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
97	IN-PFAS-MFP-04	India	SA/EA/SEA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
98	IN-PFAS-MPB-08	India	SA/EA/SEA	13 622	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
99	IN-PFAS-MPB-09	India	SA/EA/SEA	26 063	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
100	OUSANEG-PFAS-CB-01	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
101	OUSANEG-PFAS-CB-02	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
102	OUSANEG-PFAS-PP-05	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
103	OUSANEG-PFAS-MPB-6	Mexico	LAC	<LOQ	560.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	560.8	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
104	OUSANEG-PFAS-RPP-8	Mexico	LAC	<LOQ	417.4	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	206.4	67.1	143.8	<LOQ
105	OUSANEG-PFAS-RPP-9	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
106	OUSANEG-PFAS-RPP-10	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
107	OUSANEG-PFAS-PP-13	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
108	OUSANEG-PFAS-PP-18	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
109	OUSANEG-PFAS-CB-20	Mexico	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
110	OUSANEG-PFAS-RPP-23	Mexico	LAC	<LOQ	203.0	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	203.0	<LOQ	<LOQ	<LOQ
111	OUSANEG-PFAS-RPP-24	Mexico	LAC	<LOQ	4.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	4.7	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

#Photo	Sample ID	Country	Region	EOF	suma PFAS	PFBA	PF-PeA	PF-HxA	PFOA	PFDA	PF-DoA	PFBS	PFDS	5:3 FTA	n-Et-FOSAA	8:2 FTS	10:2 FTS	6:2 FTOH	8:2 FTOH	10:2 FTOH	6:2 PAP	8:2 PAP	6:2/6:2 diPAP	6:2/8:2 diPAP	8:2/8:2 diPAP	Cl-PF-HxPA
112	JM-PFAS-PP-01	Jamaica	LAC	<LOQ	290.2	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	216.2	<LOQ	74.0	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
113	JM-PFAS-PP-03	Jamaica	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
114	JM-PFAS-PP-05	Jamaica	LAC	<LOQ	1 453.0	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	1453.0	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
115	JM-PFAS-PP-06	Jamaica	LAC	<LOQ	321.2	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	321.2	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
116	JM-PFAS-PP-08	Jamaica	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
117	ARG-PFAS-PP-01	Argentina	LAC	<LOQ	777.4	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	777.4	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
118	ARG-PFAS-PP-04	Argentina	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
119	ARG-PFAS-PP-05	Argentina	LAC	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

附件4B：各地區之樣本檢測結果摘要

	南亞、東亞與東南亞（SA/EA/SEA; 36個樣本）	中東與北非（MENA; 44個樣本）	非洲（14 個樣本）	拉丁美洲與加勒比海地區（LAC; 20個樣本）	東歐（EE; 5個樣本）
檢測到PFAS的樣本（TEOF > 0 及/或個別PFAS > 0）	22 (61%)	26 (59%)	5 (36%)	8 (40%)	3 (60%)
測值高於LOQ之樣本的EOF濃度中間值/最大值（ppm）	133/27 551	353/10 374	52/52	<LOQ	211/465
測值高於LOQ之樣本的標的PFAS總和濃度中間值/最大值 (ppb)	287/61 206	1 847/7 182	298/427	369/1 453	719/826
刻意使用PFAS處理的樣本數（分子是EOF > 20 ppm的樣本數；分母是有測到EOF的樣本數）	15/17 (88%)	20/23 (87%)	1/1 (100%)	<LOQ	3/3 (100%)
PFOA>25ppb（歐盟持久性有機污染物指令）	1	2	0	0	0
長鏈PFCAs總和濃度>25ppb（歐盟REACH法規限值）	1	2	0	0	0
未能符合歐盟REACH全面限制PFAS提案中的至少一項限值的樣本數	16	23	4	7	2
最常出現的 PFAS	6:2 FTOH	6:2 FTOH	Cl-PFHxPA	6:2 FTOH	6:2 FTOH
最高濃度的PFAS	6:2 FTOH	6:2 FTOH	FTSs, diPAPs	6:2 FTOH	6:2 FTOH

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