NAVFAC
Naval Facilities Engineering Command

Off-Base Drinking Water Sample Results, Electronic Data Deliverable, Data Validation Report, and the Sample Location Figure, SDG 320-45323-1

Naval Air Station Willow Grove
Willow Grove, Pennsylvania

August 2019

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","1763-23-1","Perfluoro-octanesulfonate","13","ng/l","","0.44","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","1763-23-1L","13C8-PFOS","14","ng/l","","-99","NA","","SURR","82","","-99","NA","YES","17","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","335-67-1","Perfluorooctanoic acid","16","ng/l","","0.44","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","335-67-1L","13C8-PFOA","15","ng/l","","-99","NA","","SURR","85","","-99","NA","YES","17","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","355-46-4","Perfluorohexanesulfonate","5.6","ng/l","","0.35","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","355-46-4L","13C3-PFHxS","14","ng/l","","-99","NA","","SURR","84","","-99","NA","YES","16","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","375-73-5","Perfluorobutanesulfonate","10","ng/l","","0.26","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","375-73-5L","13C3-PFBS","14","ng/l","","-99","NA","","SURR","86","","-99","NA","YES","16","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","375-85-9","Perfluoroheptanoic acid","4.6","ng/l","","0.35","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","375-85-9L","13C4-PFHpA","14","ng/l","","-99","NA","","SURR","79","","-99","NA","YES","17","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","375-95-1","Perfluorononanoic acid","1.5","ng/l","J","0.35","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3382","537 DW DOD - UCMR list","RES","320-45323-1","EUR","375-95-1L","13C9-PFNA","13","ng/l","","-99","NA","","SURR","77","","-99","NA","YES","17","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","1763-23-1","Perfluoro-octanesulfonate","0.44","ng/l","U","0.44","MDL","","TRG","","","1.8","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","1763-23-1L","13C8-PFOS","14","ng/l","","-99","NA","","SURR","84","","-99","NA","YES","17","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","335-67-1","Perfluorooctanoic acid","0.44","ng/l","U","0.44","MDL","","TRG","","","1.8","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","335-67-1L","13C8-PFOA","16","ng/l","","-99","NA","","SURR","92","","-99","NA","YES","18","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","355-46-4","Perfluorohexanesulfonate","0.35","ng/l","U","0.35","MDL","","TRG","","","1.8","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","355-46-4L","13C3-PFHxS","16","ng/l","","-99","NA","","SURR","94","","-99","NA","YES","17","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","375-73-5","Perfluorobutanesulfonate","0.26","ng/l","U","0.26","MDL","","TRG","","","1.8","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","375-73-5L","13C3-PFBS","13","ng/l","","-99","NA","","SURR","81","","-99","NA","YES","16","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","375-85-9","Perfluoroheptanoic acid","0.35","ng/l","U","0.35","MDL","","TRG","","","1.8","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","375-85-9L","13C4-PFHpA","16","ng/l","","-99","NA","","SURR","89","","-99","NA","YES","18","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","375-95-1","Perfluorononanoic acid","0.35","ng/l","U","0.35","MDL","","TRG","","","1.8","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3382","537 DW DOD - UCMR list","RES","320-45323-2","EUR","375-95-1L","13C9-PFNA","15","ng/l","","-99","NA","","SURR","83","","-99","NA","YES","18","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","1763-23-1","Perfluoro-octanesulfonate","16","ng/l","","0.42","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","1763-23-1L","13C8-PFOS","15","ng/l","","-99","NA","","SURR","90","","-99","NA","YES","16","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","335-67-

1","Perfluorooctanoic acid","14","ng/l","","0.42","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","335-67-1L","13C8-PFOA","12","ng/l","","-99","NA","","SURR","74","","-99","NA","YES","17","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","355-46-4","Perfluorohexanesulfonate","7.2","ng/l","","0.34","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","355-46-4L","13C3-PFHxS","12","ng/l","","-99","NA","","SURR","73","","-99","NA","YES","16","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","375-73-5","Perfluorobutanesulfonate","4.9","ng/l","","0.25","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","375-73-5L","13C3-PFBS","15","ng/l","","-99","NA","","SURR","95","","-99","NA","YES","16","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","375-85-9","Perfluoroheptanoic acid","4.9","ng/l","","0.34","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","375-85-9L","13C4-PFHpA","14","ng/l","","-99","NA","","SURR","81","","-99","NA","YES","17","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","375-95-1","Perfluorononanoic acid","2.3","ng/l","","0.34","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-RW-3978","537 DW DOD - UCMR list","RES","320-45323-3","EUR","375-95-1L","13C9-PFNA","15","ng/l","","-99","NA","","SURR","87","","-99","NA","YES","17","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","1763-23-1","Perfluoro-octanesulfonate","0.43","ng/l","U","0.43","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","1763-23-1L","13C8-PFOS","13","ng/l","","-99","NA","","SURR","80","","-99","NA","YES","16","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","335-67-1","Perfluorooctanoic acid","0.43","ng/l","U","0.43","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","335-67-1L","13C8-PFOA","15","ng/l","","-99","NA","","SURR","90","","-99","NA","YES","17","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","355-46-4","Perfluorohexanesulfonate","0.34","ng/l","U","0.34","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","355-46-4L","13C3-PFHxS","15","ng/l","","-99","NA","","SURR","93","","-99","NA","YES","16","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","375-73-5","Perfluorobutanesulfonate","0.26","ng/l","U","0.26","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","375-73-5L","13C3-PFBS","12","ng/l","","-99","NA","","SURR","79","","-99","NA","YES","16","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","375-85-9","Perfluoroheptanoic acid","0.34","ng/l","U","0.34","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","375-85-9L","13C4-PFHpA","15","ng/l","","-99","NA","","SURR","89","","-99","NA","YES","17","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","375-95-1","Perfluorononanoic acid","0.34","ng/l","U","0.34","MDL","","TRG","","","1.7","RL","YES","-99","","","","0",""
"WGNA-111418-FRB-3978","537 DW DOD - UCMR list","RES","320-45323-4","EUR","375-95-1L","13C9-PFNA","13","ng/l","","-99","NA","","SURR","76","","-99","NA","YES","17","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","1763-23-1","Perfluoro-octanesulfonate","0.5","ng/l","U","0.5","MDL","","TRG","","","2","RL","YES","-99","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","1763-23-1L","13C8-PFOS","16","ng/l","","-99","NA","","SURR","86","","-99","NA","YES","19","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","335-67-1","Perfluorooctanoic acid","0.5","ng/l","U","0.5","MDL","","TRG","","","2","RL","YES","-99","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","335-67-1L","13C8-PFOA","19","ng/l","","-99","NA","","SURR","93","","-99","NA","YES","20","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","355-46-4","Perfluorohexanesulfonate","0.4","ng/l","U","0.4","MDL","","TRG","","","2","RL","YES","-99","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","355-46-4L","13C3-

PFHxS","17","ng/l","","-99","NA","","SURR","91","","-99","NA","YES","19","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","375-73-5","Perfluorobutanesulfonate","0.3","ng/l","U","0.3","MDL","","TRG","","","2","RL","YES","-99","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","375-73-5L","13C3-PFBS","15","ng/l","","-99","NA","","SURR","78","","-99","NA","YES","19","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","375-85-9","Perfluoroheptanoic acid","0.4","ng/l","U","0.4","MDL","","TRG","","","2","RL","YES","-99","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","375-85-9L","13C4-PFHpA","17","ng/l","","-99","NA","","SURR","86","","-99","NA","YES","20","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","375-95-1","Perfluorononanoic acid","0.4","ng/l","U","0.4","MDL","","TRG","","","2","RL","YES","-99","","","","0",""
"BLK3300B","537 DW DOD - UCMR list","RES","BLK3300B","EUR","375-95-1L","13C9-PFNA","17","ng/l","","-99","NA","","SURR","85","","-99","NA","YES","20","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","1763-23-1","Perfluoro-octanesulfonate","4.2","ng/l","","0.5","MDL","","SPK","81","","2","RL","YES","5.2","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","1763-23-1L","13C8-PFOS","16","ng/l","","-99","NA","","SURR","82","","-99","NA","YES","19","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","335-67-1","Perfluorooctanoic acid","5.5","ng/l","","0.5","MDL","","SPK","101","","2","RL","YES","5.4","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","335-67-1L","13C8-PFOA","18","ng/l","","-99","NA","","SURR","91","","-99","NA","YES","20","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","355-46-4","Perfluorohexanesulfonate","4.7","ng/l","","0.4","MDL","","SPK","91","","2","RL","YES","5.1","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","355-46-4L","13C3-PFHxS","17","ng/l","","-99","NA","","SURR","90","","-99","NA","YES","19","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","375-73-5","Perfluorobutanesulfonate","5","ng/l","","0.3","MDL","","SPK","105","","2","RL","YES","4.8","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","375-73-5L","13C3-PFBS","14","ng/l","","-99","NA","","SURR","76","","-99","NA","YES","19","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","375-85-9","Perfluoroheptanoic acid","5.5","ng/l","","0.4","MDL","","SPK","101","","2","RL","YES","5.4","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","375-85-9L","13C4-PFHpA","17","ng/l","","-99","NA","","SURR","84","","-99","NA","YES","20","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","375-95-1","Perfluorononanoic acid","5.5","ng/l","","0.4","MDL","","SPK","102","","2","RL","YES","5.4","","","","0",""
"LCS3303Q","537 DW DOD - UCMR list","RES","LCS3303Q","EUR","375-95-1L","13C9-PFNA","16","ng/l","","-99","NA","","SURR","80","","-99","NA","YES","20","","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","1763-23-1","Perfluoro-octanesulfonate","4.2","ng/l","","0.5","MDL","","SPK","81","0","2","RL","YES","5.2","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","1763-23-1L","13C8-PFOS","17","ng/l","","-99","NA","","SURR","89","","-99","NA","YES","19","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","335-67-1","Perfluorooctanoic acid","5.6","ng/l","","0.5","MDL","","SPK","104","3","2","RL","YES","5.4","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","335-67-1L","13C8-PFOA","18","ng/l","","-99","NA","","SURR","92","","-99","NA","YES","20","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","355-46-4","Perfluorohexanesulfonate","4.8","ng/l","","0.4","MDL","","SPK","93","2","2","RL","YES","5.1","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","355-46-4L","13C3-PFHxS","18","ng/l","","-99","NA","","SURR","93","","-99","NA","YES","19","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","375-73-5","Perfluorobutanesulfonate","5.2","ng/l","","0.3","MDL","","SPK","108","4","2","RL","YES","4.8","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","375-73-5L","13C3-

PFBS","15","ng/l","","-99","NA","","SURR","82","","-99","NA","YES","19","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","375-85-9","Perfluoroheptanoic acid","5.8","ng/l","","0.4","MDL","","SPK","107","5","2","RL","YES","5.4","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","375-85-9L","13C4-PFHpA","19","ng/l","","-99","NA","","SURR","94","","-99","NA","YES","20","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","375-95-1","Perfluorononanoic acid","5.7","ng/l","","0.4","MDL","","SPK","104","2","2","RL","YES","5.4","LCS3303Q","","","0",""
"LCS3303Y","537 DW DOD - UCMR list","RES","LCS3303Y","EUR","375-95-1L","13C9-PFNA","18","ng/l","","-99","NA","","SURR","88","","-99","NA","YES","20","LCS3303Q","","","0",""
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"Unknown","Unknown","WGNA-111418-FRB-3382","11/14/2018 09:05","AQ","320-45323-2","NM","","0.8","537 DW DOD - UCMR list","METHOD","RES","11/26/2018 16:00","11/28/2018 22:27","EUR","COA","WET","NA","1","NA","NA","","100","18330013","18330013","NA","18330013","320-45323-1","11/15/2018 13:30","11/19/2018 10:50",""
"Unknown","Unknown","WGNA-111418-RW-3978","11/14/2018 09:40","AQ","320-45323-3","NM","","0.8","537 DW DOD - UCMR list","METHOD","RES","11/26/2018 16:00","11/28/2018 22:36","EUR","COA","WET","NA","1","NA","NA","","100","18330013","18330013","NA","18330013","320-45323-1","11/15/2018 13:30","11/19/2018 10:50",""
"Unknown","Unknown","WGNA-111418-FRB-3978","11/14/2018 09:35","AQ","320-45323-4","NM","","0.8","537 DW DOD - UCMR list","METHOD","RES","11/26/2018 16:00","11/28/2018 22:45","EUR","COA","WET","NA","1","NA","NA","","100","18330013","18330013","NA","18330013","320-45323-1","11/15/2018 13:30","11/19/2018 10:50",""
"Unknown","Unknown","BLK3300B","","AQ","BLK3300B","MB","","-99","537 DW DOD - UCMR list","METHOD","RES","11/26/2018 16:00","11/28/2018 19:45","EUR","COA","WET","NA","1","NA","NA","","100","18330013","18330013","NA","18330013","320-45323-1","11/26/2018 16:00","11/19/2018 10:50",""
"Unknown","Unknown","LCS3303Q","","AQ","LCS3303Q","LCS","","-99","537 DW DOD - UCMR list","METHOD","RES","11/26/2018 16:00","11/28/2018 20:03","EUR","COA","WET","NA","1","NA","NA","","100","18330013","18330013","NA","18330013","320-45323-1","11/26/2018 16:00","11/19/2018 10:50",""
"Unknown","Unknown","LCS3303Y","","AQ","LCS3303Y","LCSD","","-99","537 DW DOD - UCMR list","METHOD","RES","11/26/2018 16:00","11/28/2018 20:12","EUR","COA","WET","NA","1","NA","NA","","100","18330013","18330013","NA","18330013","320-45323-1","11/26/2018 16:00","11/19/2018 10:50",""

Tt TETRA TECH   INTERNAL CORRESPONDENCE

TO:	**A. FREBOWITZ**	**DATE:**	**JANUARY 8, 2019**
FROM:	**TERRI L. SOLOMON**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION –POLYFLUOROALKYL SUBSTANCES (PFAS)**
NAS JRB WILLOW GROVE
SAMPLE DELIVERY GROUP (SDG) 320-45323-1

SAMPLES: 2/Field Reagent Blank (FRB)
WGNA-111418-FRB-3382   WGNA-111418-FRB-3978

2/Drinking Water
WGNA-111418-RW-3382   WGNA-111418-RW-3978

Overview

The sample set for NAS JRB Willow Grove, SDG 320-45323-1, consisted of two (2) drinking water samples and two (2) FRB sample. All samples were analyzed for select perfluorinated alkyl acids including pentadecafluorooctanoic acid (PFOA), perfluorobutane sulfonic acid (PFBS), perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA) and perfluorooctane sulfonic acid (PFOS). No field duplicate pairs were included in this SDG.

The samples were collected by Tetra Tech on November 14, 2018 and subcontracted to Eurofins Laboratory for analysis. All sample analyses were conducted in accordance with EPA method 537 modified method analytical and reporting protocols.

The data contained in this SDG was validated with regard to the following parameters: holding times, initial/continuing calibrations, ion transition check, laboratory instrument/method/field reagent blanks, surrogate spike recoveries, laboratory control sample results, extraction internal standard areas and recoveries, chromatographic resolution, analyte identification, analyte quantitation, and detection limits. Areas of concern are listed below.

Major

None.

Minor

Detected results reported below the LOQ but above the detection limit (DL) were qualified as estimated (J).

Notes

The samples in the SDG were analyzed using EPA method 537 modified. Drinking water samples should be analyzed in accordance with EPA Method 537 version 1.1. The data was reviewed by the validator and all method quality control parameters were met. Final use of the data will be determined by the project team.

Incorrect sample IDs were reported on the Form Is. The laboratory reported the sample IDs as WGNA-111418-GW-3382 and WGNA-111418-GW-3978. The validator amended the sample IDs on the Form Is to match the chain of custody. The sample IDs are corrected to WGNA-111418-RW-3382 and WGNA-111418-RW-3978.

It was noted that a preservative was indicated on the chain of custody. However, Trizma was not listed as the preservative.

Samples with detections and their associated FRBs are summarized below. No detected results were present in the FRBs.

Sample	Associated FRB
WGNA-111418-RW-3382	WGNA-111418-FRB-3382
WGNA-111418-RW-3978	WGNA-111418-FRB-3978

Non-detected results were reported to the Limit of Detection (LOD).

The buffering agent Trizma was added to all drinking water samples.

Executive Summary
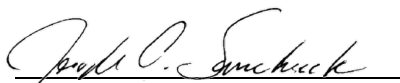
Laboratory Performance: No issues.

Other Factors Affecting Data Quality: Results below the RL were estimated.

The data for these analyses were reviewed with reference to the Environmental Protection Agency document EPA/600/R-08/092, Method 537, "Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)", (September 2009), US EPA National Functional Guidelines for Organic Data Review (January 2017), and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (July 2013) as applicable. The text of this report has been formulated to address only those areas affecting data quality.

Tetra Tech, Inc.
Terri L. Solomon
Chemist/Data Validator

Tetra Tech, Inc.
Joseph A. Samchuck
Data Validation Manager

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Data Qualifier Definitions

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted detection limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the sample.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Appendix A

Qualified Analytical Results

Qualifier Codes:

A   = Lab Blank Contamination
B   = Field Blank Contamination
C   = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D   = MS/MSD Recovery Noncompliance
E   = LCS/LCSD Recovery Noncompliance
F   = Lab Duplicate Imprecision
G   = Field Duplicate Imprecision
H   = Holding Time Exceedance
I   = ICP Serial Dilution Noncompliance
J   = ICP PDS Recovery Noncompliance; MSA's r < 0.995
K   = ICP Interference - includes ICS % R Noncompliance
L   = Instrument Calibration Range Exceedance
M   = Sample Preservation Noncompliance
N   = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O   = Poor Instrument Performance (i.e., base-time drifting)
P   = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q   = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R   = Surrogates Recovery Noncompliance
S   = Pesticide/PCB Resolution
T   = % Breakdown Noncompliance for DDT and Endrin
U   = RPD between columns/detectors >40% for positive results determined via GC/HPLC
V   = Non-linear calibrations; correlation coefficient r < 0.995
W   = EMPC result
X   = Signal to noise response drop
Y   = Percent solids <30%
Z   = Uncertainty at 2 standard deviations is greater than sample activity
Z1 = Tentatively Identified Compound considered presumptively present
Z2 = Tentatively Identified Compound column bleed
Z3 = Tentatively Identified Compound aldol condensate
Z4 = Sample activity is less than the at uncertainty at 3 standard deviations and greater than the MDC
Z5 = Sample activity is less than the at uncertainty at 3 standard deviations and less than the MDC

PROJ_NO: 08005-WE04	NSAMPLE	WGNA-111418-FRB-3382			WGNA-111418-FRB-3978			WGNA-111418-RW-3382			WGNA-111418-RW-3978		
SDG: 320-45323-1	LAB_ID	320-45323-2			320-45323-4			320-45323-1			320-45323-3		
FRACTION: PFAS	SAMP_DATE	11/14/2018			11/14/2018			11/14/2018			11/14/2018		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	NG/L			NG/L			NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID (PFOA)		1.1	U		1	U		16			14		
PERFLUOROBUTANESULFONIC ACID (PFBS)		0.97	U		0.94	U		10			4.9		
PERFLUOROHEPTANOIC ACID (PFHPA)		1.1	U		1	U		4.6			4.9		
PERFLUOROHEXANESULFONIC ACID (PFHXS)		0.97	U		0.94	U		5.6			7.2		
PERFLUORONONANOIC ACID (PFNA)		1.1	U		1	U		1.5	J	P	2.3		
PERFLUOROOCTANESULFONIC ACID (PFOS)		1.1	U		1	U		13			16		

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Analysis Report

RW

Sample Description:	**WGNA-111418-GW-3382 (320-45323-1) Grab Groundwater Warminster:/ JRB Willow Grove**
Project Name:	**Warminster: / JRB Willow Grove**

TestAmerica
ELLE Sample #: WW 9911679
ELLE Group #: 2012021
Matrix: Groundwater

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:10
SDG#: TAK18-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**	**ng/l**	**ng/l**	**ng/l**	**ng/l**	
14434	Perfluorobutanesulfonate	375-73-5	10	0.26	0.96	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	4.6	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	5.6	0.35	0.96	1.7	1
14434	Perfluorononanoic acid	375-95-1	1.5 J	0.35	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	13	0.44	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	16	0.44	1.0	1.7	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:18	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

Neri L Soloman
01/08/2019

*=This limit was used in the evaluation of the final result

Analysis Report

Sample Description:	**WGNA-111418-FRB-3382 (320-45323-2) Grab Water Warminster:/ JRB Willow Grove**
Project Name:	**Warminster: / JRB Willow Grove**

TestAmerica
ELLE Sample #: WW 9911680
ELLE Group #: 2012021
Matrix: Water

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:05
SDG#: TAK18-02FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**		**ng/l**	**ng/l**	**ng/l**	**ng/l**	
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.97	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.35	0.97	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.44	1.1	1.8	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:27	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

01/08/2019

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RW

Sample Description:	WGNA-111418-GW-3978 (320-45323-3) Grab Groundwater Warminster:/ JRB Willow Grove	**TestAmerica**
		ELLE Sample #: WW 9911681
		ELLE Group #: 2012021
Project Name:	Warminster: / JRB Willow Grove	**Matrix:** Groundwater

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:40
SDG#: TAK18-03

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**		ng/l	ng/l	ng/l	ng/l	
14434	Perfluorobutanesulfonate	375-73-5	4.9	0.25	0.93	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	4.9	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	7.2	0.34	0.93	1.7	1
14434	Perfluorononanoic acid	375-95-1	2.3	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	16	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	14	0.42	1.0	1.7	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:36	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

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Sample Description:	WGNA-111418-FRB-3978 (320-45323-4) Grab Water Warminster:/ JRB Willow Grove	**TestAmerica**	
		ELLE Sample #:	WW 9911682
		ELLE Group #:	2012021
Project Name:	Warminster: / JRB Willow Grove	**Matrix: Water**	

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:35
SDG#: TAK18-04FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**	**ng/l**	**ng/l**	**ng/l**	**ng/l**	**ng/l**	
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.94	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.34	0.94	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.43	1.0	1.7	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:45	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

01/08/2019

*=This limit was used in the evaluation of the final result

Appendix B

Results as Reported by the Laboratory

RW

Sample Description:	WGNA-111418-GW-3382 (320-45323-1) Grab Groundwater Warminster:/ JRB Willow Grove	**TestAmerica**	
		ELLE Sample #:	WW 9911679
		ELLE Group #:	2012021
Project Name:	Warminster: / JRB Willow Grove	**Matrix: Groundwater**	

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:10
SDG#: TAK18-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**	**ng/l**	**ng/l**	**ng/l**	**ng/l**		
14434	Perfluorobutanesulfonate	375-73-5	10	0.26	0.96	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	4.6	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	5.6	0.35	0.96	1.7	1
14434	Perfluorononanoic acid	375-95-1	1.5 J	0.35	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	13	0.44	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	16	0.44	1.0	1.7	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:18	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

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Analysis Report

Sample Description:	**WGNA-111418-FRB-3382 (320-45323-2) Grab Water**	**TestAmerica**
	Warminster:/ JRB Willow Grove	**ELLE Sample #:** **WW 9911680**
		ELLE Group #: **2012021**
Project Name:	**Warminster: / JRB Willow Grove**	**Matrix: Water**

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:05
SDG#:   TAK18-02FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**	**ng/l**	**ng/l**	**ng/l**	**ng/l**	**ng/l**	
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.97	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.35	0.97	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.44	1.1	1.8	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:27	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

*=This limit was used in the evaluation of the final result

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RW

Sample Description:	WGNA-111418-GW-3978 (320-45323-3) Grab Groundwater Warminster:/ JRB Willow Grove	**TestAmerica** **ELLE Sample #:** WW 9911681 **ELLE Group #:** 2012021
Project Name:	Warminster: / JRB Willow Grove	**Matrix: Groundwater**

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:40
SDG#: TAK18-03

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**		**ng/l**	**ng/l**	**ng/l**	**ng/l**	
14434	Perfluorobutanesulfonate	375-73-5	4.9	0.25	0.93	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	4.9	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	7.2	0.34	0.93	1.7	1
14434	Perfluorononanoic acid	375-95-1	2.3	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	16	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	14	0.42	1.0	1.7	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:36	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

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Sample Description:	WGNA-111418-FRB-3978 (320-45323-4) Grab Water Warminster:/ JRB Willow Grove	**TestAmerica**
Project Name:	**Warminster: / JRB Willow Grove**	**ELLE Sample #:** WW 9911682 **ELLE Group #:** 2012021 **Matrix: Water**

Submittal Date/Time: 11/24/2018 09:15
Collection Date/Time: 11/14/2018 09:35
SDG#:   TAK18-04FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
LC/MS/MS Miscellaneous	**EPA 537 mod QSM 5.1 table B-15**		**ng/l**	**ng/l**	**ng/l**	**ng/l**	
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.94	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.34	0.94	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.43	1.0	1.7	1

Sample Comments

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/19.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	6 PFAS Water DOD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/28/2018 22:45	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18330013	11/26/2018 16:00	Anthony C Polaski	1

---

*=This limit was used in the evaluation of the final result

Appendix C

Support Documentation

Chain of Custody Record

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605-1500
phone 916.373.5600 fax 303.467.7248

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Regulatory Program: ☑DW ☐NPDES ☐RCRA ☐Other:

Client Contact	Project Manager: Andy Frebowitz	Site Contact: Mary Kay Bond	Date:	11/14/2018	COC No:
TetraTech	Tel/Fax: 610.382.2920	Lab Contact: Dave Alltucker	Carrier: FedEx		1 of 1 COCs
234 Mall Boulevard Suite 260	**Analysis Turnaround Time**				Sampler: Mary Kay Bond
King of Prussia, PA 19406	☐ CALENDAR DAYS ☐ WORKING DAYS				**For Lab Use Only:**
610-382-2924	TAT if different from Below **21**				Walk-in Client:
610-491-9688	☑ 2 weeks				Lab Sampling:
Project Name: WE04	☐ 1 week				
Site: WE04	☐ 2 days				Job / SDG No.:
P O # 1132358 (through EarthToxics)	☐ 1 day				

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	EPA 537 UCMR3	Sample Specific Notes
WGNA-111418-RW-3382	11/14/2018	09:10	G	DW	2	N	N	Y	
WGNA-111418-FRB-3382	11/14/2018	09:05	G	DW	2	N	N	Y	Field Reagent Blank
WGNA-111418-RW-3978	11/14/2018	09:40	G	DW	2	N	N	Y	
WGNA-111418-FRB-3978	11/14/2018	09:35	G	DW	2	N	N	Y	Field Reagent Blank

320-45323 Chain of Custody

6

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐Return to Client ☑Disposal by Lab ☐Archive for _____ Months

Fed Ex Tracking: 7737 2212 2381

Custody Seals Intact: ☒ Yes ☐ No	Custody Seal No. 453742 453743		Cooler Temp. (°C): Obs'd: 0.8 Corr'd: 0.8		Therm ID No.: HR-3
Relinquished by:	Company: Tetra Tech	Date/Time: 11/14/2018 16:00	Received by:	Company: TA-SAC	Date/Time: 11/15/18 1330
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.11, dated 1/24/2017

C:\Users\Chris.Sinisi\Desktop\11.14.18 WG\COC 20181114

Method Summary

Method	Method Description	Protocol	Laboratory
Subcontract	537 DW DOD - UCMR list	None	SC0103

Protocol References:

None = None

Laboratory References:

SC0103 = Eurofins Lancaster Laboratories Env LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-45323-1	WGNA-111418-RW-3382	Water	11/14/18 09:10	11/15/18 13:30
320-45323-2	WGNA-111418-FRB-3382	Water	11/14/18 09:05	11/15/18 13:30
320-45323-3	WGNA-111418-RW-3978	Water	11/14/18 09:40	11/15/18 13:30
320-45323-4	WGNA-111418-FRB-3978	Water	11/14/18 09:35	11/15/18 13:30

Sample Reference List for SDG Number TAK18
with a Data Package Type of I-DOD

30939 - TestAmerica
Project: Warminster: / JRB Willow Grove

Lab Sample Number	Client Sample ID	Collection Date	Date Received
9911679	WGNA-111418-GW-3382 (320-45323-1)	11/14/2018 09:10	11/24/2018 09:15
9911680	WGNA-111418-FRB-3382 (320-45323-2)	11/14/2018 09:05	11/24/2018 09:15
9911681	WGNA-111418-GW-3978 (320-45323-3)	11/14/2018 09:40	11/24/2018 09:15
9911682	WGNA-111418-FRB-3978 (320-45323-4)	11/14/2018 09:35	11/24/2018 09:15

Sample pH Log

SDG: TAK18

LLI Sample Number	Bottle Code	Actual pH	Exp. pH	*pH Check Code	Adj. pH	Adjusted Date	Adjusted Time	Preservative Added	Preservative Lot #	LLI Supplied Bottle?	Sulfide Present?	Corrective Substance	CS Lot #	**Chlorine Present?	Corrective Substance	CS Lot #	Record Date	Employee
9911679	201A	8	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	11/24/2018 12:59:30PM	12665
9911679	201B	8	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	11/24/2018 12:57:54PM	12665
9911681	201A	8	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	11/24/2018 12:58:28PM	12665
9911681	201B	8	5-9	PK	NA	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	11/24/2018 12:59:58PM	12665

*pH Check Code Key	**Chlorine Present Code Key
PK = Original container checked - pH is within the correct range. (No preservative was added) **PA** = Original container checked - pH adjusted to correct range. (Preservative was added) **PV** = Volatile container checked **PC** = pH checked (unpreserved container) **SPK** = Subsampled from an original container. Original container checked - pH is within correct range **SPA** = Subsampled from an original container. Subsample container checked - pH adjusted to correct range. **SPC** = Subsampled from an original container. pH checked (unpreserved container). **SUP** = Subsampled from original container. Unable to be preserved due to the matrix of the sample. **UP** = Unable to preserve due to matrix of the sample. **NA** = Not applicable	**NA** = Chlorine Not Checked **Y** = Chlorine Present **N** = Chlorine Not Present

TAK18 Page 4 of 815

Pagev.fi.9.0f 825

Page 1 of 1

2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 · 717-656-2300 Fax: 717-656-2681 · www.lancasterlabs.com

14434   PFAS in Water by LC/MS/MS-DoD
14465   PFAS Water Prep - DoD

A 250 ml sample of water is extracted using a solid phase extraction (SPE) cartridge followed by dispersive cleanup of the extract using graphitized carbon. The resulting extract is analyzed by LC/MS/MS in negative electrospray ionization (ESI) mode.

Reference: Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LCMSMS), EPA 537 Version 1.1, September 2009, Modified. Department of Defense Quality System Manual Version 5.1, Table B-15.

eurofins | **Lancaster Laboratories Environmental**

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Project Name: Warminster: / JRB Willow Grove
ELLE Group #: 2012021

General Comments:

All analyses have been performed in accordance with DOD QSM Version 5.0 unless otherwise noted below.

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.
Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

EPA 537 mod QSM 5.1 table B-15, LC/MS/MS Miscellaneous

Sample #s: 9911679, 9911681

The following analytes were manually integrated due to incorrect integrations:
Perfluorooctanoic acid, Perfluorohexanesulfonate, Perfluoro-octanesulfonate

Case Narrative/Conformance Summary

CLIENT: TestAmerica
SDG: TAK18

PFAS Group
Fraction: PFAS by LC/MS/MS

Sample #	Client ID	Matrix Liquid	Solid	DF	Comments
9911679	WGNA-111418-GW-3382 (320-45323-1)	X		1	
9911680	WGNA-111418-FRB-3382 (320-45323-2)	X		1	Field Blank
9911681	WGNA-111418-GW-3978 (320-45323-3)	X		1	
9911682	WGNA-111418-FRB-3978 (320-45323-4)	X		1	Field Blank

All analyses have been performed in accordance with DOD QSM Version 5.0 unless otherwise noted below.
See QC Reference List for Associated Batch QC Samples

SAMPLE RECEIPT:

Samples were received in good condition and within temperature requirements.

HOLDING TIME:

All holding times were met.

PREPARATION/EXTRACTION/DIGESTION:

No problems were encountered.

CALIBRATION/STANDARDIZATION:

All criteria were met.

QUALITY CONTROL AND NONCONFORMANCE SUMMARY:

MS/MSD

Matrix QC may not be included if site-specific QC were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, laboratory spike data (LCS) are provided.

SAMPLE ANALYSIS:

No problems were encountered with the analysis of the samples.

Quality Control Summary

Client Name: TestAmerica

Reported: 12/04/2018 14:16

Group Number: 2012021

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	DL**	LOD	LOQ
	ng/l	ng/l	ng/l	ng/l
Batch number: 18330013	Sample number(s): 9911679-9911682			
Perfluorobutanesulfonate	N.D.	0.30	1.1	2.0
Perfluoroheptanoic acid	N.D.	0.40	1.2	2.0
Perfluorohexanesulfonate	N.D.	0.40	1.1	2.0
Perfluorononanoic acid	N.D.	0.40	1.2	2.0
Perfluoro-octanesulfonate	N.D.	0.50	1.2	2.0
Perfluorooctanoic acid	N.D.	0.50	1.2	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18330013	Sample number(s): 9911679-9911682								
Perfluorobutanesulfonate	4.81	5.04	4.81	5.22	105	108	72-127	4	30
Perfluoroheptanoic acid	5.44	5.51	5.44	5.81	101	107	75-139	5	30
Perfluorohexanesulfonate	5.14	4.68	5.14	4.77	91	93	71-130	2	30
Perfluorononanoic acid	5.44	5.54	5.44	5.67	102	104	73-144	2	30
Perfluoro-octanesulfonate	5.20	4.21	5.20	4.22	81	81	67-134	0	30
Perfluorooctanoic acid	5.44	5.49	5.44	5.63	101	104	76-136	3	30

Labeled Isotope Quality Control

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 6 PFAS Water DOD

Batch number: 18330013

	13C3-PFBS %Rec	LOD (ng/l)	13C3-PFHxS %Rec	LOD (ng/l)	13C4-PFHpA %Rec	LOD (ng/l)	13C8-PFOA %Rec	LOD (ng/l)	13C8-PFOS %Rec	LOD (ng/l)	13C9-PFNA %Rec	LOD (ng/l)
9911679	86	8.7	84	8.7	79	1.7	85	1.7	82	8.7	77	1.7
9911680	81	8.8	94	8.8	89	1.8	92	1.8	84	8.8	83	1.8
9911681	95	8.4	73	8.4	81	1.7	74	1.7	90	8.4	87	1.7

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.

(3) The surrogate spike amount was less than the LOD.

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2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Quality Control Summary

Client Name: TestAmerica
Reported: 12/04/2018 14:16

Group Number: 2012021

Labeled Isotope Quality Control

Labeled isotope recoveries which are outside of the QC window are confirmed
unless otherwise noted on the analysis report.

Analysis Name: 6 PFAS Water DOD
Batch number: 18330013

	13C3-PFBS		13C3-PFHxS		13C4-PFHpA		13C8-PFOA		13C8-PFOS		13C9-PFNA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9911682	79	8.5	93	8.5	89	1.7	90	1.7	80	8.5	76	1.7
Blank	78	10	91	10	86	2.0	93	2.0	86	10	85	2.0
LCS	76	10	90	10	84	2.0	91	2.0	82	10	80	2.0
LCSD	82	10	93	10	94	2.0	92	2.0	89	10	88	2.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

Fraction: PFAS by LC/MS/MS

18330013 / BLK330013B Analyte	Analysis Date	Blank Results	Units	DL	LOD	LOQ
Perfluorooctanoic acid	11/28/18	N.D.	ng/l	0.50	1.2	2.0
Perfluorononanoic acid	11/28/18	N.D.	ng/l	0.40	1.2	2.0
Perfluoroheptanoic acid	11/28/18	N.D.	ng/l	0.40	1.2	2.0
Perfluorobutanesulfonate	11/28/18	N.D.	ng/l	0.30	1.1	2.0
Perfluorohexanesulfonate	11/28/18	N.D.	ng/l	0.40	1.1	2.0
Perfluoro-octanesulfonate	11/28/18	N.D.	ng/l	0.50	1.2	2.0

FORM 02A
SURROGATES
LC/MS/MS

SDG No.: TAK18
Matrix: WATER

18330013			13C3-PFBS	13C3-PFHXS	13C4-PFHPA	13C8-PFOA	13C8-PFOS
		Limits	50-150	50-150	50-150	50-150	50-150
LAB SAMPLE ID	DATE/TIME		% Recovery	% Recovery	% Recovery	% Recovery	% Recovery
BLK330013	11/28/18 19:45		78	91	86	93	86
LCS330013	11/28/18 20:03		76	90	84	91	82
LCSDA	11/28/18 20:12		82	93	94	92	89
9911679	11/28/18 22:18		86	84	79	85	82
9911680	11/28/18 22:27		81	94	89	92	84
9911681	11/28/18 22:36		95	73	81	74	90
9911682	11/28/18 22:45		79	93	89	90	80

* Outside QC Limits

FORM 02A - EPA 537 mod QSM   Page 1 of 1
5.1 table B-15

FORM 02A
SURROGATES
LC/MS/MS

SDG No.: TAK18
Matrix: WATER

18330013			13C9-PFNA
		Limits	50-150
LAB SAMPLE ID	**DATE/TIME**		% Recovery
BLK330013	11/28/18 19:45		85
LCS330013	11/28/18 20:03		80
LCSDA	11/28/18 20:12		88
9911679	11/28/18 22:18		77
9911680	11/28/18 22:27		83
9911681	11/28/18 22:36		87
9911682	11/28/18 22:45		76

* Outside QC Limits

FORM 02A - EPA 537 mod QSM   Page 1 of 1
5.1 table B-15

PFAS Group
Fraction: PFAS by LC/MS/MS

LCS: LCS330013Q LCSD: LCSDAY Analyte	Batch: **18330013** (Sample number(s): 9911679-9911682)							
	Spike Added ng/l	LCS Conc ng/l	LCSD Conc ng/l	LCS %Rec	LCSD %Rec	%Rec Limits	%RPD	%RPD Limits
Perfluorooctanoic acid	5.44	5.49	5.63	101	104	76-136	3	30
Perfluorononanoic acid	5.44	5.54	5.67	102	104	73-144	2	30
Perfluoroheptanoic acid	5.44	5.51	5.81	101	107	75-139	5	30
Perfluorobutanesulfonate	4.81	5.04	5.22	105	108	72-127	4	30
Perfluorohexanesulfonate	5.14	4.68	4.77	91	93	71-130	2	30
Perfluoro-octanesulfonate	5.20	4.21	4.22	81	81	67-134	0	30

12/9/2018 10:17:00 AM

Page 1 of 1

Fraction: PFAS by LC/MS/MS

14434: 6 PFAS Water DOD Analyte Name	Default DL	Default LOD	Default LOQ	Units
Perfluorooctanoic acid	.5	1.2	2.0	ng/l
Perfluorononanoic acid	.4	1.2	2.0	ng/l
Perfluoroheptanoic acid	.4	1.2	2.0	ng/l
Perfluorobutanesulfonate	.3	1.1	2.0	ng/l
Perfluorohexanesulfonate	.4	1.1	2.0	ng/l
Perfluoro-octanesulfonate	.5	1.2	2.0	ng/l

FORM 06
INITIAL CALIBRATION AREA RATIO SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
               18NOV28DCAL-08.WIFF;
               CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
               18NOV28DCAL-11.WIFF;
               CAL7= 18NOV28DCAL-12.WIFF; CAL8= ;

Perfluorobutanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.043	0.20	0.237	18.4	±30
CAL2	0.107	0.60	0.584	-2.7	±30
CAL3	0.406	2.00	2.225	11.2	±30
CAL4	1.463	8.00	8.021	0.3	±30
CAL5	3.811	20.00	20.892	4.5	±30
CAL6	8.910	50.00	48.841	-2.3	±30
CAL7	15.845	100.00	86.862	-13.1	±30

Perfluoropentanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.046	0.20	0.225	12.5	±30
CAL2	0.103	0.60	0.505	-15.8	±30
CAL3	0.466	2.00	2.284	14.2	±30
CAL4	1.556	8.00	7.634	-4.6	±30
CAL5	4.107	20.00	20.152	0.8	±30
CAL6	9.020	50.00	44.258	-11.5	±30
CAL7	16.145	100.00	79.219	-20.8	±30

Perfluorobutanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.040	0.18	0.194	9.4	±30
CAL2	0.098	0.53	0.475	-10.6	±30
CAL3	0.401	1.77	1.948	10.1	±30
CAL4	1.393	7.08	6.761	-4.5	±30
CAL5	3.638	17.70	17.661	-0.2	±30
CAL6	9.036	44.20	43.864	-0.8	±30
CAL7	18.326	88.40	88.956	0.6	±30

4:2 fluorotelomersulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.075	0.19	0.200	6.8	±30
CAL2	0.202	0.56	0.540	-3.7	±30
CAL3	0.800	1.87	2.142	14.5	±30
CAL4	2.854	7.47	7.640	2.3	±30
CAL5	7.396	18.70	19.798	5.9	±30
CAL6	17.601	46.70	47.117	0.9	±30
CAL7	34.162	93.40	91.451	-2.1	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 1 of 8

FORM 06
INITIAL CALIBRATION AREA RATIO SUMMARY
LC/MS/MS

SDG No.: TAK18

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
18NOV28DCAL-08.WIFF;
CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
18NOV28DCAL-11.WIFF;
CAL7= 18NOV28DCAL-12.WIFF; CAL8= ;

Perfluorohexanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.058	0.20	0.233	16.5	±30
CAL2	0.146	0.60	0.586	-2.4	±30
CAL3	0.551	2.00	2.211	10.5	±30
CAL4	2.004	8.00	8.042	0.5	±30
CAL5	4.915	20.00	19.728	-1.4	±30
CAL6	11.061	50.00	44.400	-11.2	±30
CAL7	20.035	100.00	80.421	-19.6	±30

Perfluoropentanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.020	0.19	0.207	10.1	±30
CAL2	0.054	0.56	0.549	-2.4	±30
CAL3	0.213	1.88	2.157	14.7	±30
CAL4	0.735	7.50	7.436	-0.9	±30
CAL5	1.909	18.80	19.314	2.7	±30
CAL6	4.502	46.90	45.538	-2.9	±30
CAL7	9.335	93.80	94.429	0.7	±30

Perfluoroheptanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.078	0.20	0.240	19.9	±30
CAL2	0.184	0.60	0.567	-5.5	±30
CAL3	0.725	2.00	2.238	11.9	±30
CAL4	2.537	8.00	7.829	-2.1	±30
CAL5	6.457	20.00	19.926	-0.4	±30
CAL6	14.179	50.00	43.759	-12.5	±30
CAL7	23.161	100.00	71.480	-28.5	±30

Perfluorohexanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.039	0.18	0.181	-0.6	±30
CAL2	0.093	0.55	0.435	-20.6	±30
CAL3	0.391	1.82	1.831	0.6	±30
CAL4	1.405	7.30	6.580	-9.9	±30
CAL5	3.854	18.20	18.044	-0.9	±30
CAL6	9.382	45.60	43.929	-3.7	±30
CAL7	20.044	91.20	93.850	2.9	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 2 of 8

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SDG No.:   TAK18

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
                18NOV28DCAL-08.WIFF;
                CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
                18NOV28DCAL-11.WIFF;
                CAL7= 18NOV28DCAL-12.WIFF; CAL8= ;

6:2 fluorotelomersulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.087	0.19	0.226	18.9	±30
CAL2	0.227	0.57	0.591	3.9	±30
CAL3	0.823	1.90	2.149	13.1	±30
CAL4	3.275	7.58	8.546	12.7	±30
CAL5	7.342	19.00	19.156	0.8	±30
CAL6	17.619	47.40	45.972	-3.0	±30
CAL7	33.528	94.80	87.481	-7.7	±30

Perfluoroheptanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.042	0.19	0.209	10.2	±30
CAL2	0.097	0.57	0.485	-15.1	±30
CAL3	0.396	1.90	1.976	4.0	±30
CAL4	1.490	7.61	7.439	-2.2	±30
CAL5	3.788	19.00	18.906	-0.5	±30
CAL6	9.599	47.60	47.909	0.6	±30
CAL7	19.064	95.20	95.147	-0.1	±30

Perfluorooctanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.041	0.20	0.213	6.6	±30
CAL2	0.103	0.60	0.533	-11.1	±30
CAL3	0.425	2.00	2.197	9.8	±30
CAL4	1.618	8.00	8.361	4.5	±30
CAL5	3.950	20.00	20.411	2.1	±30
CAL6	9.499	50.00	49.084	-1.8	±30
CAL7	17.301	100.00	89.401	-10.6	±30

Perfluoro-octanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.041	0.19	0.172	-7.0	±30
CAL2	0.109	0.56	0.457	-17.6	±30
CAL3	0.450	1.85	1.888	2.1	±30
CAL4	1.627	7.40	6.826	-7.8	±30
CAL5	4.356	18.50	18.273	-1.2	±30
CAL6	10.840	46.30	45.472	-1.8	±30
CAL7	22.481	92.60	94.301	1.8	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 3 of 8

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
              18NOV28DCAL-08.WIFF;
              CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
              18NOV28DCAL-11.WIFF;
              CAL7= 18NOV28DCAL-12.WIFF; CAL8= ;

Perfluorononanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.060	0.20	0.229	14.7	±30
CAL2	0.156	0.60	0.599	-0.1	±30
CAL3	0.588	2.00	2.253	12.6	±30
CAL4	2.104	8.00	8.064	0.8	±30
CAL5	5.611	20.00	21.504	7.5	±30
CAL6	12.565	50.00	48.151	-3.7	±30
CAL7	23.016	100.00	88.201	-11.8	±30

Perfluorononanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.031	0.19	0.193	0.7	±30
CAL2	0.077	0.58	0.486	-15.7	±30
CAL3	0.295	1.92	1.864	-2.9	±30
CAL4	1.249	7.68	7.885	2.7	±30
CAL5	3.037	19.20	19.177	-0.1	±30
CAL6	7.581	48.00	47.867	-0.3	±30
CAL7	15.220	96.00	96.096	0.1	±30

Perfluorodecanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.039	0.20	0.222	11.2	±30
CAL2	0.108	0.60	0.612	2.0	±30
CAL3	0.417	2.00	2.360	18.0	±30
CAL4	1.454	8.00	8.227	2.8	±30
CAL5	3.687	20.00	20.868	4.3	±30
CAL6	8.633	50.00	48.868	-2.3	±30
CAL7	17.604	100.00	99.643	-0.4	±30

8:2 fluorotelomersulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.104	0.19	0.197	2.4	±30
CAL2	0.284	0.58	0.536	-6.9	±30
CAL3	1.067	1.92	2.011	4.8	±30
CAL4	3.846	7.66	7.253	-5.3	±30
CAL5	10.368	19.20	19.551	1.8	±30
CAL6	21.098	47.90	39.786	-16.9	±30
CAL7	39.430	95.80	74.355	-22.4	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 4 of 8

::: eurofins | Lancaster Laboratories Environmental

SDG No.:   TAK18

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
                18NOV28DCAL-08.WIFF;
                CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
                18NOV28DCAL-11.WIFF;
                CAL7= 18NOV28DCAL-12.WIFF; CAL8= ;

Perfluorooctanesulfonamide	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.042	0.20	0.212	5.9	±30
CAL2	0.111	0.60	0.562	−6.3	±30
CAL3	0.420	2.00	2.128	6.4	±30
CAL4	1.562	8.00	7.914	−1.1	±30
CAL5	4.013	20.00	20.329	1.6	±30
CAL6	9.802	50.00	49.655	−0.7	±30
CAL7	17.627	100.00	89.294	−10.7	±30

NMeFOSAA	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.030	0.20	0.193	−3.7	±30
CAL2	0.091	0.60	0.582	−3.0	±30
CAL3	0.348	2.00	2.220	11.0	±30
CAL4	1.243	8.00	7.928	−0.9	±30
CAL5	3.230	20.00	20.602	3.0	±30
CAL6	7.997	50.00	51.010	2.0	±30
CAL7	15.405	100.00	98.267	−1.7	±30

Perfluorodecanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.022	0.19	0.171	−11.6	±30
CAL2	0.059	0.58	0.471	−18.5	±30
CAL3	0.260	1.93	2.060	6.8	±30
CAL4	0.956	7.70	7.582	−1.5	±30
CAL5	2.461	19.30	19.512	1.1	±30
CAL6	5.967	48.20	47.309	−1.8	±30
CAL7	12.246	96.30	97.096	0.8	±30

Perfluoroundecanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.062	0.20	0.222	10.9	±30
CAL2	0.157	0.60	0.563	−6.2	±30
CAL3	0.626	2.00	2.236	11.8	±30
CAL4	2.346	8.00	8.387	4.8	±30
CAL5	5.860	20.00	20.945	4.7	±30
CAL6	14.523	50.00	51.912	3.8	±30
CAL7	27.007	100.00	96.536	−3.5	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 5 of 8

FORM 06
INITIAL CALIBRATION AREA RATIO SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
            18NOV28DCAL-08.WIFF;
            CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
            18NOV28DCAL-11.WIFF;
            CAL7= 18NOV28DCAL-12.WIFF; CAL8= ;

NEtFOSAA	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.040	0.20	0.194	-3.2	±30
CAL2	0.115	0.60	0.560	-6.7	±30
CAL3	0.407	2.00	1.980	-1.0	±30
CAL4	1.473	8.00	7.175	-10.3	±30
CAL5	4.109	20.00	20.014	0.1	±30
CAL6	10.300	50.00	50.166	0.3	±30
CAL7	20.679	100.00	100.712	0.7	±30

Perfluorododecanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.045	0.20	0.249	24.6	±30
CAL2	0.107	0.60	0.589	-1.9	±30
CAL3	0.446	2.00	2.442	22.1	±30
CAL4	1.434	8.00	7.854	-1.8	±30
CAL5	3.673	20.00	20.121	0.6	±30
CAL6	9.045	50.00	49.545	-0.9	±30
CAL7	16.657	100.00	91.243	-8.8	±30

10:2-fluorotelomersulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.097	0.19	0.214	10.9	±30
CAL2	0.277	0.58	0.610	5.6	±30
CAL3	1.087	1.93	2.396	24.1	±30
CAL4	3.492	7.71	7.701	-0.1	±30
CAL5	10.411	19.30	22.957	18.9	±30
CAL6	21.857	48.20	48.197	0.0	±30
CAL7	41.828	96.40	92.235	-4.3	±30

NMePFOSAE	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.049	0.20	0.207	3.7	±30
CAL2	0.139	0.60	0.587	-2.2	±30
CAL3	0.532	2.00	2.239	12.0	±30
CAL4	1.893	8.00	7.968	-0.4	±30
CAL5	5.008	20.00	21.073	5.4	±30
CAL6	12.293	50.00	51.733	3.5	±30
CAL7	23.048	100.00	96.993	-3.0	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 6 of 8

FORM 06
INITIAL CALIBRATION AREA RATIO SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
          18NOV28DCAL-08.WIFF;
          CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
          18NOV28DCAL-11.WIFF;
          CAL7= 18NOV28DCAL-12.WIFF; CAL8= ;

NMePFOSA	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.038	0.20	0.203	1.3	±30
CAL2	0.108	0.60	0.575	-4.1	±30
CAL3	0.411	2.00	2.179	9.0	±30
CAL4	1.485	8.00	7.873	-1.6	±30
CAL5	3.882	20.00	20.577	2.9	±30
CAL6	9.378	50.00	49.716	-0.6	±30
CAL7	18.802	100.00	99.677	-0.3	±30

Perfluorododecanesulfonate	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.013	0.19	0.181	-6.8	±30
CAL2	0.037	0.58	0.531	-8.6	±30
CAL3	0.132	1.94	1.892	-2.5	±30
CAL4	0.539	7.74	7.744	0.0	±30
CAL5	1.303	19.40	18.718	-3.5	±30
CAL6	3.225	48.40	46.320	-4.3	±30
CAL7	6.940	96.80	99.670	3.0	±30

NEtPFOSAE	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.068	0.20	0.245	22.4	±30
CAL2	0.166	0.60	0.596	-0.6	±30
CAL3	0.706	2.00	2.540	27.0	±30
CAL4	2.364	8.00	8.504	6.3	±30
CAL5	6.065	20.00	21.818	9.1	±30
CAL6	13.925	50.00	50.088	0.2	±30
CAL7	26.969	100.00	97.008	-3.0	±30

NEtPFOSA	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.048	0.20	0.217	8.3	±30
CAL2	0.118	0.60	0.530	-11.6	±30
CAL3	0.473	2.00	2.122	6.1	±30
CAL4	1.779	8.00	7.975	-0.3	±30
CAL5	4.417	20.00	19.796	-1.0	±30
CAL6	11.703	50.00	52.452	4.9	±30
CAL7	21.801	100.00	97.709	-2.3	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 7 of 8

Instrument ID: 27631
Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36
Lab File Names: CAL1= 18NOV28DCAL-06.WIFF; CAL2= 18NOV28DCAL-07.WIFF; CAL3=
                18NOV28DCAL-08.WIFF;
                CAL4= 18NOV28DCAL-09.WIFF; CAL5= 18NOV28DCAL-10.WIFF; CAL6=
                18NOV28DCAL-11.WIFF;
                CAL7= 18NOV28DCAL-12.WIFF; CAL8=   ;

Perfluorotridecanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.041	0.20	0.249	24.7	±30
CAL2	0.103	0.60	0.621	3.5	±30
CAL3	0.427	2.00	2.576	28.8	±30
CAL4	1.410	8.00	8.500	6.2	±30
CAL5	3.304	20.00	19.916	-0.4	±30
CAL6	8.119	50.00	48.938	-2.1	±30
CAL7	14.467	100.00	87.197	-12.8	±30

Perfluorotetradecanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.039	0.20	0.221	10.5	±30
CAL2	0.103	0.60	0.583	-2.8	±30
CAL3	0.406	2.00	2.303	15.2	±30
CAL4	1.418	8.00	8.033	0.4	±30
CAL5	3.685	20.00	20.882	4.4	±30
CAL6	8.609	50.00	48.777	-2.4	±30
CAL7	15.696	100.00	88.936	-11.1	±30

Perfluorohexadecanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.022	0.20	0.251	25.6	±30
CAL2	0.051	0.60	0.588	-1.9	±30
CAL3	0.206	2.00	2.359	17.9	±30
CAL4	0.728	8.00	8.321	4.0	±30
CAL5	1.973	20.00	22.560	12.8	±30
CAL6	4.311	50.00	49.281	-1.4	±30
CAL7	8.524	100.00	97.440	-2.6	±30

Perfluorooctadecanoic acid	Area Ratio	Specified Amount	Calculated Amount	% Difference	Limit
CAL1	0.016	0.20	0.219	9.6	±30
CAL2	0.042	0.60	0.565	-5.8	±30
CAL3	0.165	2.00	2.201	10.0	±30
CAL4	0.598	8.00	7.964	-0.4	±30
CAL5	1.619	20.00	21.571	7.9	±30
CAL6	3.728	50.00	49.663	-0.7	±30
CAL7	7.403	100.00	98.616	-1.4	±30

 * Outside QC Limits   FORM 06 - EPA 537 mod QSM   Page 8 of 8

FORM 06A DOD - EPA 537 mod QSM 5.1 table B-15
INITIAL CALIBRATION RESPONSE FACTOR SUMMARY
LC/MS/MS

SDG No.: TAK18

Instrument ID: 27631

Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36

Lab File Names: CAL1=18NOV28DCAL-06.WIFF; CAL2=18NOV28DCAL-07.WIFF; CAL3=18NOV28DCAL-08.WIFF;
CAL4=18NOV28DCAL-09.WIFF; CAL5=18NOV28DCAL-10.WIFF; CAL6=18NOV28DCAL-11.WIFF;
CAL7=18NOV28DCAL-12.WIFF;

Analyte	RF							RF %RSD
	CAL1	CAL2	CAL3	CAL4	CAL5	CAL6	CAL7	
Perfluorobutanoic acid	1.080	0.888	1.015	0.915	0.953	0.891	---	7
Perfluoropentanoic acid	1.146	0.858	1.164	0.972	1.027	---	---	11
Perfluorobutanesulfonate	1.048	0.856	1.054	0.915	0.956	0.951	0.964	7
4:2 fluorotelomersulfonate	1.863	1.681	1.998	1.784	1.847	1.760	1.708	6
Perfluorohexanoic acid	1.451	1.216	1.377	1.252	1.229	---	---	7
Perfluoropentanesulfonate	0.506	0.448	0.528	0.456	0.472	0.446	0.463	6
Perfluoroheptanoic acid	1.943	1.531	1.813	1.585	1.614	---	---	9
Perfluorohexanesulfonate	1.004	0.803	1.016	0.911	1.002	0.973	1.040	8
6:2 fluorotelomersulfonate	2.165	1.891	2.059	2.052	1.835	1.766	---	7
Perfluoroheptanesulfonate	1.044	0.805	0.986	0.926	0.943	0.954	0.947	7
Perfluorooctanoic acid	1.031	0.860	1.063	1.011	0.988	0.950	---	7
Perfluoro-octanesulfonate	1.059	0.938	1.163	1.051	1.126	1.119	1.160	7
Perfluorononanoic acid	1.496	1.303	1.470	1.315	1.403	1.256	---	6
Perfluorononanesulfonate	0.763	0.638	0.735	0.777	0.756	0.755	0.758	6
Perfluorodecanoic acid	0.983	0.901	1.042	0.908	0.922	0.863	0.880	6
8:2 fluorotelomersulfonate	2.600	2.366	2.661	2.405	2.587	---	---	5
Perfluorooctanesulfonamide	1.045	0.925	1.050	0.976	1.003	0.980	---	4
NMeFOSAA	0.755	0.760	0.870	0.777	0.807	0.800	0.770	5
Perfluorodecanesulfonate	0.533	0.491	0.644	0.594	0.609	0.592	0.608	8
Perfluoroundecanoic acid	1.551	1.312	1.564	1.466	1.465	1.452	1.350	6
NEtFOSAA	0.994	0.958	1.016	0.921	1.027	1.030	1.034	4
Perfluorododecanoic acid	1.137	0.896	1.115	0.896	0.918	0.904	---	11
10:2-fluorotelomersulfonate	2.409	2.294	2.697	2.170	2.584	2.172	2.078	9
NMePFOSAE	1.232	1.162	1.330	1.183	1.252	1.229	1.152	5
NMePFOSA	0.955	0.904	1.028	0.928	0.970	0.938	0.940	4
Perfluorododecanesulfonate	0.310	0.304	0.325	0.333	0.321	0.319	0.343	4
NEtPFOSAE	1.702	1.382	1.766	1.478	1.516	1.392	1.348	10
NEtPFOSA	1.208	0.986	1.184	1.112	1.104	1.170	1.090	6
Perfluorotridecanoic acid	1.034	0.859	1.068	0.881	0.826	0.812	---	11
Perfluorotetradecanoic acid	0.975	0.858	1.016	0.886	0.921	0.861	---	6
Perfluorohexadecanoic acid	0.549	0.429	0.516	0.455	0.493	0.431	0.426	10
Perfluorooctadecanoic acid	0.411	0.354	0.413	0.374	0.405	0.373	0.370	6

--- Calibration point does not apply

* = % RSD > 20

FORM 06A DOD - EPA 537 mod   Page 1 of 1

FORM 07
CALIBRATION VERIFICATION SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631   Lab File ID: 18NOV28DCAL-16.WIFF

Date/Time Analyzed: 11/28/2018 15:12   Lab Sample ID: CCV1_CAL3

Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36

Analytes	Specified Amount	Calculated Amount	% Difference	Limit
Perfluorobutanoic acid	2.00	2.29	14.50	±30
Perfluoropentanoic acid	2.00	2.15	7.30	±30
Perfluorobutanesulfonate	1.77	1.90	7.57	±30
4:2 fluorotelomersulfonate	1.87	2.10	12.26	±30
Perfluorohexanoic acid	2.00	2.32	16.20	±30
Perfluoropentanesulfonate	1.88	2.10	11.73	±30
Perfluoroheptanoic acid	2.00	2.13	6.53	±30
Perfluorohexanesulfonate	1.82	1.84	1.19	±30
6:2 fluorotelomersulfonate	1.90	2.35	23.67	±30
Perfluoroheptanesulfonate	1.90	2.07	8.75	±30
Perfluorooctanoic acid	2.00	2.15	7.45	±30
Perfluoro-octanesulfonate	1.85	1.89	2.39	±30
Perfluorononanoic acid	2.00	2.37	18.31	±30
Perfluorononanesulfonate	1.92	1.96	2.24	±30
Perfluorodecanoic acid	2.00	2.38	18.95	±30
8:2 fluorotelomersulfonate	1.92	1.87	-2.39	±30
Perfluorooctanesulfonamide	2.00	2.10	4.85	±30
NMeFOSAA	2.00	2.08	3.82	±30
Perfluorodecanesulfonate	1.93	2.07	7.49	±30
Perfluoroundecanoic acid	2.00	2.39	19.73	±30
NEtFOSAA	2.00	1.90	-5.08	±30
Perfluorododecanoic acid	2.00	2.49	24.44	±30
10:2-fluorotelomersulfonate	1.93	2.22	14.77	±30
NMePFOSAE	2.00	2.10	5.15	±30
NMePFOSA	2.00	2.11	5.69	±30
Perfluorododecanesulfonate	1.94	1.96	1.21	±30
NEtPFOSAE	2.00	2.30	14.93	±30
NEtPFOSA	2.00	2.22	10.99	±30
Perfluorotridecanoic acid	2.00	2.59	29.28	±30
Perfluorotetradecanoic acid	2.00	2.29	14.59	±30
Perfluorohexadecanoic acid	2.00	2.22	11.22	±30
Perfluorooctadecanoic acid	2.00	2.22	11.09	±30

 * Outside QC Limits.   FORM 07 - EPA 537 mod QSM   Page 1 of 1

FORM 07
CALIBRATION VERIFICATION SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631   Lab File ID: 18NOV28D-04.WIFF

Date/Time Analyzed: 11/28/2018 16:18   Lab Sample ID: CCV1_ISC_CAL2

Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36

Analytes	Specified Amount	Calculated Amount	% Difference	Limit
Perfluorobutanoic acid	0.60	0.58	-2.71	±30
Perfluoropentanoic acid	0.60	0.53	-10.89	±30
Perfluorobutanesulfonate	0.53	0.48	-8.76	±30
4:2 fluorotelomersulfonate	0.56	0.52	-7.16	±30
Perfluorohexanoic acid	0.60	0.55	-7.56	±30
Perfluoropentanesulfonate	0.56	0.55	-2.63	±30
Perfluoroheptanoic acid	0.60	0.56	-5.96	±30
Perfluorohexanesulfonate	0.55	0.42	-22.60	±30
6:2 fluorotelomersulfonate	0.57	0.60	4.82	±30
Perfluoroheptanesulfonate	0.57	0.49	-14.27	±30
Perfluorooctanoic acid	0.60	0.54	-10.35	±30
Perfluoro-octanesulfonate	0.56	0.48	-13.25	±30
Perfluorononanoic acid	0.60	0.57	-5.60	±30
Perfluorononanesulfonate	0.58	0.49	-15.63	±30
Perfluorodecanoic acid	0.60	0.64	5.86	±30
8:2 fluorotelomersulfonate	0.58	0.57	-0.98	±30
Perfluorooctanesulfonamide	0.60	0.57	-5.53	±30
NMeFOSAA	0.60	0.52	-13.33	±30
Perfluorodecanesulfonate	0.58	0.53	-8.08	±30
Perfluoroundecanoic acid	0.60	0.60	-0.35	±30
NEtFOSAA	0.60	0.57	-4.45	±30
Perfluorododecanoic acid	0.60	0.61	1.70	±30
10:2-fluorotelomersulfonate	0.58	0.54	-7.03	±30
NMePFOSAE	0.60	0.58	-3.32	±30
NMePFOSA	0.60	0.49	-18.88	±30
Perfluorododecanesulfonate	0.58	0.42	-27.65	±30
NEtPFOSAE	0.60	0.59	-0.85	±30
NEtPFOSA	0.60	0.56	-6.69	±30
Perfluorotridecanoic acid	0.60	0.62	3.10	±30
Perfluorotetradecanoic acid	0.60	0.57	-5.40	±30
Perfluorohexadecanoic acid	0.60	0.60	0.71	±30
Perfluorooctadecanoic acid	0.60	0.55	-9.08	±30

 * Outside QC Limits.   FORM 07 - EPA 537 mod QSM   Page 1 of 1

FORM 07
CALIBRATION VERIFICATION SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631   Lab File ID: 18NOV28D-16.WIFF

Date/Time Analyzed: 11/28/2018 18:06   Lab Sample ID: CCV2_CAL3

Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36

Analytes	Specified Amount	Calculated Amount	% Difference	Limit
Perfluorobutanoic acid	2.00	2.26	13.17	±30
Perfluoropentanoic acid	2.00	2.08	4.18	±30
Perfluorobutanesulfonate	1.77	1.81	2.50	±30
4:2 fluorotelomersulfonate	1.87	2.11	12.57	±30
Perfluorohexanoic acid	2.00	2.23	11.29	±30
Perfluoropentanesulfonate	1.88	2.13	13.21	±30
Perfluoroheptanoic acid	2.00	2.32	16.06	±30
Perfluorohexanesulfonate	1.82	1.79	-1.53	±30
6:2 fluorotelomersulfonate	1.90	2.06	8.56	±30
Perfluoroheptanesulfonate	1.90	2.06	8.58	±30
Perfluorooctanoic acid	2.00	2.16	8.20	±30
Perfluoro-octanesulfonate	1.85	1.87	1.00	±30
Perfluorononanoic acid	2.00	2.25	12.69	±30
Perfluorononanesulfonate	1.92	1.97	2.55	±30
Perfluorodecanoic acid	2.00	2.21	10.62	±30
8:2 fluorotelomersulfonate	1.92	2.13	11.03	±30
Perfluorooctanesulfonamide	2.00	2.12	6.04	±30
NMeFOSAA	2.00	2.09	4.44	±30
Perfluorodecanesulfonate	1.93	1.95	1.06	±30
Perfluoroundecanoic acid	2.00	2.32	15.97	±30
NEtFOSAA	2.00	2.01	0.75	±30
Perfluorododecanoic acid	2.00	2.27	13.44	±30
10:2-fluorotelomersulfonate	1.93	2.31	19.69	±30
NMePFOSAE	2.00	2.14	7.10	±30
NMePFOSA	2.00	2.38	19.21	±30
Perfluorododecanesulfonate	1.94	1.94	0.05	±30
NEtPFOSAE	2.00	2.56	27.97	±30
NEtPFOSA	2.00	1.88	-5.77	±30
Perfluorotridecanoic acid	2.00	2.33	16.74	±30
Perfluorotetradecanoic acid	2.00	2.25	12.61	±30
Perfluorohexadecanoic acid	2.00	2.25	12.69	±30
Perfluorooctadecanoic acid	2.00	2.20	10.04	±30

 * Outside QC Limits.   FORM 07 - EPA 537 mod QSM   Page 1 of 1

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FORM 07
CALIBRATION VERIFICATION SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631   Lab File ID: 18NOV28D-28.WIFF

Date/Time Analyzed: 11/28/2018 19:54   Lab Sample ID: CCV3_CAL4

Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36

Analytes	Specified Amount	Calculated Amount	% Difference	Limit
Perfluorobutanoic acid	8.00	8.08	0.95	±30
Perfluoropentanoic acid	8.00	7.43	-7.07	±30
Perfluorobutanesulfonate	7.08	6.65	-6.06	±30
4:2 fluorotelomersulfonate	7.47	7.65	2.35	±30
Perfluorohexanoic acid	8.00	8.04	0.45	±30
Perfluoropentanesulfonate	7.50	7.30	-2.66	±30
Perfluoroheptanoic acid	8.00	7.35	-8.13	±30
Perfluorohexanesulfonate	7.30	6.89	-5.65	±30
6:2 fluorotelomersulfonate	7.58	8.42	11.10	±30
Perfluoroheptanesulfonate	7.61	7.72	1.44	±30
Perfluorooctanoic acid	8.00	7.55	-5.57	±30
Perfluoro-octanesulfonate	7.40	6.90	-6.69	±30
Perfluorononanoic acid	8.00	8.23	2.91	±30
Perfluorononanesulfonate	7.68	7.45	-3.01	±30
Perfluorodecanoic acid	8.00	7.70	-3.69	±30
8:2 fluorotelomersulfonate	7.66	7.02	-8.39	±30
Perfluorooctanesulfonamide	8.00	7.84	-1.95	±30
NMeFOSAA	8.00	8.25	3.12	±30
Perfluorodecanesulfonate	7.70	7.35	-4.60	±30
Perfluoroundecanoic acid	8.00	8.58	7.21	±30
NEtFOSAA	8.00	7.74	-3.29	±30
Perfluorododecanoic acid	8.00	8.18	2.29	±30
10:2-fluorotelomersulfonate	7.71	7.18	-6.88	±30
NMePFOSAE	8.00	7.84	-1.96	±30
NMePFOSA	8.00	8.28	3.51	±30
Perfluorododecanesulfonate	7.74	7.16	-7.49	±30
NEtPFOSAE	8.00	8.63	7.88	±30
NEtPFOSA	8.00	8.09	1.08	±30
Perfluorotridecanoic acid	8.00	8.64	8.00	±30
Perfluorotetradecanoic acid	8.00	8.31	3.93	±30
Perfluorohexadecanoic acid	8.00	8.37	4.58	±30
Perfluorooctadecanoic acid	8.00	8.45	5.68	±30

 * Outside QC Limits.   FORM 07 - EPA 537 mod QSM   Page 1 of 1

FORM 07
CALIBRATION VERIFICATION SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631   Lab File ID: 18NOV28D-39.WIFF

Date/Time Analyzed: 11/28/2018 21:33   Lab Sample ID: CCV4_ISC_CAL2

Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36

Analytes	Specified Amount	Calculated Amount	% Difference	Limit
Perfluorobutanoic acid	0.60	0.58	-4.06	±30
Perfluoropentanoic acid	0.60	0.54	-10.58	±30
Perfluorobutanesulfonate	0.53	0.46	-13.54	±30
4:2 fluorotelomersulfonate	0.56	0.55	-2.45	±30
Perfluorohexanoic acid	0.60	0.60	-0.65	±30
Perfluoropentanesulfonate	0.56	0.53	-6.41	±30
Perfluoroheptanoic acid	0.60	0.51	-15.64	±30
Perfluorohexanesulfonate	0.55	0.46	-15.94	±30
6:2 fluorotelomersulfonate	0.57	0.59	3.44	±30
Perfluoroheptanesulfonate	0.57	0.46	-18.81	±30
Perfluorooctanoic acid	0.60	0.55	-9.12	±30
Perfluoro-octanesulfonate	0.56	0.47	-16.20	±30
Perfluorononanoic acid	0.60	0.60	-0.40	±30
Perfluorononanesulfonate	0.58	0.47	-19.09	±30
Perfluorodecanoic acid	0.60	0.60	0.35	±30
8:2 fluorotelomersulfonate	0.58	0.48	-16.36	±30
Perfluorooctanesulfonamide	0.60	0.54	-10.63	±30
NMeFOSAA	0.60	0.62	2.60	±30
Perfluorodecanesulfonate	0.58	0.51	-11.06	±30
Perfluoroundecanoic acid	0.60	0.57	-4.72	±30
NEtFOSAA	0.60	0.44	-26.46	±30
Perfluorododecanoic acid	0.60	0.61	1.09	±30
10:2-fluorotelomersulfonate	0.58	0.52	-10.47	±30
NMePFOSAE	0.60	0.56	-6.14	±30
NMePFOSA	0.60	0.56	-7.44	±30
Perfluorododecanesulfonate	0.58	0.46	-20.80	±30
NEtPFOSAE	0.60	0.63	5.48	±30
NEtPFOSA	0.60	0.51	-14.31	±30
Perfluorotridecanoic acid	0.60	0.60	0.03	±30
Perfluorotetradecanoic acid	0.60	0.58	-2.55	±30
Perfluorohexadecanoic acid	0.60	0.58	-2.86	±30
Perfluorooctadecanoic acid	0.60	0.56	-6.98	±30

 * Outside QC Limits.   FORM 07 - EPA 537 mod QSM   Page 1 of 1

FORM 07
CALIBRATION VERIFICATION SUMMARY
LC/MS/MS

SDG No.:   TAK18

Instrument ID: 27631   Lab File ID: 18NOV28D-50.WIFF

Date/Time Analyzed: 11/28/2018 23:12   Lab Sample ID: CCV5_CAL3

Init. Calib. Date/Times: 11/28/2018 13:42   11/28/2018 14:36

Analytes	Specified Amount	Calculated Amount	% Difference	Limit
Perfluorobutanoic acid	2.00	2.25	12.29	±30
Perfluoropentanoic acid	2.00	2.07	3.69	±30
Perfluorobutanesulfonate	1.77	1.90	7.55	±30
4:2 fluorotelomersulfonate	1.87	2.27	21.14	±30
Perfluorohexanoic acid	2.00	2.31	15.65	±30
Perfluoropentanesulfonate	1.88	2.17	15.34	±30
Perfluoroheptanoic acid	2.00	1.96	-2.13	±30
Perfluorohexanesulfonate	1.82	1.82	-0.08	±30
6:2 fluorotelomersulfonate	1.90	2.53	32.92 *	±30
Perfluoroheptanesulfonate	1.90	1.93	1.51	±30
Perfluorooctanoic acid	2.00	2.30	14.83	±30
Perfluoro-octanesulfonate	1.85	1.78	-3.88	±30
Perfluorononanoic acid	2.00	2.24	12.02	±30
Perfluorononanesulfonate	1.92	2.00	4.34	±30
Perfluorodecanoic acid	2.00	2.22	11.22	±30
8:2 fluorotelomersulfonate	1.92	2.04	6.27	±30
Perfluorooctanesulfonamide	2.00	1.98	-0.78	±30
NMeFOSAA	2.00	2.07	3.49	±30
Perfluorodecanesulfonate	1.93	1.96	1.51	±30
Perfluoroundecanoic acid	2.00	2.41	20.35	±30
NEtFOSAA	2.00	2.14	7.02	±30
Perfluorododecanoic acid	2.00	2.32	15.86	±30
10:2-fluorotelomersulfonate	1.93	2.37	22.95	±30
NMePFOSAE	2.00	2.25	12.45	±30
NMePFOSA	2.00	2.16	8.12	±30
Perfluorododecanesulfonate	1.94	1.84	-5.08	±30
NEtPFOSAE	2.00	2.45	22.74	±30
NEtPFOSA	2.00	2.21	10.68	±30
Perfluorotridecanoic acid	2.00	2.35	17.68	±30
Perfluorotetradecanoic acid	2.00	2.30	15.22	±30
Perfluorohexadecanoic acid	2.00	2.31	15.28	±30
Perfluorooctadecanoic acid	2.00	2.22	11.01	±30

 * Outside QC Limits.   FORM 07 - EPA 537 mod QSM   Page 1 of 1

Batch: 18330013		13C2-PFDA	13C2-PFOA	13C3-PFBA	13C4-PFOS
File Name:18NOV28DCAL-08.WIFF		Area	Area	Area	Area
CAL3 Area/ CCV Area		441791	498502	887249	283214
LOWER LIMIT		220896	249251	443625	141607
UPPER LIMIT		662687	747753	1330874	424821
LAB SAMPLE ID	DATE ANALYZED				
BLK330013	11/28/18 19:45	503481	553627	997106	316442
LCS330013	11/28/18 20:03	543268	565895	1014652	333251
LCSDA	11/28/18 20:12	531497	556152	973455	316626
9911679	11/28/18 22:18	503780	578307	866926	323216
9911680	11/28/18 22:27	536609	547281	994961	330243
9911681	11/28/18 22:36	528208	683624	805765	312514
9911682	11/28/18 22:45	528302	538751	1013193	337259

AREA: Upper limit: 150% of the internal standard area.
         Lower Limit: 50% of the internal standard area.

  * Outside QC Limits

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Instrument Name: LM27631

Data File Name	Sample ID	Batch No	Analysis Date/Time
18NOV28DCAL-05.wiff	MDL	N/A	11/28/2018 1:33:07 PM
18NOV28DCAL-06.wiff	CAL1	N/A	11/28/2018 1:42:10 PM
18NOV28DCAL-07.wiff	CAL2	N/A	11/28/2018 1:51:13 PM
18NOV28DCAL-08.wiff	CAL3	N/A	11/28/2018 2:00:13 PM
18NOV28DCAL-09.wiff	CAL4	N/A	11/28/2018 2:09:13 PM
18NOV28DCAL-10.wiff	CAL5	N/A	11/28/2018 2:18:16 PM
18NOV28DCAL-11.wiff	CAL6	N/A	11/28/2018 2:27:16 PM
18NOV28DCAL-12.wiff	CAL7	N/A	11/28/2018 2:36:16 PM
18NOV28DCAL-13.wiff	Instrument Blank	N/A	11/28/2018 2:45:19 PM
18NOV28DCAL-14.wiff	ICV	N/A	11/28/2018 2:54:22 PM
18NOV28DCAL-15.wiff	L+B CAL3	N/A	11/28/2018 3:03:22 PM
18NOV28DCAL-16.wiff	CCV1_CAL3	N/A	11/28/2018 3:12:25 PM
18NOV28D-01.wiff	solvent	N/A	11/28/2018 3:51:03 PM
18NOV28D-02.wiff	solvent	N/A	11/28/2018 4:00:07 PM
18NOV28D-03.wiff	solvent	N/A	11/28/2018 4:09:10 PM
18NOV28D-04.wiff	CCV1_ISC_CAL2	N/A	11/28/2018 4:18:13 PM
18NOV28D-05.wiff	INBLK	N/A	11/28/2018 4:27:13 PM
18NOV28D-06.wiff	BLK330012	18330012	11/28/2018 4:36:13 PM
18NOV28D-07.wiff	LCS330012	18330012	11/28/2018 4:45:16 PM
18NOV28D-08.wiff	LCSDA	18330012	11/28/2018 4:54:16 PM
18NOV28D-09.wiff	9909715	18330012	11/28/2018 5:03:19 PM
18NOV28D-10.wiff	9909716	18330012	11/28/2018 5:12:20 PM
18NOV28D-11.wiff	9909717	18330012	11/28/2018 5:21:22 PM
18NOV28D-12.wiff	9909718	18330012	11/28/2018 5:30:25 PM
18NOV28D-13.wiff	9909719	18330012	11/28/2018 5:39:28 PM
18NOV28D-14.wiff	9909720	18330012	11/28/2018 5:48:28 PM
18NOV28D-15.wiff	9909721	18330012	11/28/2018 5:57:28 PM
18NOV28D-16.wiff	CCV2_CAL3	N/A	11/28/2018 6:06:28 PM
18NOV28D-17.wiff	9909722	18330012	11/28/2018 6:15:28 PM
18NOV28D-18.wiff	9909723	18330012	11/28/2018 6:24:28 PM
18NOV28D-19.wiff	9909724	18330012	11/28/2018 6:33:28 PM
18NOV28D-20.wiff	9909725	18330012	11/28/2018 6:42:28 PM
18NOV28D-21.wiff	9909726	18330012	11/28/2018 6:51:28 PM
18NOV28D-22.wiff	9909727	18330012	11/28/2018 7:00:28 PM
18NOV28D-23.wiff	9909728	18330012	11/28/2018 7:09:28 PM
18NOV28D-24.wiff	9909729	18330012	11/28/2018 7:18:31 PM
18NOV28D-25.wiff	9909745	18330012	11/28/2018 7:27:31 PM
18NOV28D-26.wiff	solvent	N/A	11/28/2018 7:36:34 PM
18NOV28D-27.wiff	BLK330013	18330013	11/28/2018 7:45:37 PM
18NOV28D-28.wiff	CCV3_CAL4	N/A	11/28/2018 7:54:40 PM
18NOV28D-29.wiff	LCS330013	18330013	11/28/2018 8:03:40 PM
18NOV28D-30.wiff	LCSDA	18330013	11/28/2018 8:12:43 PM
18NOV28D-31.wiff	9909730	18330013	11/28/2018 8:21:43 PM
18NOV28D-32.wiff	9909731	18330013	11/28/2018 8:30:43 PM
18NOV28D-33.wiff	9909753	18330013	11/28/2018 8:39:43 PM
18NOV28D-34.wiff	9909754	18330013	11/28/2018 8:48:43 PM
18NOV28D-35.wiff	9909755	18330013	11/28/2018 8:57:43 PM
18NOV28D-36.wiff	9909756	18330013	11/28/2018 9:06:46 PM
18NOV28D-37.wiff	9909757	18330013	11/28/2018 9:15:47 PM
18NOV28D-38.wiff	9909758	18330013	11/28/2018 9:24:47 PM
18NOV28D-39.wiff	CCV4_ISC_CAL2	N/A	11/28/2018 9:33:47 PM
18NOV28D-40.wiff	9909759	18330013	11/28/2018 9:42:46 PM
18NOV28D-41.wiff	9909760	18330013	11/28/2018 9:51:50 PM
18NOV28D-42.wiff	9909761	18330013	11/28/2018 10:00:50 PM
18NOV28D-43.wiff	9909762	18330013	11/28/2018 10:09:50 PM
18NOV28D-44.wiff	9911679	18330013	11/28/2018 10:18:52 PM
18NOV28D-45.wiff	9911680	18330013	11/28/2018 10:27:56 PM

APPROVED
By MCD at 7:12 pm, 11/30/18

Instrument Name: LM27631

18NOV28D-46.wiff	9911681	18330013	11/28/2018 10:36:56 PM
18NOV28D-47.wiff	9911682	18330013	11/28/2018 10:45:56 PM
18NOV28D-48.wiff	solvent	N/A	11/28/2018 10:54:56 PM
18NOV28D-49.wiff	IDOC1	N/A	11/28/2018 11:03:59 PM
18NOV28D-50.wiff	CCV5_CAL3	N/A	11/28/2018 11:12:59 PM
18NOV28D-51.wiff	BLK330003	18330003	11/28/2018 11:21:59 PM
18NOV28D-52.wiff	LCS330003	18330003	11/28/2018 11:30:59 PM
18NOV28D-53.wiff	9911357	18330003	11/28/2018 11:39:59 PM
18NOV28D-54.wiff	9911358	18330003	11/28/2018 11:48:59 PM
18NOV28D-55.wiff	9911359BKG	18330003	11/28/2018 11:58:02 PM
18NOV28D-56.wiff	9911362	18330003	11/29/2018 12:07:05 AM
18NOV28D-57.wiff	9911363	18330003	11/29/2018 12:16:08 AM
18NOV28D-58.wiff	9911364	18330003	11/29/2018 12:25:08 AM
18NOV28D-59.wiff	9911365	18330003	11/29/2018 12:34:11 AM
18NOV28D-60.wiff	9911366	18330003	11/29/2018 12:43:11 AM
18NOV28D-61.wiff	CCV6_CAL4	N/A	11/29/2018 12:52:11 AM
18NOV28D-62.wiff	9911367	18330003	11/29/2018 1:01:11 AM
18NOV28D-63.wiff	9911368	18330003	11/29/2018 1:10:11 AM
18NOV28D-64.wiff	9911360MS	18330003	11/29/2018 1:19:11 AM
18NOV28D-65.wiff	9911361MSD	18330003	11/29/2018 1:28:11 AM
18NOV28D-66.wiff	solvent	N/A	11/29/2018 1:37:11 AM
18NOV28D-67.wiff	BLK330004	18330004	11/29/2018 1:46:11 AM
18NOV28D-68.wiff	LCS330004	18330004	11/29/2018 1:55:14 AM
18NOV28D-69.wiff	9911390	18330004	11/29/2018 2:04:14 AM
18NOV28D-70.wiff	9911391	18330004	11/29/2018 2:13:14 AM
18NOV28D-71.wiff	9911392BKG	18330004	11/29/2018 2:22:14 AM
18NOV28D-72.wiff	9911395	18330004	11/29/2018 2:31:17 AM
18NOV28D-73.wiff	CCV7_ISC_CAL2	N/A	11/29/2018 2:40:20 AM
18NOV28D-74.wiff	Instrument Blank	N/A	11/29/2018 2:49:20 AM
18NOV28D-75.wiff	9911396	18330004	11/29/2018 2:58:20 AM
18NOV28D-76.wiff	9911397	18330004	11/29/2018 3:07:23 AM
18NOV28D-77.wiff	9911398	18330004	11/29/2018 3:16:26 AM
18NOV28D-78.wiff	9911399	18330004	11/29/2018 3:25:26 AM
18NOV28D-79.wiff	9911400	18330004	11/29/2018 3:34:26 AM
18NOV28D-80.wiff	9911401	18330004	11/29/2018 3:43:26 AM
18NOV28D-81.wiff	9911393MS	18330004	11/29/2018 3:52:26 AM
18NOV28D-82.wiff	9911394MSD	18330004	11/29/2018 4:01:26 AM
18NOV28D-83.wiff	CCV8_CAL3	N/A	11/29/2018 4:10:26 AM
18NOV28D-84.wiff	BLK331005	18331005	11/29/2018 4:19:26 AM
18NOV28D-85.wiff	LCS331005	18331005	11/29/2018 4:28:26 AM
18NOV28D-86.wiff	9911369	18331005	11/29/2018 4:37:26 AM
18NOV28D-87.wiff	9911370	18331005	11/29/2018 4:46:26 AM
18NOV28D-88.wiff	9911371	18331005	11/29/2018 4:55:26 AM
18NOV28D-89.wiff	9911372	18331005	11/29/2018 5:04:26 AM
18NOV28D-90.wiff	9911373BKG	18331005	11/29/2018 5:13:26 AM
18NOV28D-91.wiff	9911376	18331005	11/29/2018 5:22:26 AM
18NOV28D-92.wiff	9911377	18331005	11/29/2018 5:31:29 AM
18NOV28D-93.wiff	9911378	18331005	11/29/2018 5:40:32 AM
18NOV28D-94.wiff	CCV9_CAL4	N/A	11/29/2018 5:49:32 AM
18NOV28D-95.wiff	9911379	18331005	11/29/2018 5:58:32 AM
18NOV28D-96.wiff	9911380	18331005	11/29/2018 6:07:32 AM
18NOV28D-97.wiff	9911381	18331005	11/29/2018 6:16:32 AM
18NOV28D-98.wiff	9911382	18331005	11/29/2018 6:25:32 AM
18NOV28D-99.wiff	9911383	18331005	11/29/2018 6:34:32 AM
18NOV28D-100.wiff	9911384	18331005	11/29/2018 6:43:32 AM
18NOV28D-101.wiff	9911385	18331005	11/29/2018 6:52:32 AM
18NOV28D-102.wiff	9911386	18331005	11/29/2018 7:01:32 AM
18NOV28D-103.wiff	9911387	18331005	11/29/2018 7:10:35 AM

APPROVED
By MCD at 7:12 pm, 11/30/18

Instrument Name: LM27631

18NOV28D-104.wiff	9911374MS	18331005	11/29/2018 7:19:35 AM
18NOV28D-105.wiff	CCV10_ISC_CAL2	N/A	11/29/2018 7:28:35 AM
18NOV28D-106.wiff	9911375MSD	18331005	11/29/2018 7:37:35 AM
18NOV28D-107.wiff	solvent	N/A	11/29/2018 7:46:35 AM
18NOV28D-108.wiff	BLK332015	18332015	11/29/2018 7:55:35 AM
18NOV28D-109.wiff	LCS332015	18332015	11/29/2018 8:04:35 AM
18NOV28D-110.wiff	LCSDA	18332015	11/29/2018 8:13:35 AM
18NOV28D-111.wiff	9911715	18332015	11/29/2018 8:22:35 AM
18NOV28D-112.wiff	9911716	18332015	11/29/2018 8:31:35 AM
18NOV28D-113.wiff	9911717	18332015	11/29/2018 8:40:35 AM
18NOV28D-114.wiff	CCV11_CAL3	N/A	11/29/2018 8:49:35 AM
18NOV28D-115.wiff	solvent	N/A	11/29/2018 8:58:35 AM

20 mM Ammonium Acetate in H2O: 2615711261833A
20 mM Ammonium Acetate in 0.5% H2O\Methanol: 2615711261833B

APPROVED
By MCD at 7:12 pm, 11/30/18

**LC-MS/MS
Analysis Report**

DOD Initial Calibration Verification

Instrument ID:	LM27631	**ICAL Name:**	18NOV28DCAL	**QMethod Name:**	18AUG20QM
Result Table:	18NOV28DCAL11/28/2018 4:47:11 PM		**Acquisition Method:**		18AUG13_3uL.dam

Sample File Name	Acquisition Date	Sample ID	Sample Name
18NOV28DCAL-06.wiff	11/28/2018 1:42:10 PM	CALBRN11833C	CAL1
18NOV28DCAL-07.wiff	11/28/2018 1:51:13 PM	CALBRN21833C	CAL2
18NOV28DCAL-08.wiff	11/28/2018 2:00:13 PM	CALBRN31833B	CAL3
18NOV28DCAL-09.wiff	11/28/2018 2:09:13 PM	CALBRN41833B	CAL4
18NOV28DCAL-10.wiff	11/28/2018 2:18:16 PM	CALBRN51833B	CAL5
18NOV28DCAL-11.wiff	11/28/2018 2:27:16 PM	CALBRN61833B	CAL6
18NOV28DCAL-12.wiff	11/28/2018 2:36:16 PM	CALBRN71833B	CAL7

CAL3 Injection Standard Areas

Sample Name	Injection Std Name	Injection Std Area
CAL3	13C3-PFBA	887248.9
CAL3	13C2-PFOA	498501.6
CAL3	13C4-PFOS	283214.2
CAL3	13C2-PFDA	441790.6

DOD Initial Calibration Verification

Instrument ID: LM27631   **ICAL Name:** 18NOV28DCAL   **QMethod Name:** 18AUG20QM
Result Table: 18NOV28DCAL11/28/2018 4:47:11 PM   **Acquisition Method:** 18AUG13_3uL.dam

Response Factor Table

Analyte Name	CAL 1	CAL 2	CAL 3	CAL 4	CAL 5	CAL 6	CAL 7	%RSD	Limit	OOS	r²	OOS
PFBA	1.080	0.888	1.015	0.915	0.953	0.891	N/A	7	20		0.999	
PFPeA	1.146	0.858	1.164	0.972	1.027	N/A	N/A	11	20		0.997	
PFBS	1.048	0.856	1.054	0.915	0.956	0.951	0.964	7	20		1.000	
4:2-FTS	1.863	1.681	1.998	1.784	1.847	1.760	1.708	6	20		0.999	
PFHxA	1.451	1.216	1.377	1.252	1.229	N/A	N/A	7	20		0.999	
PFPeS	0.506	0.448	0.528	0.456	0.472	0.446	0.463	6	20		0.999	
PFHpA	1.943	1.531	1.813	1.585	1.614	N/A	N/A	9	20		0.999	
PFHxS	1.004	0.803	1.016	0.911	1.002	0.973	1.040	8	20		0.999	
6:2-FTS	2.165	1.891	2.059	2.052	1.835	1.766	N/A	7	20		0.998	
PFHpS	1.044	0.805	0.986	0.926	0.943	0.954	0.947	7	20		1.000	
PFOA	1.031	0.860	1.063	1.011	0.988	0.950	N/A	7	20		0.999	
PFOS	1.059	0.938	1.163	1.051	1.126	1.119	1.160	7	20		0.999	
PFNA	1.496	1.303	1.470	1.315	1.403	1.256	N/A	6	20		0.997	
PFNS	0.763	0.638	0.735	0.777	0.756	0.755	0.758	6	20		1.000	
PFDA	0.983	0.901	1.042	0.908	0.922	0.863	0.880	6	20		0.999	
8:2-FTS	2.600	2.366	2.661	2.405	2.587	N/A	N/A	5	20		0.999	
PFOSA	1.045	0.925	1.050	0.976	1.003	0.980	N/A	4	20		1.000	
NMeFOSAA	0.755	0.760	0.870	0.777	0.807	0.800	0.770	5	20		0.999	
PFDS	0.533	0.491	0.644	0.594	0.609	0.592	0.608	8	20		1.000	
PFUnDA	1.551	1.312	1.564	1.466	1.465	1.452	1.350	6	20		0.998	
NEtFOSAA	0.994	0.958	1.016	0.921	1.027	1.030	1.034	4	20		1.000	
PFDoDA	1.137	0.896	1.115	0.896	0.918	0.904	N/A	11	20		0.999	
10:2-FTS	2.409	2.294	2.697	2.170	2.584	2.172	2.078	9	20		0.994	
NMePFOSAE	1.232	1.162	1.330	1.183	1.252	1.229	1.152	5	20		0.999	
NMePFOSA	0.955	0.904	1.028	0.928	0.970	0.938	0.940	4	20		1.000	
PFDoS	0.310	0.304	0.325	0.333	0.321	0.319	0.343	4	20		0.999	
NEtPFOSAE	1.702	1.382	1.766	1.478	1.516	1.392	1.348	10	20		0.998	
NEtPFOSA	1.208	0.986	1.184	1.112	1.104	1.170	1.090	6	20		0.999	
PFTrDA	1.034	0.859	1.068	0.881	0.826	0.812	N/A	11	20		0.998	
PFTeDA	0.975	0.858	1.016	0.886	0.921	0.861	N/A	6	20		0.999	
PFHxDA	0.549	0.429	0.516	0.455	0.493	0.431	0.426	10	20		0.997	
PFODA	0.411	0.354	0.413	0.374	0.405	0.373	0.370	6	20		0.999	

DOD Initial Calibration Verification

Instrument ID: LM27631 **ICAL Name:** 18NOV28DCAL **QMethod Name:** 18AUG20QM
Result Table: 18NOV28DCAL11/28/2018 4:47:11 PM **Acquisition Method:** 18AUG13_3uL.dam

Sample Name	Sample ID:	Sample File:	Acquisition Date:
ICV	ICVMODX1833G	18NOV28DCAL-14.wiff	11/28/2018 2:54:22 PM

Analyte Name	Analyte Area	Ext Std Name	Ext Std Area	Ext Std Con	Area Ratio	RT (min)	RRT	Spec Amt	Calc Amt	% Diff	% Diff Lim	% Diff OOS
PFBA	387187.03	13C4-PFBA	992615.76	5.00	0.390	3.27	1.00	2.000	2.138	7	30	
PFPeA	377961.59	13C5-PFPeA	975580.85	5.00	0.387	3.77	1.00	2.000	1.901	-5	30	
PFBS	159425.00	13C3-PFBS	446011.00	4.65	0.357	3.81	1.00	1.769	1.735	-2	30	
4:2-FTS	N/A	13C2-4:2-FTS	68184.32	4.67	N/A	N/A	N/A	0.000	N/A		30	
PFHxA	369137.13	13C5-PFHxA	699371.27	5.00	0.528	4.16	1.00	2.000	2.119	6	30	
PFPeS	N/A	13C3-PFBS	446011.00	4.65	N/A	N/A	N/A	0.000	N/A		30	
PFHpA	373590.76	13C4-PFHpA	556403.09	5.00	0.671	4.55	1.00	2.000	2.072	4	30	
PFHxS	125085.30	13C3-PFHxS	317108.95	4.73	0.394	4.55	1.00	1.890	1.847	-2	30	
6:2-FTS	N/A	13C2-6:2-FTS	63350.52	4.75	N/A	N/A	N/A	0.000	N/A		30	
PFHpS	131043.06	13C3-PFHxS	317108.95	4.73	0.413	4.91	1.08	1.900	2.062	9	30	
PFOA	404358.94	13C8-PFOA	1001731.38	5.00	0.404	4.92	1.00	2.000	2.086	4	30	
PFOS	122334.56	13C8-PFOS	316117.13	4.78	0.387	5.25	1.00	1.910	1.623	-15	30	
PFNA	351872.00	13C9-PFNA	647064.12	5.00	0.544	5.26	1.00	2.000	2.084	4	30	
PFNS	N/A	13C8-PFOS	316117.13	4.78	N/A	N/A	N/A	0.000	N/A		30	
PFDA	325191.94	13C6-PFDA	857032.88	5.00	0.379	5.56	1.00	0.000	2.148		30	
8:2-FTS	N/A	13C2-8:2-FTS	51912.86	4.79	N/A	N/A	N/A	0.000	N/A		30	
PFOSA	N/A	13C8-PFOSA	637370.65	5.00	N/A	N/A	N/A	0.000	N/A		30	
NMeFOSAA	74168.76	d3-NMeFOSAA	183040.02	5.00	0.405	5.70	1.00	2.000	2.585	29	30	
PFDS	72374.27	13C8-PFOS	316117.13	4.78	0.229	5.79	1.10	1.930	1.815	-6	30	
PFUnDA	354099.76	13C7-PFUnDA	559327.43	5.00	0.633	5.82	1.00	2.000	2.263	13	30	
NEtFOSAA	57367.95	d5-NEtFOSAA	140839.96	5.00	0.407	5.83	1.00	2.000	1.984	-1	30	
PFDoDA	427818.87	13C2-PFDoDA	1134142.10	5.00	0.377	6.05	1.00	2.000	2.066	3	30	
10:2-FTS	N/A	13C2-8:2-FTS	51912.86	4.79	N/A	N/A	N/A	0.000	N/A		30	
NMePFOSAE	N/A	d7-NMePFOSAE	262732.24	5.00	N/A	N/A	N/A	0.000	N/A		30	
NMePFOSA	N/A	d3-NMePFOSA	81059.54	5.00	N/A	N/A	N/A	0.000	N/A		30	
PFDoS	N/A	13C8-PFOS	316117.13	4.78	N/A	N/A	N/A	0.000	N/A		30	
NEtPFOSAE	N/A	d9-NEtPFOSAE	227167.68	5.00	N/A	N/A	N/A	0.000	N/A		30	
NEtPFOSA	N/A	d5-NEtPFOSA	67297.85	5.00	N/A	N/A	N/A	0.000	N/A		30	
PFTrDA	416758.36	13C2-PFDoDA	1134142.10	5.00	0.367	6.25	1.03	2.000	2.215	11	30	
PFTeDA	312632.12	13C2-PFTeDA	820071.67	5.00	0.381	6.42	1.00	2.000	2.160	8	30	
PFHxDA	N/A	13C2-PFTeDA	820071.67	5.00	N/A	N/A	N/A	0.000	N/A		30	
PFODA	N/A	13C2-PFTeDA	820071.67	5.00	N/A	N/A	N/A	0.000	N/A		30	

Assigned to: 26543 Anthony Polaski   Reviewed by: _MSM26157_   Start Date: _11/26/18_   Start time: _16:00_

18330013   Tech 1: _ACP26543_   Tech 2: _CF17698_

Analyses on Batch: PFAS in Water by LC/MS/MS-DoD

Dept: 33   Prep Analysis: 14465 PFAS Water Prep - DoD   ③ ml. ACP26543 11/26/18

Port#	QC	Sample Code	Amt (g)	SS/IS Sol.	Amt (mL)	MS Sol.	Amt (mL)	FV ③ (uL)	IS amt (uL)	BC	Comments
1	BLANKA	BLK330013	250.00	SSMODX1833CE	.025	N/A	N/A	1.0	20	7	
2	LCSA	LCS330013	↓	SSMODX1833CE	.025	MSMODX1833AU	.04	1.0	↓	7 N/A	
3	LCSDA	LCSD330013	↓	SSMODX1833CE	.025	MSMODX1833AU	.04	1.0	↓	↙	

Spike Solutions: Witness: _DDM25478_   Instrument: _LM27631_

MSMODX1833AU   PFAS 537 Native Spike   ③ mCD7824 11/30/18

SSMODX1833CE   PFAS 537 Modified Extraction/Surrogate Spike   Sequence: 18NOV28DOD/18NOV28D + 18NOV29D

Port#	Sample #	Sample Code	Amt (g)	SS/IS Sol.	Amt (mL)	FV ③ (uL)	IS Amt (uL)	BC	Comments	Analyses	Due Date	Prio
4	1 9909730	4096	291.86	SSMODX1833CE	.025	1.0	20	173a		14434	12/04/2018	N
5	2 9909731	4067	274.94	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
6	3 9909753	B230	288.10	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
7	4 9909754	EB B230	278.24	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
8	5 9909755	EB B230	285.87	SSMODX1833CE	.025	1.0		173a	-	14434	12/04/2018	N
9	6 9909756	B230	291.05	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
10	7 9909757	B230	291.46	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
11	8 9909758	B230	273.60	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
12	9 9909759	B230	285.39	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
1	10 9909760	EB B230	278.93	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
2	11 9909761	EB B230	289.19	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
3	12 9909762	B231	281.73	SSMODX1833CE	.025	1.0		173a		14434	12/04/2018	N
4	13 9911679	K180	287.26	SSMODX1833CE	.025	1.0		201a		14434	12/05/2018	N
5	14 9911680	FB K180	284.19	SSMODX1833CE	.025	1.0		173a		14434	12/05/2018	N
6	15 9911681	K180	296.36	SSMODX1833CE	.025	1.0		201a		14434	12/05/2018	N
7	16 9911682	FB K180	293.34	SSMODX1833CE	.025	1.0	↓	173a		14434	12/05/2018	N

NA mCD7824 11/30/18

18330013

Port#	Sample #	Sample Code	Amt ( )	SS/IS Sol.	Amt (mL)	FV (uL)	IS Amt (uL)	BC	Comments	Analyses	Due Date	Prio

Reagents used During Extraction

Reagent/Material/Equip	Lot No./ID No.
0.3% NH4OH:MeOH	273191125I833 D
1:1 ACN:MeOH	2731911251833 C
Auto-pipette (dilutions)	——————
Auto-pipette (extract vialin	P1000-3
Envi-Carb 107563	97324 ③
Internal Standard	IS1833133A
Methanol	DV013 - US
Milli-Q H2O	House A372
SPE Cartridge #1	6424575 - 01
Syringe (IS)	PFAS 11
Syringe (MS)	PFAS 10
Syringe (SS)	PFAS 9
Trizma	NA

③ CF12698
11/27/18

ACP26543 11/26/18

CF12698
11/27/18

MSM26157
11-29-18

Balance #	B629764122		SPE Manifold	7,8	N-evap	B	32° C

DF = Dilution Factor   FV = Final Volume

Documented temps are NIST corrected.

Page 2 of 2

18330013

MSM26157
11-29-18

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LC-MS/MS
DOD Analysis Report

Printed: 11/29/2018 10:21:00 AM
Template: DOD-Sample-18JUN22.docx

ICAL Name: 18NOV28DCAL
QMethod Name: 18AUG20QM

Result Table: 18330013   11/29/2018 10:16:31 AM
Acquisition Method: 18AUG13_3uL.dam

Sample Name:	9911679			Data File:		18NOV28D-44.wiff
Sample ID:	EPA 537 mod QSM 5.1 table B-15 18330013 WGNA-111418-GW-3382 (320-45323-1) Grab Groundwater			Acquis Date:		2018-11-28T22:18:52
Sample Type:	Unknown			Instrument:		LM27631
Vial Position:	59			Acquis Method:		18AUG13_3uL.dam
Injection Vol:	3.00			Result Table:		18330013
QMethod File:	18AUG20QM			ICAL Name:		18NOV28DCAL
Batch Number:	18330013			Operator:		MM26157
Sample Wt.:	0.28726			Dilution Factor:		1.00
Sample Vol.:	1.000			Prep Factor:		1.000

Injection Standard Peak Table

Injection Standard Area Reference File: 18NOV28DCAL-08

Injection Standard Name	Inj Std Conc	Injection Std Peak Area	Rreference Injection Standard Area	Injection Std %Diff	Injection Std %Diff Limit	Injection Std %Diff OOS
13C3-PFBA	5.0	866925.6	887248.9	-2	50	
13C2-PFOA	5.0	578307.1	498501.6	16	50	
13C4-PFOS	4.8	323216.1	283214.2	14	50	
13C2-PFDA	5.0	503779.9	441790.6	14	50	

Extraction Standard Peak Table

Extraction Standard Name	Ext Std Area	Inj Std Name	Inj Std Area	Area Ratio	Ext Std Conc	Ext Std Result	Ext Std %REC	Ext Std %REC Limit	Ext Std OOS
E13C3-PFBS	364235.0	13C3-PFBA	866925.6	0.420	16.187	13.954	86	50-150	
E13C3-PFHxS	293173.1	13C2-PFOA	578307.1	0.507	16.466	13.832	84	50-150	
E13C4-PFHpA	500273.2	13C2-PFOA	578307.1	0.865	17.406	13.837	79	50-150	
E13C8-PFOA	887714.2	13C2-PFOA	578307.1	1.535	17.406	14.708	85	50-150	
E13C8-PFOS	282054.5	13C4-PFOS	323216.1	0.873	16.640	13.713	82	50-150	
E13C9-PFNA	563531.0	13C4-PFOS	323216.1	1.744	17.406	13.331	77	50-150	

PFOS reported result 13 ng/L

y=1.13953x

((247601.9 / 282054.5) / 1.13953) / 0.28726 * 4.8 = 12.87 ng/L

LCS PFOS 81%   4.21 / 5.20 *100 = 80.96
LCSD PFOS 81%   4.22 / 5.20 * 100 = 81.15
RPD 0%   (81-81)/ (81+81 / 2) = 0

APPROVED
By MSM at 10:52 am, 11/29/18

REVIEWED
By umar at 12:53 pm, 12/4/18

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LC-MS/MS
DOD Analysis Report

ICAL Name: 18NOV28DCAL
QMethod Name: 18AUG20QM

Result Table: 18330013   11/29/2018 10:16:31 AM
Acquisition Method: 18AUG13_3uL.dam

Analyte Quantitation Peak Table

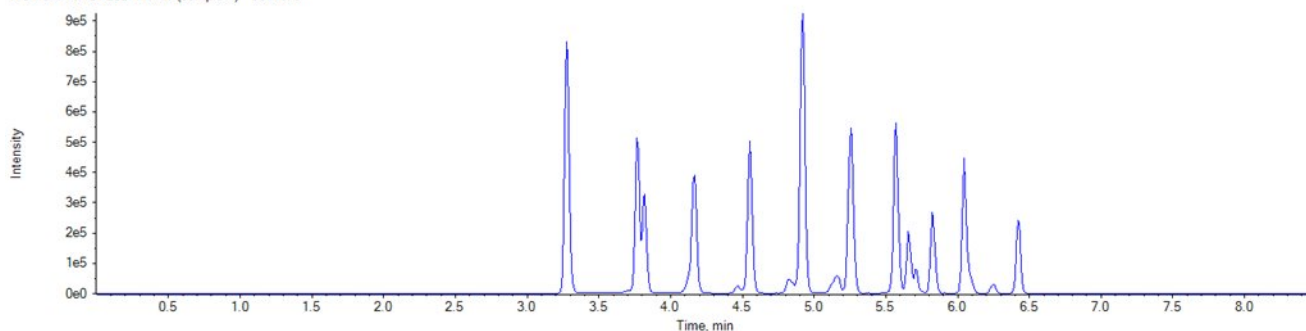**Sample Name:** 9911679   **Instrument Name:** LM27631   **File Name:** 18NOV28D-44.wiff

Sample Wt	Sample Vol	Dilution Factor	PrepFactor
0.28726	1.000	1.00	1.000

Analyte Name	RT	RRT	Analyte Area Response	E	Int Typ	ES Name	ES RT	ES Area Response	Area Ratio	Sample Result (ng/L)
PFBS	3.82	1.000	215339.2		A	13C3-PFBS	3.82	364235.0	0.591	9.990
PFHpA	4.55	1.000	214013.8		A	13C4-PFHpA	4.55	500273.3	0.428	4.596
PFHxS	4.55	1.000	99900.8		M	13C3-PFHxS	4.55	293173.1	0.341	5.554
PFOA	4.92	1.000	785092.7		M	13C8-PFOA	4.92	887714.2	0.884	15.909
PFOS	5.22	1.000	247601.9		M	13C8-PFOS	5.25	282054.5	0.878	12.819
PFNA	5.26	1.000	65048.8		A	13C9-PFNA	5.26	563531.0	0.115	1.540

Total Ion Chromatogram

TIC from 18NOV28D-44.wiff (sample 1) - 9911679

APPROVED
By MSM at 10:52 am, 11/29/18

REVIEWED
By umar at 12:53 pm, 12/4/18

eurofins | Lancaster Laboratories

DOD Initial Calibration Verification

Instrument ID:	LM27631	**ICAL Name:**	18NOV28DCAL	**QMethod Name:**	18AUG20QM
Result Table:	18NOV28DCAL11/28/2018 4:47:11 PM		**Acquisition Method:**	18AUG13_3uL.dam	

PFOS

$y = 1.13953\ x\ (r = 0.99969)\ (\text{weighting: } 1/x)$
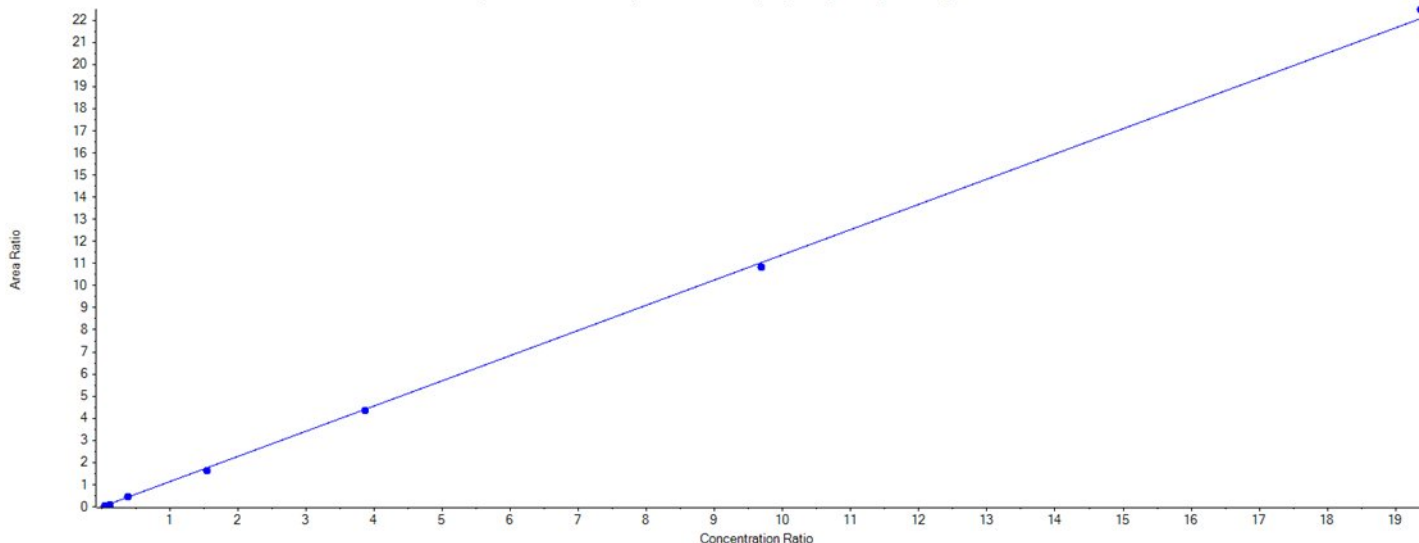
Component Calibration Verification

Sample Name	PFOS Area	S/N	13C8-PFOS Area	Used	ES Conc	Area Ratio	RT (min)	RRT	Spec Amount	Calc Amount	%Diff	%D Limit	%D OOS
CAL1	13060.03	1060.4	318525.43	True	4.78	0.041	5.25	1.000	0.185	0.172	-7	30	
CAL2	34203.58	972.6	313894.27	True	4.78	0.109	5.25	1.000	0.555	0.457	-18	30	
CAL3	139506.62	732.7	309913.74	True	4.78	0.450	5.26	1.000	1.850	1.888	2	30	
CAL4	481949.96	1137.9	296147.52	True	4.78	1.627	5.25	1.000	7.400	6.826	-8	30	
CAL5	1305020.45	988.3	299574.48	True	4.78	4.356	5.26	1.000	18.500	18.273	-1	30	
CAL6	3026664.45	1448.1	279204.36	True	4.78	10.840	5.25	1.000	46.300	45.472	-2	30	
CAL7	5620328.96	1278.0	250004.23	True	4.78	22.481	5.25	1.000	92.600	94.301	2	30	

LEGEND
- PFOA & PFOS BELOW DETECTION LIMITS
- SUM OF PFOA & PFOS CONCENTRATIONS AT OR BELOW 40 PPT
- SUM OF PFOA & PFOS CONCENTRATIONS BETWEEN 40 PPT AND 70 PPT
- SUM OF PFOA & PFOS CONCENTRATIONS ABOVE 70 PPT
- PUBLIC WATER CONNECTION (SOME NOT BY NAVY)
- SAMPLING AREA
- HORSHAM AIR GUARD (HAGS)
- FORMER NASJRB WILLOW GROVE
- TOWNSHIP BOUNDARY

5,000 2,500 0 5,000
Feet

PFC SAMPLE RESULTS MAP
FORMER NASJRB WILLOW GROVE
AND HORSHAM AIR GUARD
MONTGOMERY COUNTY, PENNSYLVANIA

SCALE	
AS NOTED	
FILE	
WGNA	
REV	DATE
0	02/14/19
FIGURE NUMBER	
FIGURE 1	

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