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US ARMY ENVIRONMENTAL COMMAND  
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March 10, 2020

SUBJECT: Draft Final Preliminary Assessment/Site Investigation of Per and Polyfluoroalkyl Substances for Badger Army Ammunition Plant

Mr. Steve Martin  
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Dear Mr. Martin:

The US Army is pleased to provide you with the Draft Final Preliminary Assessment/Site Investigation of Per- and Polyfluoroalkyl Substances for Badger Army Ammunition Plant.

Please call or email me at 210-466-1351/bryan.p.lynch.civ@mail.mil if you have any questions or comments.

Sincerely,



Bryan P. Lynch  
Commander's Representative

Digitally signed by  
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254  
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Enclosures

Copy furn: Joel Janssen, SpecPro Professional Services, LLC



# **DRAFT FINAL Preliminary Assessment/Site Inspection of Per- and Polyfluoroalkyl Substances**

**Badger Army Ammunition Plant  
Sauk County, Wisconsin**

Prepared For:  
U.S. Army Corps of Engineers, Baltimore District  
2 Hopkins Plaza  
Baltimore, MD 21201

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March 2020

DRAFT FINAL Preliminary Assessment/Site Inspection of Per- and Polyfluoroalkyl Substances  
Badger Army Ammunition Plant, Sauk County, Wisconsin

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**BADGER ARMY AMMUNITION PLANT  
Sauk County, Wisconsin**

Prepared for:

U.S. Army Corps of Engineers

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50 Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October  
51 15.

## 52 1 INTRODUCTION

53 The per- and polyfluoroalkyl substances (PFAS) Preliminary Assessment (PA)/Site Inspection (SI)  
54 includes two distinct efforts. The PA evaluates potential hazards associated with storing, disposing, or  
55 using PFAS-containing products at the former Badger Army Ammunition Plant (BAAP). When the PA  
56 identifies the need for further investigation, the SI investigates whether human exposure to PFAS as a  
57 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) pollutant and  
58 contaminant, requires additional investigation under CERCLA. The United States (U.S.) Army is the lead  
59 agency under CERCLA and Executive Order 12,580 and is conducting the PA/SI as the lead agency,  
60 consistent with its authority under CERCLA, 42 United States Code (U.S.C.) §§ 9600, et seq. (as  
61 amended), and the Defense Environmental Restoration Program, 10 U.S.C. §§ 2701, et seq.

62 The Army's PFAS PA program has focused on identifying the locations of potential releases through the  
63 storage, disposal or use of PFAS containing materials. The BAAP was constructed in 1942 to produce  
64 smokeless gunpowder and solid rocket propellant as munitions components for World War II. Packaging  
65 of items (assembled munitions) which may have had Teflon® containing materials was not a part of the  
66 BAAP mission. Based on the previous mission of BAAP, the use of PFAS containing products at BAAP is  
67 unlikely.

### 68 1.1 Project Background

69 PFAS is a class of compounds that has been used in a wide range of industrial applications and  
70 commercial products due to their unique surface tension/leveling properties. Some common compounds  
71 containing PFAS include Teflon® coated cookware, firefighting foams, paints, hydraulic fluids, electronics,  
72 textiles, and paper coatings. Due to industry and regulatory concerns about the potential health effects  
73 and adverse environmental impacts, there has been a reduction in the manufacture and use of PFAS  
74 worldwide. In the U.S., significant reductions in the production, importation, and use of  
75 perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), two individual compounds in the  
76 PFAS class, occurred between 2001 and 2015 (Interstate Technology Regulatory Council 2017).  
77 Perfluorobutanesulfonic acid (PFBS) replaced PFOS in some applications and is currently used and  
78 manufactured in the U.S.

79 The focus of the Army's PA program is to identify the locations, or areas of potential interest (AOPs), at  
80 installations where PFAS, specifically PFOS, PFOA, and PFBS were stored, disposed of, or used in  
81 accordance with the Army Guidance for Addressing Releases of PFAS (Army 2018). The Army has  
82 identified areas where PFOS/PFOA/PFBS has been stored, disposed of, or used. The PA is focused on  
83 likely sources or PFOS/PFOA/PFBS from 1) locations where Class B firefighting foam (i.e., aqueous film  
84 forming foam [AFFF]) was stored or used and if a suspected release occurred at these locations; 2)  
85 locations where chromium plating operations occurred and if a suspected release occurred at these  
86 locations; 3) landfills where PFOS/PFOA/PFBS-containing materials may have been disposed; and 4)  
87 wastewater treatment plants that may have received wastewater from facilities that used or disposed of  
88 PFOS/PFOA/PFBS-containing liquid effluents (U.S. Army 2018). During the PA, investigators collected  
89 readily available information through document research, personnel interviews, and site reconnaissance.

90 The objective of the Army's SI program is to compile sufficient technically defensible and useful data to  
91 verify assumptions made during the PA and determine whether media (groundwater, soil, surface water,  
92 and/or sediment) associated with individual AOPIs contain levels of PFOS/PFOA/PFBS exceeding  
93 screening levels in accordance with current Department of Defense Environmental Laboratory  
94 Accreditation Program standards. The SI is typically a limited investigation near suspected sources of  
95 contamination to determine if a release has occurred but is not a comprehensive extent-of-contamination  
96 survey.

97 The regulatory environment related to PFAS is evolving as research continues. Currently, there is no set  
98 federal maximum contaminant level defined for any PFAS. In 2016, the United States Environmental  
99 Protection Agency (USEPA) established a lifetime health advisory (LHA) of 70 nanograms per liter (ng/L)  
100 in drinking water for PFOS or PFOA and for the sum of PFOS and PFOA when both are present (USEPA  
101 2016a). A USEPA Office of Ground Water and Drinking Water Memorandum indicates that the USEPA  
102 LHA for PFOS and PFOA are non-enforceable and non-regulatory (USEPA 2016b). In addition, some  
103 states have proposed or established their own standards for PFAS, which include PFOS and PFOA. In  
104 November 2018, the USEPA also issued draft subchronic and chronic oral toxicity values for PFBS for  
105 public comment.

106 Additionally, on 15 October 2019, the Office of the Secretary of Defense (OSD) provided guidance on the  
107 investigation of PFOS, PFOA, and PFBS at Environmental Restoration Account-funded, Base  
108 Realignment and Closure Account-funded, and Operation and Maintenance accounts for the National  
109 Guard-funded sites (OSD 2019). The DoD guidance provides risk screening levels for PFOS, PFOA, and  
110 PFBS in groundwater (tap water) or soil, calculated using the USEPA's regional screening level (RSL)  
111 calculator for residential and industrial/commercial worker receptor scenarios as shown in **Table 1**, **Table**  
112 **2**, and **Table 3**. To be conservative, the OSD tap water risk screening levels will be used to compare all  
113 groundwater and potable-use surface water for this Army PFAS PA/SI program. The AOPIs at BAAP were  
114 evaluated for the residential and industrial/commercial tap water scenario (**Table 1**) and the residential or  
115 industrial/commercial worker receptor scenarios for soil (**Table 2**, **Table 3**) based on current and/or future  
116 land use and compared to the relevant values. If only one PFAS constituent is detected (i.e., PFOS, PFOA  
117 or PFBS), the hazard quotient (HQ) is 1, if more than one PFAS constituent is detected (i.e., PFOS,  
118 PFOA, PFBS, or other), the hazard quotient is 0.1, or 10% of the risk screening level. The 15 October  
119 2019 Memorandum: Investigation Per- and Polyfluoroalkyl Substances within the Department of Defense  
120 Cleanup Program is provided for reference as **Attachment 6**. The data from the SI sampling event are  
121 compared to the relevant risk screening levels in **Section 4**.

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122 Table 1 Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Tap Water Using USEPA's RSL Calculator  
123 for Residential and Industrial/Commercial Receptor Scenario

Chemical	Carcinogenic Slope Factor- Oral (SF) (mg/kg-day) <sup>-1</sup>	Non-Carcinogenic Reference Dose (RfD) (mg/kg-day)	Residential and Industrial/Commercial Scenario Screening Levels Calculated Using USEPA RSL Calculator			
			Tap Water (ng/L or ppt)			
			HQ= 0.1	HQ= 1.0	ILCR= 1E-06	ILCR= 1E-04
PFOS	NA	2.00 E-05	40	400	NA	NA
PFOA	7.00 E-02	2.00 E-05	40	400	1,100	111,000
PFBS	NA	2.00 E-02	40,000	400,000	NA	NA

124 Notes:

125 ILCR – incremental lifetime cancer risk

126 mg/kg – milligrams per kilogram

127 NA= Not available/applicable

128 ppt – parts per trillion

129

130 Table 2 Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Soil Using USEPA's RSL Calculator for  
131 Residential Receptor Scenario

Chemical	Carcinogenic Slope Factor- Oral (SF) (mg/kg-day) <sup>-1</sup>	Non-Carcinogenic Reference Dose (RfD) (mg/kg-day)	Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator			
			Soil (mg/kg or ppm)			
			HQ= 0.1	HQ= 1.0	ILCR= 1E-06	ILCR= 1E-04
PFOS	NA	2.00 E-05	0.13	1.3	NA	NA
PFOA	7.00 E-02	2.00 E-05	0.13	1.3	7.8	775
PFBS	NA	2.00 E-02	130	1,300	NA	NA

132 Note:

133 ppm – parts per million



134 **Table 3 Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Soil Using USEPA's RSL Calculator for**  
 135 **Industrial/Commercial Receptor Scenario**

Chemical	Carcinogenic Slope Factor- Oral (SF) (mg/kg-day) <sup>-1</sup>	Non-Carcinogenic Reference Dose (RfD) (mg/kg-day)	Industrial/Commercial Composite Worker Screening Levels Calculated Using USEPA RSL Calculator			
			Soil (mg/kg or ppm)			
			HQ= 0.1	HQ= 1.0	ILCR= 1E-06	ILCR= 1E-04
PFOS	NA	2.00 E-05	1.6	16	NA	NA
PFOA	7.00 E-02	2.00 E-05	1.6	16	33	3,280
PFBS	NA	2.00 E-02	1,600	16,000	NA	NA

136

137 **2 INSTALLATION OVERVIEW**

138 Located in south-central Wisconsin within Sumpter and Merrimac Townships in Sauk County, BAAP was  
 139 constructed in 1942 to produce smokeless gunpowder and solid rocket propellant as munitions  
 140 components for World War II. The installation is located on the Sauk Prairie, between the Baraboo Range  
 141 and the Wisconsin River. The impoundment of the Wisconsin River forms Lake Wisconsin, which borders  
 142 the southeast side of BAAP.

143 Production of nitric acid, sulfuric acid, oleum (also known as fuming sulfuric acid), nitrocellulose, and  
 144 nitroglycerin occurred in support of munitions components production. Production periods were as follows:  
 145 World War II (1942 to 1945), Korean War (1951 to 1958), and the Vietnam Conflict (1966 to 1975).  
 146 Disposal of contaminants related to these historical operations occurred at two locations on-site: the  
 147 propellant burning ground (PBG) and the deterrent burning ground (DBG). Soil and groundwater at former  
 148 BAAP are impacted by contaminants associated with past munitions production and waste disposal  
 149 practices common at the time the facility was operational.

150 The primary land uses in the immediate vicinity of BAAP are agricultural, recreational, and residential.  
 151 Agriculture is the primary land use within and adjacent to the installation. Devil's Lake State Park, located  
 152 to the north of the installation, is used primarily for recreation. This area has not been impacted by past  
 153 activities at BAAP as it is located hydrologically upgradient of BAAP. Lake Wisconsin and the Wisconsin  
 154 River are located to the south and southeast of BAAP; several tributaries which flow across the installation  
 155 flow into Lake Wisconsin and the Wisconsin River.

156 BAAP is located within the Townships of Merrimac and Sumpter. The 2010 U.S. Census estimated the  
 157 Township of Sumpter population at 1,191 residents and the Township of Merrimac at 942 residents. As a  
 158 result of production and waste disposal practices common at the time, prior CERCLA investigations  
 159 revealed the soil and groundwater at BAAP were impacted with several constituents of concern.

160 Constituents of concern have been observed in numerous offsite private wells throughout the remedial  
161 history of BAAP and to date the Army has replaced seven of these wells under prior remedial actions.

### 162 **3 SUMMARY OF PA ACTIVITIES AND AREAS RESEARCHED**

163 The principal sources of information used to develop this PA/SI Report were personnel interviews (Joel  
164 Janssen with SpecPro and Verlyn Mueller at the Museum of Badger Army Ammunition) and records  
165 review. The records reviewed included, but were not limited to, various Installation Restoration Program  
166 administrative record documents, compliance documents, and geographic information system files.  
167 Internet searches were also conducted to identify publicly available and other relevant information. A list of  
168 the documents reviewed is provided in **Table 4**.

169 The areas evaluated for potential PFOS/PFOA/PFBS use, disposal, or storage at BAAP were further  
170 refined during the PA/SI process and categorized either as an AOPI or non-AOPI. Of these areas, eight  
171 have been identified as non-AOPIs and three have been identified as AOPIs.

#### 172 **3.1 Non-AOPIs**

173 Through the analysis of information obtained during records research, personnel interviews, and/or site  
174 reconnaissance, the areas described below were categorized as non-AOPIs. These areas were previously  
175 identified as potential PFOS/PFOA/PFBS sources (e.g., non-AFFF fire incidents, non-chromium plating  
176 activities, auto maintenance, wastewater and WWTPs, landfills) at BAAP. However, following site research  
177 conducted for this PA, PFOS/PFOA/PFBS storage, disposal, or use was not suspected for these areas. A  
178 description of the areas identified as non-AOPIs is presented below and summarized in **Table 5**.

- 179 • The Box Wash Repair consisted of two different sites constructed in the early 1940s used for  
180 material storage and maintenance (Olin Corporation 2004a). There is no evidence of  
181 PFOS/PFOA/PFBS containing products use at the Box Wash Repair area therefore, this area has  
182 been classified as a non-AOPI.
- 183 • The Lead Burning House was located in the support shops area of BAAP, east of the  
184 administration buildings. It was used to construct and maintain lead-coated floors and contained a  
185 smelting pot covered by an overhead exhaust system (Olin Corporation 2004b). There is no  
186 evidence that PFOS/PFOA/PFBS containing products were stored, used, or disposed of here  
187 therefore, this area has been classified as a non-AOPI.
- 188 • The DBG was located in the northeastern portion of BAAP and spanned seven acres. From 1940  
189 to 1960, the area was used for waste disposal and deterrent burning (ABB Environmental  
190 Services, Inc. 1993). There is no evidence that PFOS/PFOA/PFBS containing products were  
191 stored, used, or disposed of here. Burning activities also occurred prior to the known use of AFFF  
192 at Army installations therefore, this area has been classified as a non-AOPI.
- 193 • The Nitroglycerine Pond and Rocket Paste Area were located in the central portion of BAAP.  
194 These areas are hydraulically connected. The Nitroglycerine Pond was used for holding  
195 wastewater and the Rocket Paste Area was used for rocket paste operations (ABB Environmental  
196 Services, Inc. 1993). There is no evidence of storage, disposal, or use of PFOS/PFOA/PFBS  
197 containing products therefore, this area has been classified as a non-AOPI.

- 198 • The New Acid Area was located in the north-central portion of BAAP. An acid complex and  
199 wastewater lagoon were part of the New Acid Area from 1973 to 1986 (ABB Environmental  
200 Services, Inc. 1993). There is no evidence of storage, disposal, or use of PFOS/PFOA/PFBS  
201 containing products therefore, this area has been classified as a non-AOPI.
- 202 • The Oleum Plant and Oleum Plant Pond were created in 1942 and operated on and off until 1975.  
203 The Oleum Plant was used to make oleum, a concentrated sulfuric acid. Cooling water from  
204 operations here was discharged to the Oleum Plant Pond to the east of the Oleum Plant (ABB  
205 Environmental Services, Inc. 1993). There is no evidence of storage, disposal, or use of  
206 PFOS/PFOA/PFBS containing products therefore, this area has been classified as a non-AOPI.
- 207 • The Ballistics Pond was an unlined pond approximately 5 acres in area located in the  
208 northwestern corner of BAAP. The pond served as an evaporation and settling basin for removal  
209 of suspended solids from filter backwash water (ABB Environmental Services, Inc. 1993). There is  
210 no evidence of storage, disposal, or use of PFOS/PFOA/PFBS containing products therefore, this  
211 area has been classified as a non-AOPI.
- 212 • The Old Acid Area and Old Fuel Oil Tank areas were located in the northwestern section of BAAP.  
213 These areas were known for nitric and sulfuric acid manufacturing and handling and fuel oil  
214 storage tanks (ABB Environmental Services, Inc. 1993). There is no evidence of storage, disposal,  
215 or use of PFOS/PFOA/PFBS containing products therefore, this area has been classified as a  
216 non-AOPI.

### 217 3.2 AOPIs

218 Three AOPIs were identified during the PA process at BAAP: the Firefighter Training Area (FFTA), Landfill  
219 3646, and the PBG. A brief history of each AOPI is presented below and the drinking water conceptual site  
220 models (CSMs) for each AOPI are presented in **Attachment 1**. The AOPI locations are displayed on  
221 **Figure 1**.

- 222 • The FFTA consisted of two 10-foot by 10-foot fire training areas located in the northwestern  
223 portion of BAAP, southwest of Fire Station #1. While the operational timeframe of the FFTA is  
224 within the limits of AFFF use, it is unconfirmed to have been used at BAAP based on site  
225 knowledge and mission. The BAAP mission would not typically generate the potential for aircraft  
226 and fuel fires because no aircraft were stationed there, and no runway was present. Therefore, it  
227 is unlikely that the firefighters would have trained with AFFF. As part of the soil remedial action, in  
228 August 2011, both of these FFTA areas were excavated to a depth of four feet with the excavated  
229 soil transported to the on-site construction and demolition waste landfill (Landfill 3646) for disposal  
230 (SpecPro, Inc. 2011a and 2011b).
- 231 • Landfill 3646 is considered an AOPI due to the documented receipt of soil from the two 10-foot by  
232 10-foot by 4-foot areas at the FFTA (SpecPro, Inc. 2019). Because of the potential that the landfill  
233 might have received impacted soil if the FFTA was impacted with PFOS/PFOA/PFBS this site was  
234 carried forward as an AOPI.
- 235 • The PBG is located in the southwestern portion of the BAAP and encompasses 80 acres. The  
236 PBG consists of several distinct areas including the Contaminated Waste Area, 1949 Pit Area, the

237 Racetrack/Burning Ground, Landfill 1, and the Settling Ponds/Spoils Disposal Area (ABB  
238 Environmental Services, Inc. 1993).

## 239 **4 SUMMARY OF SI ACTIVITIES**

### 240 **4.1 Sampling Objective**

241 At the request of the Army, Arcadis U.S., Inc. (Arcadis) performed sampling at the selected areas with  
242 potential to have had storage, disposal, or use of PFOS/PFOA/PFBS containing products and which may  
243 pose a threat to human health through drinking water exposure. The objective of sampling at BAAP was to  
244 evaluate the presence or absence of PFOS/PFOA/PFBS in possible primary and secondary source areas.  
245 The following sections discuss how presence of PFOS/PFOA/PFBS was determined.

### 246 **4.2 Scope of Work Completed**

247 Locations and media types included as part of the sampling are:

- 248 • FFTA
  - 249 ○ Soil: 19 sampling intervals from 3 soil boring locations
- 250 • PBG Plume
  - 251 ○ Groundwater: 17 sample locations
  - 252 ○ Sediment: 3 sample locations
  - 253 ○ Surface Water: 3 sample locations

254 The focused sampling scope above was selected by the Army based on available information sources  
255 from previous and ongoing investigations, including layout descriptions of the locations within these areas  
256 with potential historical PFOS/PFOA/PFBS storage, disposal, or use, historical aerial photographs,  
257 existing site documentation made available for review, and verbal accounts/comments. No active  
258 monitoring wells exist close to the FFTA. In the Army's analysis of the documents received prior to the PA,  
259 it was determined that monitoring wells downgradient of the FFTA would be sufficient to identify any  
260 potential PFOS/PFOA/PFBS impacts that might exist due to the PFOS/PFOA/PFBS releases at the FFTA.  
261 If impacts were found, the intent was to add monitoring wells close to the FFTA to determine if FFTA was  
262 the source. Based on the sampling results, no additional wells were necessary.

263 Because Landfill 3646 received soil from a prior remedial action at the FFTA, no samples were collected  
264 at the landfill. If the data indicated the FFTA was a source, additional sampling at the landfill would have  
265 been added.

### 266 **4.3 Sampling Methodology and Data Analysis**

267 Environmental data was collected and analyzed in accordance with the Programmatic Uniform Federal  
268 Policy - Quality Assurance Project Plan (PQAPP; Arcadis 2018a); the standard operating procedures  
269 (SOPs) and technical guidance instructions (TGIs) included as Appendix A of the PQAPP; the quality  
270 assurance/quality control requirements identified in Worksheet #20 of the PQAPP; and the site-specific  
271 QAPP Addendum (Arcadis 2018b). The site-specific QAPP Addendum details the sampling rationale and

272 design for the sampling at BAAP. **Table 6** lists the coordinates and sampling interval(s) for each sampling  
273 location and media type.

274 The PQAPP and QAPP Addendum provide detailed procedures employed during the sampling event. In  
275 summary, groundwater samples were collected via high-volume purging methods from approximately the  
276 center of the saturated screened interval at existing monitoring wells. The high-volume purge method  
277 chosen for BAAP was a deviation from standard PFAS TGIs and was selected due to the presence of  
278 dedicated pumps and Teflon® lined tubing in the wells. Prior to sampling, each dedicated pump and tubing  
279 was removed and approximately 10 well volumes were purged from the wells. Soil samples were collected  
280 via rotary sonic drilling at three locations. Soil samples were collected at the 5 feet below ground surface  
281 (bgs) interval and every subsequent 15 feet until the water table was reached. Surface water samples  
282 were collected via direct-fill methods just below the water surface. Sediment samples were collected from  
283 the upper 10 centimeters using a Lexan™ tube and decanted before bottling for laboratory analysis. Field  
284 notes and field forms documenting sampling activities are included in **Attachments 2** and **3**, respectively.

285 The sampling methods described in the SOPs and TGIs establish equipment requirements, procedures for  
286 equipment and containers before sampling, sampling procedures under various conditions, and storing  
287 samples to ensure that sample contamination does not occur during collection, transport and analysis.  
288 Worksheet #20 of the PQAPP and the QAPP Addendum provide quality assurance/quality control  
289 requirements for field duplicate, matrix spike/matrix spike duplicate, equipment blank, field blank, and  
290 source blank sample collection. The following QA/QC samples were collected at BAAP during the  
291 sampling event:

- 292 • 5 field duplicates
- 293 • 5 matrix spike/matrix spike duplicates
- 294 • 8 equipment blanks (water level meter, hand auger, core barrel, three submersible pumps, and two  
295 dedicated pumps)
- 296 • 5 field blanks (laboratory-supplied water used in final decontamination step)
- 297 • 1 source blank (water used in initial decontamination step)

298 Groundwater and surface water samples were analyzed for 18 PFAS constituents (including  
299 PFOS/PFOA/PFBS) as listed in Worksheet #18 of the PQAPP (Arcadis 2018a), and field parameters  
300 (temperature, pH, conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential) were  
301 measured during sampling to support the interpretation of analytical data. Soil and sediment samples were  
302 analyzed for 18 PFAS constituents (including PFOS/PFOA/PFBS) as listed in Worksheet #18 of the  
303 PQAPP (Arcadis 2018a). Total organic carbon, pH, and grain size; soil and sediment descriptions were  
304 also logged during sample collection.

305 Samples collected during the sampling for BAAP were analyzed by Eurofins Lancaster Laboratories  
306 Environmental, a Department of Defense Environmental Laboratory Accreditation Program-certified  
307 laboratory. All laboratory analyses associated with this PA/SI were completed in accordance with  
308 Worksheets #12.1 through 12.5 in the PQAPP via the methods below:

- 309 • PFAS constituents: Modified USEPA Method 537, following Quality Systems Manual 5.1.1, Table B-15
- 310 • Total organic carbon by SW846 9060A

311 • Grain size analysis by American Society for Testing and Materials D422-63

312 • pH by SW846 9045D

313 All laboratory analytical data generated during the sampling event were verified and validated in  
314 accordance with the Data Verification Procedures described in Worksheets #34 through #36 of the  
315 PQAPP. A Data Usability Assessment, that reviews precision, accuracy, completeness,  
316 representativeness, comparability, and sensitivity, was performed by the project chemist and documented  
317 in a Data Usability Summary Report (**Attachment 4**). Based on the Data Quality Assessment, most of the  
318 reported results are acceptable for use with the appropriate validation qualifiers. Minor deviations for some  
319 individual sample results for n-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) and n-methyl  
320 perfluorooctanesulfonamidoacetic acid (NMeFOSAA) were identified in the Data Quality Assessment, but  
321 the overall data quality of the samples collected are within the guidelines established by the PQAPP and  
322 QAPP Addendum. Validation qualifiers were added to the project database, and all validated laboratory  
323 analytical results are included in **Attachment 5**.

## 324 4.4 Sampling Results

325 The discussion of analytical results below is focused on results for PFOS/PFOA/PFBS. Analytical results  
326 for all 18 PFAS constituents, total organic carbon, grain size analysis, and pH are provided in **Attachment**  
327 **5. Figures 2** through **4** show the PFOS/PFOA/PFBS analytical results for groundwater, soil, surface water  
328 and sediment. Detected concentrations of PFAS greater than the limits of detection (LODs) (i.e., PFAS are  
329 present) are bolded in summary tables and on figures for the sampled media. Detections of  
330 PFOS/PFOA/PFBS greater than the OSD risk screening levels and/or the USEPA LHA are highlighted in  
331 summary tables and on figures. The RSLs for PFOS/PFOA/PFBS are specific to the current and expected  
332 future land use scenario noted for each AOPI (i.e., residential or industrial [**Table 1, Table 2**]) (OSD 2019).  
333 The expected land use at former BAAP is industrial/commercial. Final qualifiers applied to the data by the  
334 laboratory and the Arcadis project chemist are presented on the analytical tables. Groundwater and  
335 surface water data collected during the SI are reported in ng/L, or ppt, and soil and sediment data are  
336 reported in mg/kg, or ppm.

### 337 4.4.1 Groundwater

338 Groundwater PFOS/PFOA/PFBS analytical results are summarized in **Table 7** and are shown on **Figure**  
339 **2**. Field parameters measured during low-flow purging and collection of groundwater samples are  
340 recorded on the field forms in **Attachment 3**.

341 Seventeen monitoring wells throughout the PBG were sampled for PFAS in August/September 2018.  
342 Some detections of PFOS and PFOA were observed, however there were no exceedances of OSD risk  
343 screening levels. Of the samples taken, nine resulted in no detection, which means they were lower than  
344 the level the equipment could see. The largest detection was at PBGP-PBN-9303D which had a combined  
345 PFOS/PFOA concentration of 19.5 ppt. PFBS was not detected above the LOD in any groundwater  
346 sample.

#### 347 4.4.2 Soil

348 Soil PFOS/PFOA/PFBS analytical results are summarized in **Table 8** and are shown on **Figure 3**. Soil  
349 lithologic descriptions are recorded on the field forms in **Attachment 3**.

350 In summary, there were 3 soil borings advanced up to 84 feet bgs at the FFTA with samples collected  
351 every 15 feet. Of PFOS/PFOA/PFBS, PFOA was the only one detected above the LOD. Soil boring FFTA-  
352 SN-1 exhibited PFOA concentrations above the LOD at 50 feet bgs, 65 feet bgs, and 84 feet bgs. The  
353 maximum soil PFOA concentration observed at FFTA-SN-1 was 0.005 mg/kg at 84 feet bgs. Soil boring  
354 FFTA-SN-2 exhibited PFOA concentrations above the LOD at 35 feet bgs and 80 feet bgs. The maximum  
355 soil concentration PFOA concentration observed at FFTA-SN-2 was 0.0011 mg/kg at the 35 feet bgs  
356 interval. Soil boring FFTA-SN-3 exhibited PFOA concentrations above the LOD at the 80 feet bgs interval  
357 with a concentration of 0.0013 mg/kg. All results were below the residential scenario screening levels of  
358 7.8 mg/kg calculated using the USEPA RSL calculator. Therefore, the soil is not considered a  
359 PFOS/PFOA source.

#### 360 4.4.3 Surface Water

361 Surface water PFOS/PFOA/PFBS analytical results are summarized in **Table 9** and are shown on **Figure**  
362 **4**. Field parameters measured concurrent with the collection of surface water samples are recorded on the  
363 field forms in **Attachment 3**.

364 In summary, no surface water samples collected exhibited PFOS/PFOA/PFBS concentrations greater than  
365 the LOD.

#### 366 4.4.4 Sediment

367 Sediment PFOS/PFOA/PFBS analytical results are summarized in **Table 10** and are shown on **Figure 4**.  
368 Sediment lithologic descriptions are recorded on the field forms in **Attachment 3**.

369 In summary, no sediment samples collected exhibited PFOS/PFOA/PFBS concentrations greater than the  
370 LOD.

## 371 5 DATA LIMITATIONS

372 Soil excavation with disposal to the on-site Landfill 3646 as a remedial action at the FFTA was  
373 documented in 2011. Landfill 3646 has a known source of soil from the FFTA. However, based on the  
374 analytical results from the FFTA, the FFTA is not being carried forward as a PFOS/PFOA/PFBS source.  
375 Therefore, the excavated shallow soil from the 2011 remedial actions should not contain  
376 PFOS/PFOA/PFBS which eliminates Landfill 3646 as an AOPI.

377 Potential off-post PFAS sources were not identified during this PA/SI however, an exhaustive search to  
378 identify all potential off-post PFAS sources (i.e., not related to operations at the BAAP sub-installations) is  
379 not part of this PA/SI. The search is limited to areas that were identified during relevant document  
380 research and installation personnel interviews.

381 Lastly, the potential for human exposure to PFAS through non-drinking water pathways has not yet been  
382 established and may be evaluated at a future date, if it has been determined that those pathways warrant

383 further consideration. The CSMs presented in **Attachment 1** focus on the potential for human exposure  
384 through ingestion of groundwater or surface water that is used, or realistically could be used in the future,  
385 as a source of potable water. Potential human exposures through other environmental media (e.g.,  
386 soil/airborne dust, sediment, aquatic biota) are not evaluated.

## 387 **6 CONCLUSIONS**

388 BAAP does not appear to be a significant source of PFAS contamination in groundwater, soil, sediment, or  
389 surface water. Three AOPIs were identified at BAAP during the PA; prior to finalizing the list of AOPIs at  
390 BAAP, sampling was conducted at the FFTA and PBG AOPIs during August/September 2018. Limited  
391 PFAS detections were observed in soil and groundwater. The results of this investigation indicated the  
392 highest concentration in soil was from location FFTA-SN-1 with a PFOA concentration of 0.005 mg/kg and  
393 the highest concentration in groundwater was found at monitoring well PBGP-PBN-9303D with a  
394 combined PFOS/PFOA concentration of 19.5 ppt. There were no detections of PFOS/PFOA/PFBS in  
395 sediment or surface water above the LOD and there were limited detections in soil at depths greater than  
396 35 feet. All samples collected were below OSD risk screening levels. No further action is recommended at  
397 this time.

## 398 **7 REFERENCES**

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408 [content/uploads/2017/11/pfas fact sheet history and use 11 13 17.pdf](https://pfas-1.itrcweb.org/wp-content/uploads/2017/11/pfas_fact_sheet_history_and_use_11_13_17.pdf).
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Badger Army Ammunition Plant, Sauk County, Wisconsin

- 415 Olin 2004b. Site Assessment Report, Lead Burning House, Follow-Up Remedial Investigation Phase 2.  
416           September.
- 417 Olin 2004c. Site Assessment Report, Fire Training Area. January

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## Tables

Document Location	Area	Document Date	Document Name	Author	Description of Information
AR	Former Fire Fighting Training Area	6/27/2011	Former Fire Training Areas Remedial Investigation Report	SpecPro, Inc	Soil sampling and recommendations summary
AR	Former Fire Fighting Training Area	September 2011	Former Fire Training Areas Remedial Actions Report	SpecPro, Inc	Soil excavation summary
AR	Former Fire Fighting Training Area	January 2004	Site Assessment Report Fire Training Area Follow-Up Remedial Investigation	Olin Corporation	General site history and soil investigation summary
AR	Deterrent Burning Ground, Propellant Burning Ground, Nitroglycerine Pond, Rocket Paste Area, New Acid Area, Oleum Plant and Oleum Plant Pond, Ballistics Pond, Old Acid Area and Old Fuel Tank Area	April 1993	Final Remedial Investigation Report Volume I & II	ABB Environmental Services, Inc	General Site History
AR	Propellant Burning Ground	3/17/2008	Final Alternative Feasibility Study Propellant Burning Ground Waste Pits Subsurface Soil	Shaw Environmental, Inc.	Soil contamination and remedial actions summary
AR	Lead Burning House	January 2004	Site Assessment Report Lead Burning House	Olin Corporation	General site history and soil investigation summary
AR	Lead Burning House	May 2010	Parcel R Lead Burning House Remediation Report	SpecPro, Inc	General site history and soil investigation summary
AR	Box Wash Repair Site	September 2007	Soil Remediation Summary Report Box Wash Repair Site	SpecPro, Inc	General site history and soil investigation summary
AR	Box Wash Repair Site	September 2004	Site Assessment Report Box Wash Repair, Follow-Up Remedial Investigation Phase 2	Olin Corporation	General site history and vapor investigation summary
AR	Propellant Burning Ground, Settling Ponds	5/5/1981	Design Report for the Badger Army Ammunition Plant Site Burning Grounds	R.F. Sarko and Associates, Inc.	General site history and hydrogeology and sampling investigation
AR	Propellant Burning Ground	3/17/2008	Final Determination of Remedy for Propellant Burning Ground Waste Pits Subsurface Soil Letter	WDNR	Summary of remedial action
AR	Propellant Burning Ground	7/15/1998	Waste Pile Disposal Final Report and Letter	Department of the Army	Soil excavation disposal summary
AR	Propellant Burning Ground	August 1995	Propellant Contaminated Soils Stored in Magazines	Olin Corporation	General site history and feasibility study
AR	Propellant Burning Ground	11/22/2002	Racetrack Area Soils Investigation Report Propellant Burning Ground	Stone & Webster, Inc	General site history and site investigation summary
AR	Propellant Burning Ground	2/14/2003	Technical Report Pilot-Scale Treatability Study and Biologically Enhanced Subsurface Treatment System Propellant Burning Ground	Stone & Webster, Inc	On-site water treatment system summary
AR	Lead Burning House	May 2010	Site Assessment Report Follow-Up Remedial Investigation Phase 3 - Lead Burning House	SpecPro, Inc	General site history and soil investigation summary
AR	Lead Burning House	September 2004	Site Assessment Report Lead Burning House Phase 2	Olin Corporation	General site history and soil investigation summary
AR	Lead Burning House	7/15/2010	Final Case Closure for BAAP Lead Burning House Letter	WDNR	Site closure acceptance letter
AR	Box Wash Repair	9/10/2007	Soil Remediation Summary Report Box Wash Repair Site	SpecPro, Inc	Soil investigation and remediation summary
AR	Box Wash Repair	9/30/2004	Site Assessment Report Box Wash Repair, Follow-Up Remedial Investigation Phase 2	Olin Corporation	Vapor sampling investigation summary
AR	Box Wash Repair	9/9/2005	Subsurface Soil Investigation Report, Box Wash Repair Area Draft	Shaw Environmental, Inc.	Soil investigation summary
AR	Deterrent Burning Ground, Propellant Burning Ground	12/15/2011	Revised Alternative Feasibility Study Groundwater Remedial Strategy Badger Army Ammunition Plant	SpecPro, Inc	General site history and groundwater investigation and remediation summary
AR	Deterrent Burning Ground, Propellant Burning Ground	1/16/2019	Documentation of Annual Maintenance Activities 2018	Department of the Army	General site history and annual maintenance summary
AR	Landfill 3646	8/26/2019	Email	SpecPro, Inc	General site summary

**Acronyms:**

AR - administrative record  
 BAAP - Badger Army Ammunition Plant  
 FY - fiscal year  
 NA - not available  
 PFAS - per- and polyfluoroalkyl substances  
 US - United States  
 WDNR - Wisconsin Department of Natural Resources

Non-AOPI	Dates Of Relevant Release and/or Operation	Relevant Site History	Is there a potential release?	Is there a potential drinking water receptor?	Reason Eliminated
Box Wash Repair	Early 1940s - 2007	The Box Wash Repair consisted of two different sites constructed in the early 1940's. One site supported nitrocellulose production and housed a variety of materials including paints, cleaners, strippable lacquer, and explosives. The second site supported Ball Powder® production and conducted activities related to maintenance and repair of boxes containing powder. Both buildings' floors drained to sewer pipes with an outfall in grass-lined ditches (Olin Corporation 2004).	No	No	No evidence of PFAS containing products
Lead Burning House	unknown	The Lead Burning House was located in the support shops area of BAAP, east of the administration buildings. It was used to construct and maintain lead-coated floors and contained a smelting pot covered by an overhead exhaust system (Olin Corporation 2004).	No	No	No indication of AFFF use during burning
Deterrent Burning Ground	1940s-1970s	The Deterrent Burning Ground was located in the northeastern portion of BAAP and spanned seven acres. From 1940-1960, the area was used as a sand borrow pit and a waste disposal site and contained three burn areas within a man-made depression approximately 3 acres across and 20 feet deep. Deterrent was burned in open-topped metal tanks, along with debris such as timbers, shingles, cardboard, paper, and office waste (ABB Environmental Services, Inc. 1993).	No	No	Burning activities were conducted from 1940-1960, before the use of AFFF began
Nitroglycerine Pond and Rocket Paste Area	unknown	The Nitroglycerine Pond is a small, unlined basin, approximately 160,000square feet in an area with a maximum depth of three to five feet. The pond was used to hold cooling water and process wastewaters generated during manufacturing processes at BAAP. The Rocket Paste Area was located in the central portion of BAAP, immediately to the south of the Nitroglycerine Pond. Before and after World War II, the Rocket Paste Area contained numerous facilities for blending, milling, and drying rocket paste. The Rocket Paste Area and Nitroglycerine Pond are hydraulically connected via various drainage ditches (ABB Environmental Services, Inc. 1993).	No	No	No evidence of release
New Acid Area	1973-1986	The New Acid Area was located in the north-central portion of BAAP. An acid complex and wastewater lagoon were part of the New Acid Area from 1973 to 1986 (ABB Environmental Services, Inc. 1993).	No	No	No evidence of release
Oleum Plant and Oleum Plant Pond	1942-1975	The Oleum Plant was created in 1942 and operated on and off until 1975. The Oleum Plant was used to make oleum, a concentrated sulfuric acid. Cooling water from operations here was discharged to the Oleum Plant Pond to the east of the Oleum Plant (ABB Environmental Services, Inc. 1993).	No	No	No evidence of release
Ballistics Pond	unknown	The Ballistics Pond is an unlined pond approximately 5 acres in area located in the northwestern corner of BAAP. The pond collected natural drainage water before 1941 and filter backwash water from the water filtration plant after 1971. The pond served as an evaporation and settling basin for removal of suspended solids from filter backwash water (ABB Environmental Services, Inc. 1993).	No	No	No evidence of release
Old Acid Area and Old Fuel Oil Tank Area	unknown	The Old Acid Area and Old Fuel Oil Tank areas are located in the northwestern section of BAAP. These areas were known for nitric and sulfuric acid manufacturing and handling and fuel oil storage tanks (ABB Environmental Services, Inc. 1993).	No	No	No evidence of release

**Acronyms:**

AFFF - aqueous film-forming foam

BAAP - Badger Army Ammunition Plant

Media	Location ID	Sample ID	Latitude	Longitude	Sampling Depth (ft bgs)
GW	PBGP-PBM-8201	BAAP-PBGP-PBM-8201	43°20'52.83895"N	89°45'05.91261"W	80.7 - 100.7
	PBGP-PBM-8203	BAAP-PBGP-PBM-8203	43°20'46.60170"N	89°45'03.06269"W	188.8 - 108.8
	PBGP-PBN-8201A	BAAP-PBGP-PBN-8201A	43°20'59.56657"N	89°44'53.39217"W	107.8 - 117.8
	PBGP-PBN-8201B	BAAP-PBGP-PBN-8201B	43°20'59.55003"N	89°44'53.56052"W	129.5 - 131.5
	PBGP-PBN-8201C	BAAP-PBGP-PBN-8201C	43°20'59.64663"N	89°44'53.46875"W	139 - 141
	PBGP-PBN-8205A	BAAP-PBGP-PBN-8205A	43°20'42.20060"N	89°44'56.43902"W	102.5 - 112.5
	PBGP-PBN-8205B	BAAP-PBGP-PBN-8205B	43°20'42.28361"N	89°44'56.57573"W	122.3 - 124.3
	PBGP-PBN-8205C	BAAP-PBGP-PBN-8205C	43°20'42.15583"N	89°44'56.59623"W	131.5 - 133.5
	PBGP-PBN-9301B	BAAP-PBGP-PBN-9301B	43°20'32.57358"N	89°44'33.03883"W	150.5 - 160.5
	PBGP-PBN-9301C	BAAP-PBGP-PBN-9301C	43°20'32.45616"N	89°44'32.87788"W	217.5 - 227.5
	PBGP-PBN-9303B	BAAP-PBGP-PBN-9303B	43°20'00.55991"N	89°44'33.84184"W	83.5 - 93.5
	PBGP-PBN-9303C	BAAP-PBGP-PBN-9303C	43°20'00.58885"N	89°44'33.51474"W	154.5 - 164.5
	PBGP-PBN-9303D	BAAP-PBGP-PBN-9303D	43°20'00.59389"N	89°44'33.22446"W	214.5 - 224.5
	PBGP-PBN-1302A	BAAP-PBGP-PBN-1302A	43°19'46.56519"N	89°44'40.45540"W	69.7 - 84.7
	PBGP-PBN-1302B	BAAP-PBGP-PBN-1302B	43°19'46.56685"N	89°44'40.54912"W	131.2 - 136.2
PBGP-PBN-1302C	BAAP-PBGP-PBN-1302C	43°19'46.56634"N	89°44'40.62035"W	182.6 - 187.6	
PBGP-PBN-1302D	BAAP-PBGP-PBN-1302D	43°19'46.56835"N	89°44'40.70578"W	240.1 - 245.1	
SO	FFTA-SN-1	BAAP-FFTA-SN-1-5.0-SO	43° 22' 7.845" N	89° 45' 42.451" W	5
		BAAP-FFTA-SN-1-20-SO			20
		BAAP-FFTA-SN-1-35-SO			35
		BAAP-FFTA-SN-1-50-SO			50
		BAAP-FFTA-SN-1-65-SO			65
		BAAP-FFTA-SN-1-80-SO			80
		BAAP-FFTA-SN-1-WT84-SO			84
	FFTA-SN-2	BAAP-FFTA-SN-2-5.0-SO	43° 22' 7.328" N	89° 45' 41.930" W	5
		BAAP-FFTA-SN-2-20-SO			20
		BAAP-FFTA-SN-2-35-SO			35
		BAAP-FFTA-SN-2-50-SO			50
		BAAP-FFTA-SN-2-65-SO			65
		BAAP-FFTA-SN-2-WT80-SO			80
	FFTA-SN-3	BAAP-FFTA-SN-3-5.0-SO	43° 22' 6.972" N	89° 45' 41.236" W	5
		BAAP-FFTA-SN-3-20-SO			20
		BAAP-FFTA-SN-3-35-SO			35
		BAAP-FFTA-SN-3-50-SO			50
		BAAP-FFTA-SN-3-65-SO			65
BAAP-FFTA-SN-3-WT80-SO		80			

Media	Location ID	Sample ID	Latitude	Longitude	Sampling Depth (ft bgs)
SW	POND-1	BAAP-POND-1-SW	43° 19' 49.300" N	89° 44' 51.602" W	0 - .5
	POND-2	BAAP-POND-2-SW	43° 19' 49.214" N	89° 44' 51.441" W	0 - .5
	POND-3	BAAP-POND-3-SW	43° 19' 48.807" N	89° 44' 51.336" W	0 - .5
SE	POND-1	BAAP-POND-1-SE	43° 19' 49.300" N	89° 44' 51.602" W	0 - 10 cm
	POND-2	BAAP-POND-2-SE	43° 19' 49.214" N	89° 44' 51.441" W	0 - 10 cm
	POND-3	BAAP-POND-3-SE	43° 19' 48.807" N	89° 44' 51.336" W	0 - 10 cm

**Notes and Acronyms:**

BAAP - Badger Army Ammunition Plant

cm - centimeter

FFTA -Former Firefighting Training Area

ft bgs - feet below ground surface

GW - groundwater

PBGp - Propellant Burning Ground Plume

SE - sediment

SN - sonic drilling

SO - soil

SW - surface Water

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Table 7 - Groundwater PFOS/PFOA/PFBS Analytical Results

Badger Army Ammunition Plant, Wisconsin

USACE PFAS Preliminary Assessment/Site Inspection

Location					PBG-PBM-8201		PBG-PBN-1302A		PBG-PBN-1302B		PBG-PBN-1302C		PBG-PBN-1302D		PBG-PBN-8201A	
Sample/Parent ID					BAAP-PBGP-PBM-8201		BAAP-PBGP-PBN-1302A		BAAP-PBGP-PBN-1302B		BAAP-PBGP-PBN-1302C		BAAP-PBGP-PBN-1302D		BAAP-PBGP-PBN-8201A	
Sample Date					09/05/2018		08/31/2018		08/31/2018		09/04/2018		08/31/2018		08/29/2018	
Sample Type					N		N		N		N		N		N	
Matrix					Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.91	U	1.4	U	0.94	U	0.98	U	1.4	U	0.93	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	0.99	U	1.5	U	<b>3.4</b>		1.1	U	1.5	U	<b>1.3</b>	J
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	0.99	U	1.5	U	<b>1.2</b>	J	<b>3.5</b>		1.5	U	1.0	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

Shaded = Value exceeds HAL

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

PBGP = Propellant Buring Ground Plume

Qual = qualifier

-- = Not Applicable

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.



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Table 7 - Groundwater PFOS/PFOA/PFBS Analytical Results  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS Preliminary Assessment/Site Inspection

Location					PBGP-PBN-8201B		PBGP-PBN-8201C		PBGP-PBN-8205B		PBGP-PBN-9301B		PBGP-PBN-9301C		PBGP-PBN-9303B	
Sample/Parent ID					BAAP-PBGP-PBN-8201B		BAAP-PBGP-PBN-8201C		BAAP-PBGP-PBN-8205B		BAAP-PBGP-PBN-9301B		BAAP-PBGP-PBN-9301C		BAAP-PBGP-PBN-9303B	
Sample Date					08/29/2018		08/28/2018		08/29/2018		09/04/2018		09/04/2018		09/05/2018	
Sample Type					N		N		N		N		N		N	
Matrix					Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.99	U	1.0	U	0.93	U	0.93	U	0.93	U	0.96	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	1.1	U	1.1	U	1.0	U	1.0	U	<b>1.6</b>	J	1.1	U
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	<b>1.6</b>	J	1.1	U	1.0	U	1.0	U	<b>2.0</b>		<b>1.2</b>	J

Notes:  
 When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:  
 BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
 Shaded = Value exceeds HAL  
 CAS = Chemical Abstracts Service number  
 FD = field duplicate sample  
 ID = identification  
 N = primary sample  
 ng/L = nanograms per liter  
 % = percent  
 PBGP = Propellant Buring Ground Plume  
 Qual = qualifier  
 -- = Not Applicable

Qualifier:  
 J = The analyte was positively identified; however the associated numerical value is an estimated concentration only  
 U = The analyte was analyzed for but the result was not detected above the method detection limit.

DRAFT FINAL

Table 7 - Groundwater PFOS/PFOA/PFBS Analytical Results  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS Preliminary Assessment/Site Inspection

Location					PBG-PBN-9303C		PBG-PBN-9303D		PGB-PGM-8203		PGB-PGM-8203		PGB-PGN-8205A		PGB-PGN-8205C	
Sample/Parent ID					BAAP-PBGP-PBN-9303C		BAAP-PBGP-PBN-9303D		BAAP-PBGP-PBM-8203		BAAP-FD-GW-083018FD / BAAP-PBGP-PBM-8203		BAAP-PBGP-PBN-8205A		BAAP-PBGP-PBN-8205C	
Sample Date					09/05/2018		09/05/2018		08/30/2018		08/30/2018		08/30/2018		08/30/2018	
Sample Type					N		N		N		FD		N		N	
Matrix					Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.98	U	1.4	U	0.95	U	0.99	U	0.96	U	1.1	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	<b>7.8</b>		<b>14</b>		1.0	U	<b>1.5</b>	J	1.1	U	<b>2.2</b>	
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	<b>3.8</b>		<b>5.5</b>		1.0	U	1.1	U	1.1	U	<b>2.8</b>	

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

- BAAP = Badger Army Ammunition Plant
- Bold = Detected result above the level of detection**
- Shaded = Value exceeds HAL
- CAS = Chemical Abstracts Service number
- FD = field duplicate sample
- ID = identification
- N = primary sample
- ng/L = nanograms per liter
- % = percent
- PBGP = Propellant Buring Ground Plume
- Qual = qualifier
- = Not Applicable

Qualifier:

- J = The analyte was positively identified; however the associated numerical value is an estimated concentration only
- U = The analyte was analyzed for but the result was not detected above the method detection limit.

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Table 8 - Soil PFOS/PFOA/PFBS  
Badger Army Ammunition Plant,  
USACE PFAS Preliminary

Location					FFTA-SN-01		FFTA-SN-01		FFTA-SN-01		FFTA-SN-01		FFTA-SN-01		FFTA-SN-01	
Sample/Parent ID					BAAP-FFTA-SN-1-20-SO		BAAP-FFTA-SN-1-35-SO		BAAP-FFTA-SN-1-5.0-SO		BAAP-FFTA-SN-1-50-SO		BAAP-FFTA-SN-1-65-SO		BAAP-FFTA-SN-1-80-SO	
Depth (feet below ground surface)					20		35		5		50		65		80	
Sample Date					08/28/2018		08/28/2018		08/28/2018		08/28/2018		08/28/2018		08/29/2018	
Sample Type					N		N		N		N		N		N	
Matrix					Soil		Soil		Soil		Soil		Soil		Soil	
Analyte	CAS	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1600	16000	mg/kg	0.0006	U	0.00059	U	0.00068	U	0.00061	U	0.00057	U	0.00056	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.6	16	mg/kg	0.00065	U	0.00064	U	0.00074	U	0.00066	U	0.00061	U	0.00061	U
Perfluorooctanoic acid (PFOA)	335-67-1	1.6	16	mg/kg	0.00068	U	0.00067	U	0.00078	U	<b>0.0011</b>		<b>0.0011</b>		0.00063	U

Notes:  
When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0).  
When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:  
AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:  
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

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Table 8 - Soil PFOS/PFOA/PFBS  
Badger Army Ammunition Plant,  
USACE PFAS Preliminary

Location					FFTA-SN-01		FFTA-SN-01		FFTA-SN-02		FFTA-SN-02		FFTA-SN-02		FFTA-SN-02	
Sample/Parent ID					BAAP-FFTA-SN-1-WT84-SO		BAAP-FD-SO-082818FD / BAAP-FFTA-SN-1-50-SO		BAAP-FFTA-SN-2-20-SO		BAAP-FFTA-SN-2-35-SO		BAAP-FFTA-SN-2-5.0-SO		BAAP-FFTA-SN-2-50-SO	
Depth (feet below ground surface)					84		50		20		35		5		50	
Sample Date					08/29/2018		08/28/2018		08/29/2018		08/29/2018		08/29/2018		08/29/2018	
Sample Type					N		FD		N		N		N		N	
Matrix					Soil		Soil		Soil		Soil		Soil		Soil	
Analyte	CAS	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1600	16000	mg/kg	0.0006	U	0.00057	U	0.00057	U	0.00057	U	0.00065	U	0.00062	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.6	16	mg/kg	0.00065	U	0.00062	U	0.00062	U	0.00062	U	0.00071	U	0.00067	U
Perfluorooctanoic acid (PFOA)	335-67-1	1.6	16	mg/kg	<b>0.005</b>		<b>0.0025</b>		0.00065	U	<b>0.0011</b>		0.00074	U	0.0007	U

Notes:  
When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0).  
When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:  
AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:  
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

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Table 8 - Soil PFOS/PFOA/PFBS  
Badger Army Ammunition Plant,  
USACE PFAS Preliminary

Location					FFTA-SN-02		FFTA-SN-02		FFTA-SN-02		FFTA-SN-03		FFTA-SN-03		FFTA-SN-03	
Sample/Parent ID					BAAP-FFTA-SN-2-65-SO		BAAP-FFTA-SN-2-WT80-SO		BAAP-FD-SO-082918FD / BAAP-FFTA-SN-3-20-SO		BAAP-FFTA-SN-3-20-SO		BAAP-FFTA-SN-3-35-SO		BAAP-FFTA-SN-3-5.0-SO	
Depth (feet below ground surface)					65		80		20		20		35		5	
Sample Date					08/29/2018		08/29/2018		08/29/2018		08/29/2018		08/29/2018		08/29/2018	
Sample Type					N		N		FD		N		N		N	
Matrix					Soil		Soil		Soil		Soil		Soil		Soil	
Analyte	CAS	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1600	16000	mg/kg	0.00057	U	0.00059	U	0.00058	U	0.00058	U	0.00061	U	0.00069	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.6	16	mg/kg	0.00061	U	0.00063	U	0.00063	U	0.00063	U	0.00067	U	0.00075	U
Perfluorooctanoic acid (PFOA)	335-67-1	1.6	16	mg/kg	0.00064	U	<b>0.00067</b>	J	0.00066	U	0.00066	U	0.0007	U	0.00078	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0).  
When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

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Table 8 - Soil PFOS/PFOA/PFBS  
Badger Army Ammunition Plant,  
USACE PFAS Preliminary

Location					FFTA-SN-03		FFTA-SN-03		FFTA-SN-03	
Sample/Parent ID					BAAP-FFTA-SN-3-50-SO		BAAP-FFTA-SN-3-65-SO		BAAP-FFTA-SN-3-WT80-SO	
Depth (feet below ground surface)					50		65		80	
Sample Date					08/30/2018		08/30/2018		08/30/2018	
Sample Type					N		N		N	
Matrix					Soil		Soil		Soil	
Analyte	CAS	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1600	16000	mg/kg	0.00062	U	0.00059	U	0.00061	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.6	16	mg/kg	0.00067	U	0.00064	U	0.00066	U
Perfluorooctanoic acid (PFOA)	335-67-1	1.6	16	mg/kg	0.0007	U	0.00067	U	<b>0.0013</b>	

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0).  
When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

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Table 9 - Surface Water PFOS/PFOA/PFBS Analytical Results

Badger Army Ammunition Plant, Wisconsin

USACE PFAS Preliminary Assessment/Site Inspection

Location					POND-1		POND-1		POND-2		POND-3	
Sample/Parent ID					BAAP-POND-1-SW		BAAP-FD-SW-090618FD / BAAP-POND-1-SW		BAAP-POND-2-SW		BAAP-POND-3-SW	
Sample Date					09/06/2018		09/06/2018		09/06/2018		09/06/2018	
Sample Type					N		FD		N		N	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	5.4	U	5.5	U	5.5	U	5.4	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	5.9	U	<b>6.1</b>	J	6.0	U	5.9	U
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	5.9	U	6.0	U	6.0	U	5.9	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

Qual = qualifier

-- = Not Applicable

SW = surface water

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.

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Table 10 - Sediment PFOS/PFOA/PFBS Analytical Results

Badger Army Ammunition Plant, Wisconsin

USACE PFAS Preliminary Assessment/Site Inspection

Location					POND-1		POND-2		POND-3		POND-3	
Sample/Parent ID					BAAP-POND-1-SE		BAAP-POND-2-SE		BAAP-POND-3-SE		BAAP-FD-SE-090618FD / BAAP-POND-3-SE	
Sample Date					09/06/2018		09/06/2018		09/06/2018		09/06/2018	
Sample Type					N		N		N		FD	
Matrix					Sediment		Sediment		Sediment		Sediment	
Analyte	CAS	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1600	16000	mg/kg	0.0011	U	0.0011	U	0.0013	U	0.0012	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.6	16	mg/kg	0.0012	U	0.0012	U	0.0014	U	0.0013	U
Perfluorooctanoic acid (PFOA)	335-67-1	1.6	16	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest

**Bold = Detected result above the level of detection**

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

mg/kg = micrograms per kilogram

N = primary sample

% = percent

Qual = qualifier

-- = Not Applicable

SE = sediment

Qualifier:

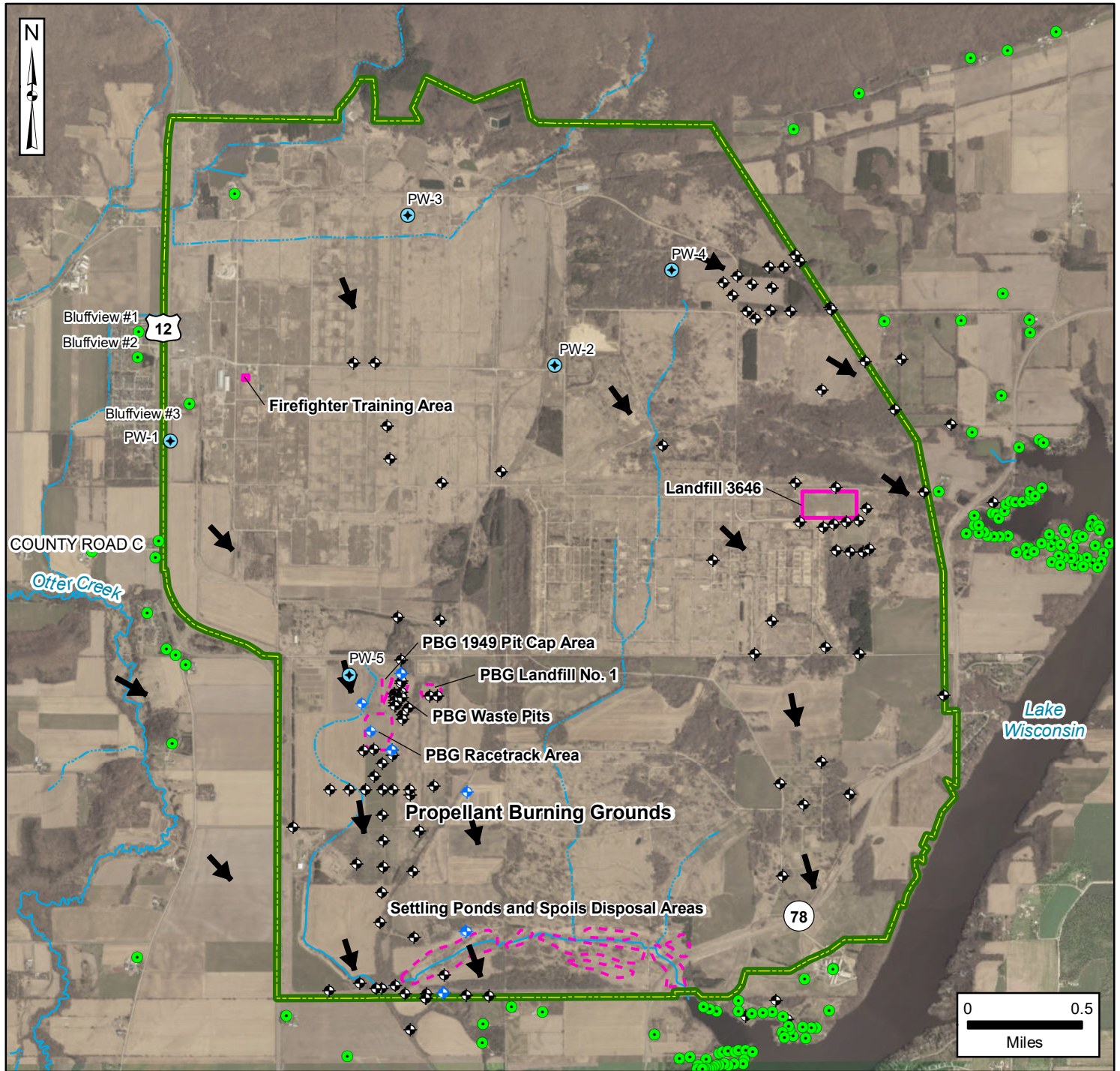
U = The analyte was analyzed for but the result was not detected above the method detection limit.




## Figures



**Figure 1**  
**Site Features Map**




 Installation Boundary


 AOPI

 Area within the Propellant Burning Grounds

 River/Stream (Perennial)

 Stream (Intermittent)

 Groundwater Flow Direction

 Production Well

 Residential Well

 Monitoring Well

 Monitoring Well Sampled in 2018

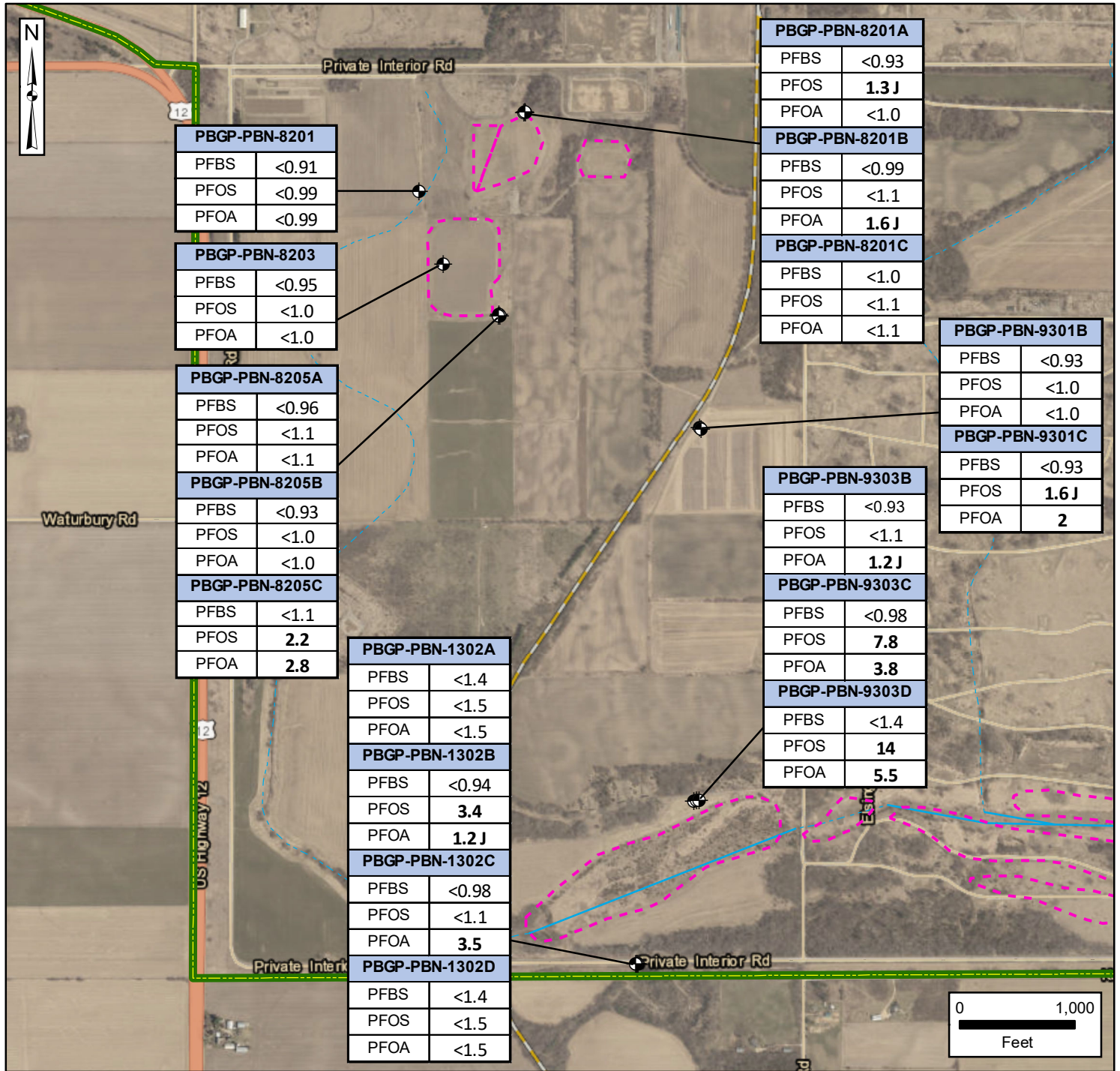
AOPI = area of potential interest  
 PBG = propellant burning ground

Data Sources:  
 ESRI ArcGIS Online, Aerial Imagery

Coordinate System:  
 NAD 1983, Wisconsin State Plane South



**Figure 2**  
**Groundwater PFOS/PFOA/PFBS**  
**Analytical Results**



- Installation Boundary
- Area within the Propellant Burning Grounds
- River/Stream (Perennial)
- Stream (Intermittent)
- Groundwater Sampling Location

Notes:  
 1. Results are in ng/l.  
 2. **BOLD** = Detected results above the level of detection.  
 3. Sampling was completed from 30 August 2018 to 5 September 2018.

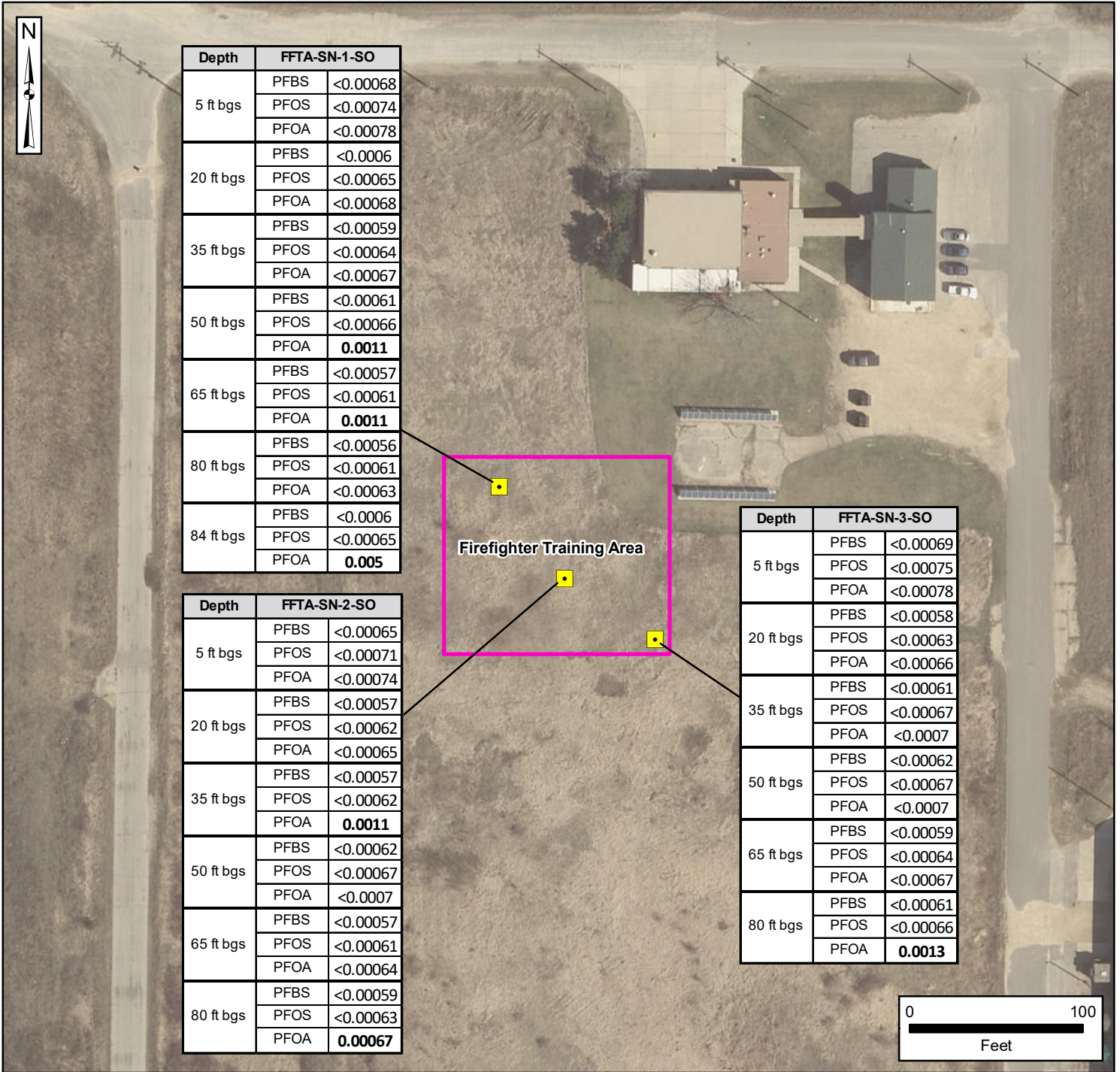


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Abbreviated PA/SI Report  
USAEC PFAS Preliminary Assessment/Site Inspection  
Badger Army Ammunition Plant, WI



Figure 3  
Soil PFOS/PFOA/PFBS  
Analytical Results



- Installation Boundary
- AOPI
- Soil Sampling Location

- Notes:
1. Results are in mg/g.
  2. **BOLD** = Detected results above the level of detection.
  3. Sampling was completed from 28 August 2018 to 30 August 2018.

Data Sources:  
ESRI ArcGIS Online, Aerial Imagery

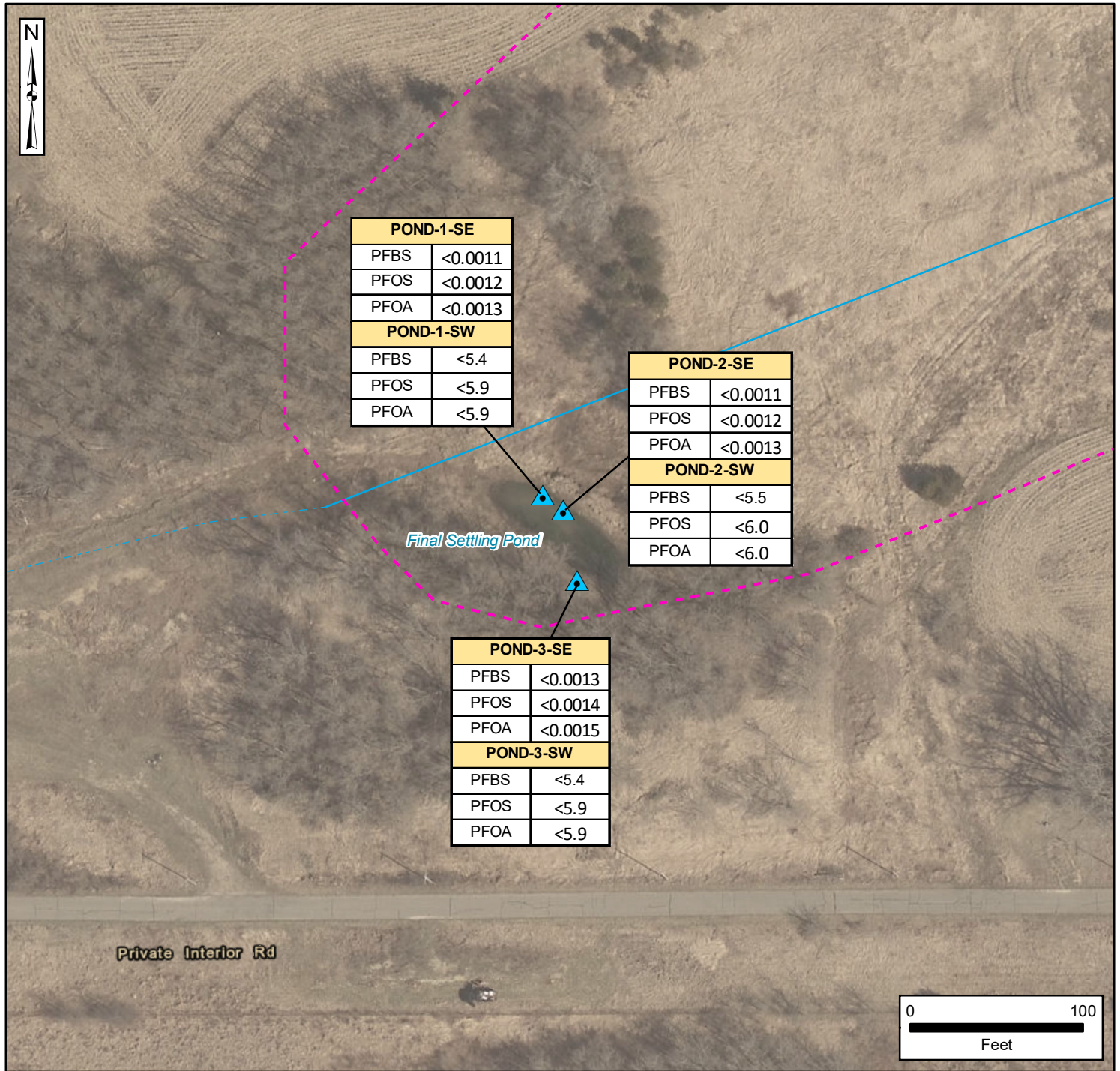
Coordinate System:  
NAD 1983, Wisconsin State Plane South



ARCADIS



**Figure 4**  
**Sediment and Surface Water**  
**PFOS/PFOA/PFBS Analytical Results**



- Installation Boundary
- Area within the Propellant Burning Grounds
- River/Stream (Perennial)
- Stream (Intermittent)
- Surface Water / Sediment Sampling Location

Notes:  
 1. Surface water results are in ng/l. Sediment results are in mg/g.  
 2. Sampling was completed on 6 September 2018.

Data Sources:  
 ESRI ArcGIS Online, Aerial Imagery

Coordinate System:  
 NAD 1983, Wisconsin State Plane South

## **Attachment 1**

Description of AOPs and their CSMs

## Attachment 1 – Description of AOPIs and their CSMs

As part of the preliminary assessment for per- and polyfluoroalkyl substances (PFAS) at Badger Army Ammunition Plant (BAAP), the following were identified as areas of potential interest (AOPI): Former Firefighter Training Area (FFTA), the Propellant Burning Ground (PBG), and Landfill 3646. AOPI site histories and conceptual site models (CSMs) for each AOPI are presented in this enclosure. In August/September 2018, PFAS sampling occurred at the FFTA and the PBG. The data collected during this sampling event were used to aid in development of these CSMs.

Based on the potential historical use or release of PFAS at the AOPIs, affected media at all AOPIs are likely to consist of soil and groundwater. The release and transport mechanisms are desorption from soil and dissolution to groundwater. For the PBG, surface water and sediment may also be affected media. Additional release and transport mechanisms at the PBG include transport via sediment carried in and dissolution to stormwater and surface water, discharge/recharge between groundwater and surface water, and adsorption/desorption between surface water and sediment. Human exposure pathways are noted as “potentially complete” or “incomplete.” A potentially complete exposure pathway consists of a constituent source and release mechanism, a transport or retention medium, an exposure point where human contact with the contaminated medium could occur, and an exposure route at the exposure point. If any of these elements is missing, the exposure pathway is incomplete.

### Former Firefighter Training Area

The FFTA consisted of two fire training areas located in the northwestern portion of BAAP, southwest of Fire Station #1. These fire training areas included a new paved practice area and an existing firefighting area. The existing firefighting area was a circular gravelly area with a rectangle concrete slab. The new paved practice area was used between 1971 and 1980 (Olin Corporation 2004c). In August 2011, each of these FFTA areas was excavated to approximately 10 feet below ground surface (bgs), totaling 35 cubic yards (cy) of soil (SpecPro, Inc. 2011). The excavated soil was transported to the on-site construction and demolition waste landfill (Landfill 3646) for disposal. AFFF use has not been confirmed in either of these areas, but the operational timeframes indicate the possibility of AFFF use. Soil samples were collected for PFAS compounds from the FFTA during an August/September 2018 investigation. Data collected during this investigation indicate perfluorooctanoic acid (PFOA) was detected in six soil samples at the training area, at concentrations ranging from 0.67 nanograms per gram (ng/g) to 5 ng/g. The depth of the samples with PFOA detections ranges from 35 feet to 84 feet. Soil samples from 5 feet below ground surface did not exhibit detected PFAS concentrations.

The FFTA AOPI CSM information is presented in **Figure 1-1**.

- There were no observed concentrations of PFOS, PFOA, or PFBS in shallow soil. The Former Firefighter Training Area was excavated to approximately 10 feet bgs, with shallow soil being taken to on-site Landfill 3646. Therefore, soil exposure pathways (via incidental ingestion, dermal contact, and inhalation) for on-site workers and on-site recreational users are incomplete. There are no residences at BAAP, and the AOPIs are not likely to be accessed by off-site receptors. Therefore, the soil exposure pathways for on-site residents and off-site receptors are also incomplete.
- The AOPI is side gradient of a potable water supply well located on the site property that serves the community of Bluffview. Therefore, the groundwater exposure pathway for off-site receptors consuming water from this well is incomplete. However, groundwater originating at this AOPI flows

## Attachment 1 – Description of AOPIs and their CSMs

off-site through the south to southeastern boundary. Therefore, the groundwater exposure pathway for off-site receptors south to southeast of the site boundary is potentially complete.

- Site workers at BAAP do not receive their drinking water from groundwater at BAAP. One office building uses groundwater for sanitary purposes only, however it is located upgradient of the AOPI. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-site workers is incomplete. There are no residences at BAAP, and on-site recreational users are not likely to contact groundwater; therefore, the groundwater exposure pathways for on-site residents and recreational users are also incomplete.
- There are no surface water bodies near this AOPI, to which shallow groundwater could potentially discharge. Therefore, surface water and sediment are not potential exposure media for this AOPI.

**Table 1. AOPI CSM Information Profile – Former Firefighting Training Area**

Profile Type	Information Needs	Preliminary Assessment Findings
Site profile	AOPI site structures and description	The FFTA, located in the northwestern portion of the installation, south of Fire Station #1 (Bldg. 222 and 223). The original training area was a circular gravelly area with a rectangular concrete pad. A new paved practice area was constructed in 1971. In August 2011, each of these FFTA areas was excavated to approximately 10 ft bgs, totalling 35 cy of soil. The excavated soil was disposed of in the on-site construction and demolition waste landfill (Landfill 3646).
	Latitude, longitude	43°22'07.54125"N, 89°45'41.89619"W
Land use	Current and future land use	Commercial
CSM profile	Source media	Soil
	Migration routes/release mechanisms	PFAS compounds could migrate via the following migration routes and release mechanisms: <ul style="list-style-type: none"> <li>• Soil to groundwater via desorption/dissolution</li> </ul>
	Exposure media, pathways, and human receptors	<ul style="list-style-type: none"> <li>• No human receptors are present at BAAP; therefore, the groundwater exposure pathway for on-post receptors is incomplete.</li> <li>• There is one nearby on-post potable water well supplying the community of Bluffview. This potable well is side gradient of the AOPI; therefore, the groundwater exposure pathway for</li> </ul>



## Attachment 1 – Description of AOPs and their CSMS

Profile Type	Information Needs	Preliminary Assessment Findings
		<p>off-post receptors consuming water from the on-post well is incomplete.</p> <ul style="list-style-type: none"> <li>• However, groundwater flows from this AOPI in a south-southeast direction and eventually migrates off-post. Therefore, the groundwater exposure pathway for off-post receptors consuming water from off-post wells south-southeast of BAAP remains potentially complete.</li> <li>• There are no surface water bodies near this AOPI, to which shallow groundwater could potentially discharge. Therefore, the surface water exposure pathway for on-and off-post receptors is incomplete.</li> </ul>

## Attachment 1 – Description of AOPIs and their CSMs

### Propellant Burning Ground

The PBG is located in the southwestern portion of the BAAP and encompasses 80 acres. Several distinct areas exist at the PBG including the Contaminated Waste Area, the Racetrack/Burning Ground, Landfill 1, and the Settling Ponds/Spoils Disposal Area. The Contaminated Waste Area contains three former waste disposal pits, a large open area for burning propellant-contaminated waste, and an area designated the 1949 Pit. The Racetrack/Burning Ground area is south of the Contaminated Waste Area and contains two concrete burning pads, four metal drying plates, and three refuse burning pits. Landfill 1 was located approximately 400 feet to the east of the Contaminated Waste Area. The facility was used between 1942 and 1959 for disposal of waste that included structural timbers, asphalt shingles, cardboard, office refuse, and other unknown wastes. The Settling Ponds/Spoils Disposal Area is located in the south-central portion of BAAP and spans over 40 acres. The settling ponds were first used in 1941 and comprised four unlined settling ponds that received sewage, industrial wastewater, and surface runoff from the installation facilities. In the mid-1970s, the wastewater treatment plant was constructed, and the settling ponds served as aeration and settling basins for treated effluent water (ABB Environmental Services, Inc. 1993). Seventeen monitoring wells throughout the PBG were sampled for PFAS in August/September 2018. Perfluorooctanesulfonic acid (PFOS) and PFOA were detected in nine groundwater samples throughout the PBG ranging from 1.2 nanograms per liter (ng/L) to 14 ng/L. All detections of PFOS and PFOA were below the health advisory level of 70 ng/L.

The PBG AOPI CSM information is presented in **Figure 1-2**.

- Soil was not sampled at this AOPI and the location and extent of any potential PFAS in soil is unknown. Therefore, the soil exposure pathway via incidental ingestion, dermal contact and inhalation of dust for on-site workers is potentially complete. There are no residences at BAAP, and the AOPI is not likely to be accessed by on-site recreational users, or by off-site receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- There are no potable wells within the AOPI boundary or in the path of groundwater flow from this AOPI. Also, site workers at BAAP do not receive their drinking water from groundwater at BAAP. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-site workers is incomplete. There are no residences at BAAP and on-site recreational users are not likely to contact groundwater; therefore, the groundwater exposure pathways for these on-site receptors are incomplete.
- Groundwater originating at this AOPI flows off-site through the south to southeastern boundary. Therefore, the groundwater exposure pathway for off-site receptors is potentially complete.
- Surface water bodies at BAAP are not used for drinking water. There are no residences at BAAP, and on-site workers and recreational users are not likely to contact surface water and sediment; therefore, the surface water and sediment exposure pathways for these receptors are incomplete.
- Surface water bodies flow off-site through unnamed tributaries to Lake Wisconsin, which is not known to be used as a source of drinking water. Therefore, the surface water exposure pathway (via drinking water ingestion and dermal contact) for off-site drinking water receptors is incomplete. However, off-site receptors could contact constituents in surface water and sediment through incidental ingestion

## Attachment 1 – Description of AOPs and their CSMs

and dermal contact; as such, the surface water and sediment exposure pathways for off-site receptors are potentially complete.

**Table 2 AOP CSM Information Profile – Propellant Burning Ground**

Profile Type	Information Needs	Preliminary Assessment Findings
Site profile	AOP site structures and description	The PBG encompasses approximately 80 acres and consists of two different areas: the Contaminated Waste area and the Racetrack/Burning Ground. The Contaminated Waste Area is in the northern portion of the PBG and contains four former waste disposal pits and an open burning area. The Racetrack/Burning Ground is in the southern portion of the PBG and contains two burning pads, four metal drying plates, three burning pits, settling ponds, and a spoils disposal area.
	Latitude, longitude	43°20'47.0"N, 89°44'59.8"W
Land use	Current and future land use	Agricultural
CSM profile	Source media	Soil
	Migration routes/release mechanisms	<p>PFAS compounds could migrate via the following migration routes and release mechanisms:</p> <ul style="list-style-type: none"> <li>• Soil to groundwater via desorption/dissolution</li> <li>• Soil to surface water via runoff, dissolution, and adsorption</li> <li>• Groundwater to surface water via shallow groundwater discharge</li> <li>• Surface water to sediment via adsorption.</li> </ul>
	Exposure media, pathways, and human receptors	<ul style="list-style-type: none"> <li>• No human receptors are present at BAAP; therefore, the groundwater exposure pathway for on-post receptors is incomplete.</li> <li>• Surface water bodies on-post are not currently used and are not likely to be used in the future, as a potable water source; therefore, the surface water exposure pathway for on-post receptors is incomplete.</li> <li>• Groundwater flows from this AOP in a southeasterly direction and</li> </ul>

## Attachment 1 – Description of AOPs and their CSMs

Profile Type	Information Needs	Preliminary Assessment Findings
		<p>eventually migrates off-post. Therefore, the groundwater exposure pathway for off-post receptors consuming water from off-post wells is potentially complete.</p> <ul style="list-style-type: none"> <li>• Surface water on-post flows off-post via tributaries to the Wisconsin River, which is not known to be used as a source of drinking; therefore, the surface water exposure pathway for off-post receptors is incomplete.</li> </ul>

## Attachment 1 – Description of AOPIs and their CSMs

### Landfill 3646

Landfill 3646 is located in the eastern portion of the BAAP. Landfill 3646 is approximately 18 acres, has a capacity of 770,000 cubic yards, and is considered an AOPI due to the documented receipt of potentially PFAS-containing soil from the FFTA where historical AFFF use is likely (SpecPro, Inc. 2019). PFAS sampling has not occurred at this AOPI but may be evaluated during a potential future phase of work.

The Landfill 3646 AOPI CSM information is presented in **Figure 1-3**.

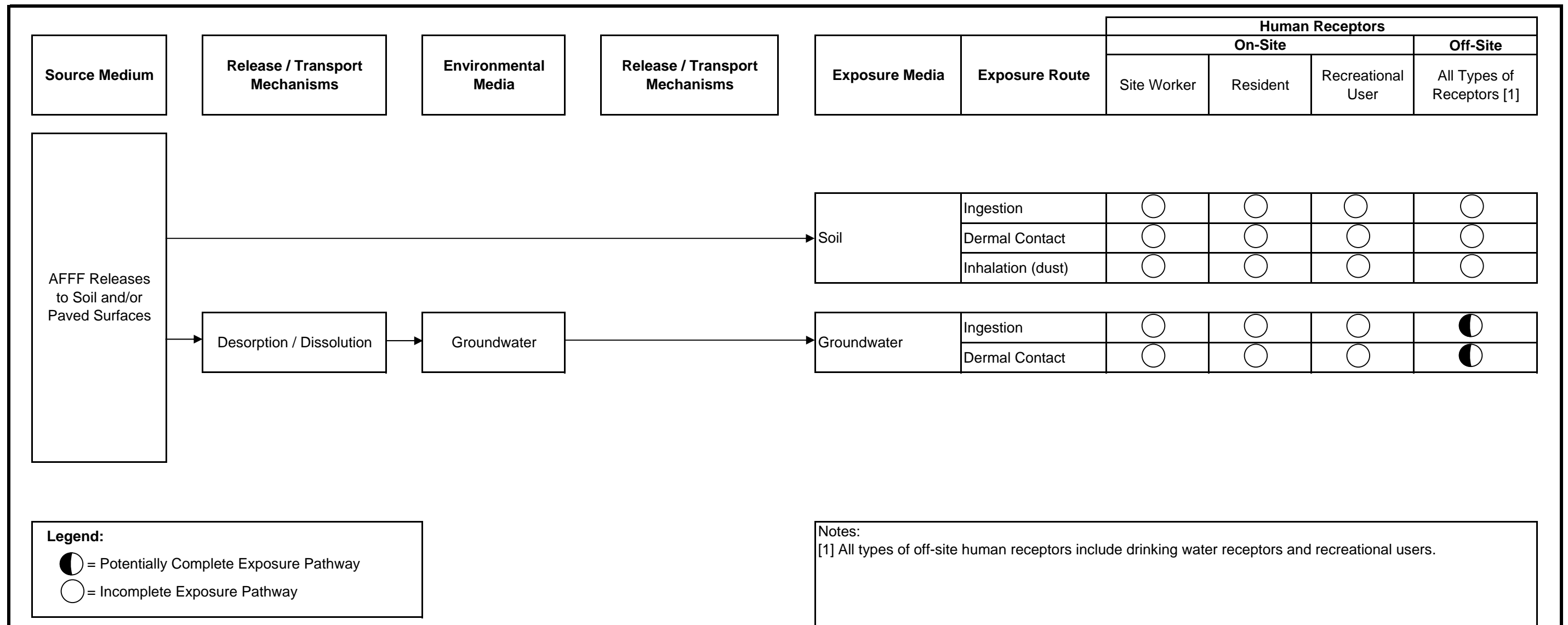
- Soil sampling was not performed at Landfill 3646, but excavated soil from the Former Firefighter Training Area was placed here. Therefore, the soil exposure pathway (via incidental ingestion, dermal contact, and inhalation) for on-site workers is potentially complete. There are no residences at BAAP, and the AOPI is not likely to be accessed by on-site recreational users, or by off-site receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- There are no potable wells within the AOPI boundary or in the path of groundwater flow from this AOPI. Also, site workers at BAAP do not receive their drinking water from groundwater at BAAP. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-site workers is incomplete. There are no residences at BAAP and on-site recreational users are not likely to contact groundwater; therefore, the groundwater exposure pathways for these on-site receptors are incomplete.
- Groundwater originating at this AOPI flows off-site through the east-southeastern site boundary. Therefore, the groundwater exposure pathway for off-site receptors east-southeast of the site boundary is potentially complete.
- There are no surface water bodies near this AOPI, to which shallow groundwater could potentially discharge. Therefore, surface water and sediment are not potential exposure media for this AOPI.

**Table 3 AOPI CSM Information Profile – Landfill**

Profile Type	Information Needs	Preliminary Assessment Findings
Site profile	AOPI site structures and description	Landfill 3646 located in the eastern portion of the BAAP. This AOPI is approximately 18 acres and has a capacity of 770,000 cy. In 2011, this area received 35 cy of potentially AFFF contaminated soil from the FFTA.
	Latitude, longitude	43°21'37.69"N, 89°42'38.28"W
Land use	Current and future land use	Agricultural, Recreational
CSM profile	Source media	Subsurface soil
	Migration routes/release mechanisms	PFAS compounds could migrate via the following migration routes and release mechanisms: <ul style="list-style-type: none"> <li>• Subsurface soil to groundwater via desorption/dissolution</li> </ul>

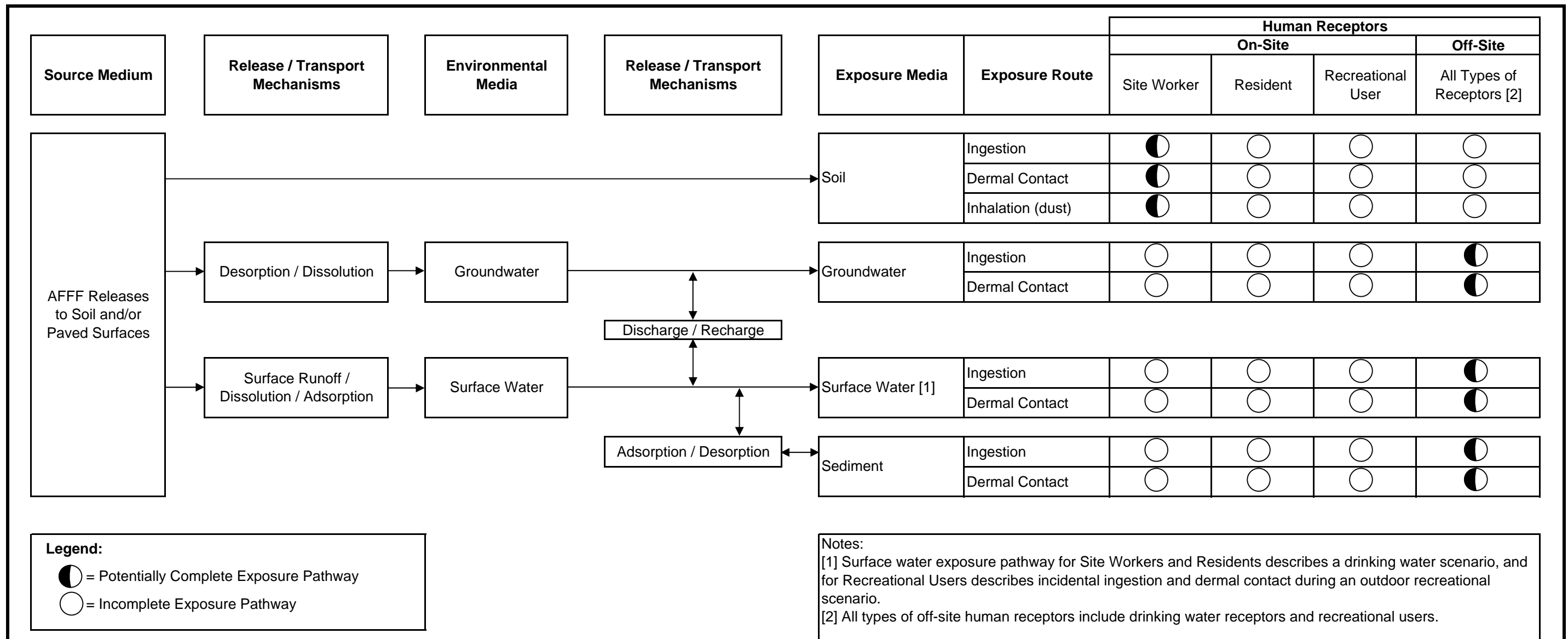
## Attachment 1 – Description of AOPIs and their CSMs

Profile Type	Information Needs	Preliminary Assessment Findings
	<p>Exposure media, pathways, and human receptors</p>	<ul style="list-style-type: none"> <li>No human receptors are present at BAAP; therefore, the groundwater exposure pathway for on-post receptors is incomplete.</li> <li>There are no surface water bodies near this AOPI, to which shallow groundwater could potentially discharge. Therefore, the surface water exposure pathway for on-post receptors is incomplete.</li> <li>Groundwater flows from this AOPI in a south-southeast direction and eventually migrates off-post. Therefore, the groundwater exposure pathway for off-post receptors consuming water from off-post wells is potentially complete.</li> <li>Surface water on-post eventually migrates off post via tributaries to the Wisconsin River, which is not known to be used as a source of drinking water; therefore, the surface water exposure pathway for off-post receptors is incomplete.</li> </ul>



**Conceptual Site Model - Former Firefighting Training Area AOPI**  
 USAEC PFAS Preliminary Assessment / Site Inspection  
 Badger Army Ammunition Plant, Wisconsin

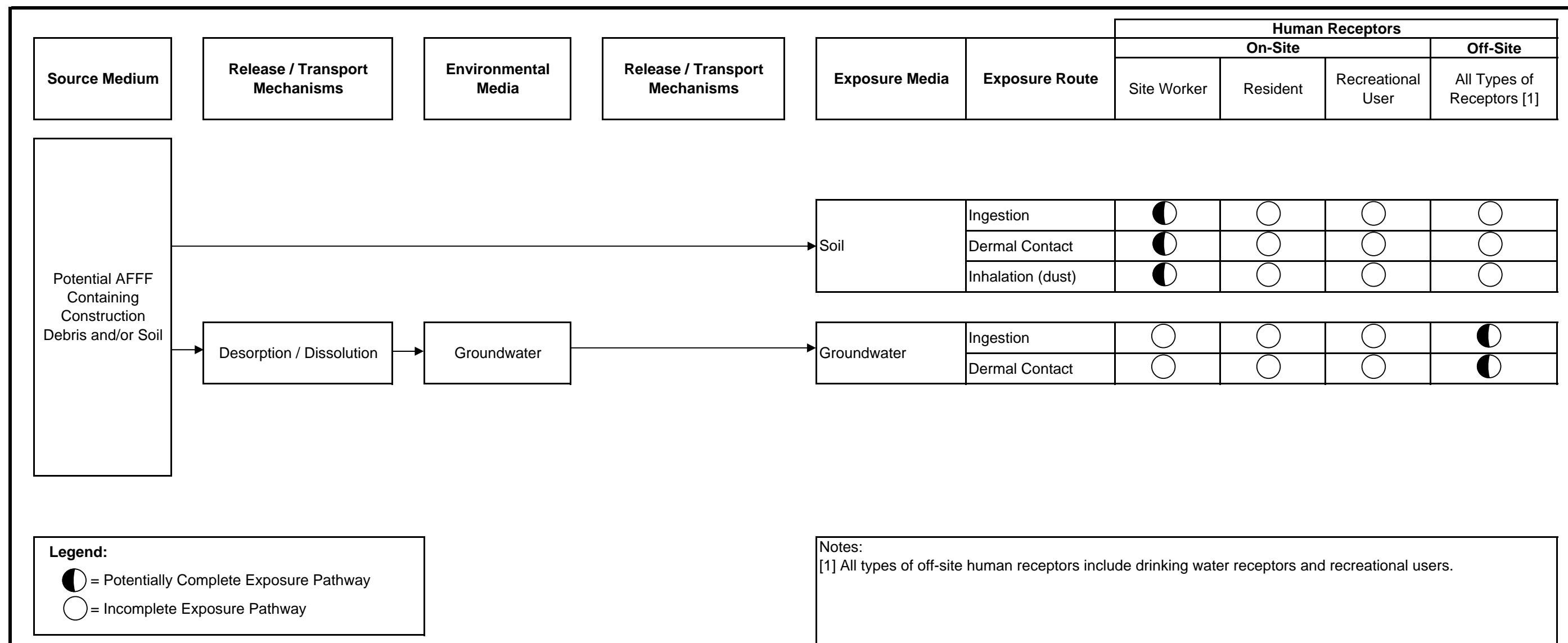
**Figure 1-1**



**Conceptual Site Model - Propellant Burning Ground AOPI**  
 USAEC PFAS Preliminary Assessment / Site Inspection  
 Badger Army Ammunition Plant, Wisconsin

**Figure 1-2**





**Legend:**  
 ● = Potentially Complete Exposure Pathway  
 ○ = Incomplete Exposure Pathway

**Notes:**  
 [1] All types of off-site human receptors include drinking water receptors and recreational users.



**Conceptual Site Model - Landfill 3646 AOP**  
 USAEC PFAS Preliminary Assessment / Site Inspection  
 Badger Army Ammunition Plant, Wisconsin

**Figure 1-3**

## **Attachment 2**

Field Notes

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Subject: BAAAP / BARABOO, WI / 02118216.1000.AD00 / 8-27-18			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

19 1/2

Monday 27 Aug 18

Purpose: soil borings / soil sampling / groundwater sampling / mobilization  
 Arcadis: Bruce Evans (BE) / Jess Nugent (TN)  
 weather: AM cloudy w/ wind, 77-80°F, humid, chance storms  
 PM cloudy-pty cloudy, strong S. wind, 80-86°F / humid

- 06:45 Leave for site
- 08:19 pickup equip at United Rental
- 08:40 continue to site
- 09:30 Arrive site
  - call Joel Jansson (608)-438-1110 / meet w/ Joel
  - discuss areas / locations
  - prep to mark location
- 10:00 GPRS utility locations on site / Paul Mandelke
  - MARK DAiking locations for soil borings / soil sampling
- 10:30 - Hold trail route at the gate by meeting - see HOS logs
- ~~10:30 - Begin marking soil locations / clearing utilities~~
- 11:15 - ~~continue~~ R Ann starts / steps
  - continue marking utility / clearing areas
- 11:20 Drawk / Kerkak onsite / meet w/ Joel
- 11:20 - Fract tank also on location
- 12:00 - utilities cleared at daiking locations
  - GPRS offsite
- 12:10 - BE to check with Drawk / Fract tank placement
- 12:20 - at location where fract tank being dropped
- 12:50 - Fract tank dropped / escort driver offsite
- 13:00 - Return to Fire Station Building
  - Jess N has arrived
- Note - Daikers (contractors) calls - contract still not signed  
~~may~~ will not leave Schofield until signed / may not be here today
- 13:30 - DK / KK offsite / for supplies for GWS samples
  - BE tries to contact Robin Meier (608-643-7930)
  - No answer / leave message / also email per instructions
  - Review SOU w/ TN
- 14:00 - email that Daiking contract is signed / call Daiking  
 may not be here today as he has work home per instructions
- 14:40 - call Kevin E re soil boring abandonment / Grant  
 Note Robin Meier gone for day per email to Kevin
- 15:00 - ~~check~~ check sample collection

Subject <b>BAAAP / PARABOO, WI / 8/27/18</b>			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

192/2

- 15:25 CAA Lwb to discuss containers
- 15:30 DK/KK Return with supplies
  - begin to wire RediFlow pump
- 15:50 - at Fire Truck / GW staging area
  - unload / stage GW staging supplies
  - stage Trash pump / conduct hoses
  - check wells to sample
  - check RediFlow 3 pump operation
- 16:45 - Return to Fire Station
- 17:00 - BE off site to hotel
- 17:15 - at hotel
  - Reporting

*[Signature]* 27 Aug 18

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Subject BAAAP / Baraboo, WI / 02118216.1000.7AD00 / 8-28-18			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

pg 1/2

Tuesday 28 Aug 18

Purpose: site mob / soil borings - soils sampling / groundwater sampling  
 Arcadis: Bruce Evans (SE) / Tess Nugent (TN)  
 weather: AM cloudy - pty cloudy, some sun, calm, 60-82°F  
 PM: cloudy - pty cloudy, sun, strong S-SW winds, 82-83°F

- 07:40 Leave for site
- 07:00 Arrive site / Drewk / Kondrak also on site
- 07:10 Conduct Tailgate health & Safety Meeting / see H&S Logs
- 07:20 Leave for ~~100~~ BAAAP - 166P - 8201 A/B/C
- 07:40 arrive location wells begin setup on 8201A
- 08:45 BE Leaves GW sampling / returns to Fire Station
- 08:57 at Fire station (Derrick have just arrived Cascade / Grofield, WI)
- 09:15 setup drill rig over BAAAP-FFTA-SN-1 location
  - waiting on Holpe coming separately from Dig
  - also call Robin Meier (608-645-1930) RE water she is not yet in - a, need to wait until 10:00 for Vaik water
- 09:20 check calibration of field sequencing equipment using a photoionization detector (PID) / Mini Rite 3000 RACOP S/N 592-920414 / 11.7 EU Bulb / Eco-Ratal
  - check calibration with 100 ppm T-solubly one gas standard
  - small canister Eco-Ratal solution 0.6cu/17L Lot FBI-248-100-12 use before 6/22 / 300 psi

	Standard	Reading
PID	100 ppm	101.0 ppm
background	= 0.0 ppm	
- 09:30 3rd Derrick arriving
  - continue setup on BAAAP-~~166P~~ FFTA-SN-1
- 09:45 - Hold 2nd Tailgate H&S for Derrick S
- 09:55 speak with Robin M. / will come to fire station & direct to water supply / just need to keep track each load water gotta
- 10:05 Robin arriving / Take water truck to Bluffview Municipal hydrant across Hwy 12 for water
- 10:10 begin hand auguring SN-1 location
- 10:20 collect sample BAAAP-FFTA-SN-1-5.0-50 from hand auger cuttings
- 10:30 collect Field Blank: BAAAP-FB-50-082818
- 10:35 Derrick returns with water truck / filled with ~ 2,000 gal water from Bluffview MD hydrant
  - Reposition water truck to drill rig

Subject BAAAP / Baraboo, WI / 8-28-18			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

P92/2

- 10:38 - water truck getting stuck position to Drill Rig
  - place mud mats to help soft ground
- 10:45 - try to pull water truck out with pickup / can't do stick stake
  - move drill rig to pull out water truck
- 10:50 - tow straps break trying to pull with drill rig
- 11:09 - check with tool for wrecker / equipment to pull
  - may have heavy duty tow strap / go to check
- 11:40 - no tow strap available
  - call wrecker service / will come & assess if they can pull ~~the~~ water truck out
- 11:45 - wait on tow truck
- 12:15 - wrecker / Drillers return / look like won't be able to wrecker to pull water truck, but has heavy chams for drill rig to pull water truck
- 12:35 - drill rig pulls water truck from mud onto mud mats
- 12:40 - resume getting up drill rig with water truck
- 13:00 - collect equipment BLADE from core barrel  
BAAAP-EB-50-082818
- 13:03 - begin drilling BAAAP-FFTA-SN-1 from 5'
- 13:29 - collect sample: BAAAP-FFTA-SN-1-20-50
- 13:40 - collect sample: BAAAP-FFTA-SN-1-35-50
- 14:35 - collect sample: BAAAP-FFTA-SN-1-50-50  
Also collect sample Duplicate BAAAP-FD-50-082818
- 15:15 - collect sample: BAAAP-FFTA-SN-1-65-50  
Also collect MS / MSD for BAAAP-FFTA-SN-1-65-50 3sets
- 15:20 - stop work / Heavy rains / strong wind / lightning / thunder
- 15:45 - End work for day / Terracid rains persist
- 15:50 - Drillers off site
- 16:00 - Drew K / Kandak off site / getting parts to fix problem pumping water from truck tanks to Frack Tank
  - BESTN to Fire station / clean DRY test samples from rain
- 16:15 - BESTN off site
- BE picks up additional supplies / Ice for samples
- 17:00 - at hotel
- Reporting

*[Signature]* 28 Aug 18

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Subject BAAAP / BARABOO, WI / 02118216.1000.7AD00 / 8-29-18			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

Pg 1/3

Wednesday 29 Aug 18

Purpose: Soil borings / soil sampling / GW sampling  
 Arcadis: Bruce Evans (BE) / Tess Nugent (TN)  
 weather: AM: cloudy, strong NW wind, 59-65°F  
 PM: partly cloudy, sun, strong NW wind, 65-68°F

06:40 Leave Con Site

07:00 Arrive Site / Drillers View K / conduct / TN also on site

07:10 Hold Tailgate Health & Safety meeting / see H&S Logs

07:20 Resume Drilling BAAAP - FFTA - SN-1 from 65'

- GW crew dispose of water / pick up new generator /  
Resume GW sampling

07:30 - check calibration PID / per yesterday Minik AE 3000  
same calibration gets 100 ppm Isohexthylene -  
standard reading

PID	100 ppm	101.2 ppm
-----	---------	-----------

PID background = 0.0 ppm

Ⓧ 08:20 Collect sample BAAAP - FFTA - SN-1 - 80-50

Ⓧ 08:50 Collect sample BAAAP - FFTA - SN-1 - WT 8 1/2 - 50 e (84)

09:00 End Borehole at 85'  
water table 68'

- set up to grout borehole to abandon

09:05 - Mix Grout: 28 gal water from Bluffview MH hydrant  
with 3 bags Portland cement 94 lb bags  
Furfuryl Com at commercial grade / 0.5 bag bentonite  
powder Quick gel / Halliburton Hydrex - Hydrex

09:12 pump grout into 6" casing in borehole through a tremie  
pipe of 1.5" HDPE tubing set at 92' / fill to surface

09:16 - Begin pulling 6" casing from borehole / add grout  
as needed

09:20 Mix 2nd batch grout / as before 28 gal water / 3 bags cement /  
0.5 bag bentonite gel / pump into borehole as before

09:30 Mix & pump 3rd batch grout / as before

09:40 Mix & pump 4th batch grout / as before

- 6" casing removed from borehole / borehole filled  
with grout to surface

09:45 - Begin moving skill rig / water truck to BAAAP - FFTA - SN-2 location

Ⓧ 09:45 Collect Equipment Black Box Hand Auger

~~BAAAP - EB - 50 - 082918 - 2~~  
BAAAP - EB - 50 - 082918 - 2

Subject <b>BAAAP / Baraboo, WI / 8-29-18</b>			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

P9/2/3

- ⓐ 10:00 collect Field Blank  
BAAAP-FB-50-082918  
- Move DRILL RIG TO BAAAP-FFAP-SN-2 & prep to begin Borehole
- 10:10 Begin Hand Auger BAAAP-FFAP-SN-2 Borehole
- \* 10:20 collect sample  
BAAAP-FFAP-SN-2-5.0-50
- 10:30 collect Equipment Blank Core Barrel  
~~BAAAP-FFAP-SN-2-5.0-50~~  
BAAAP-EB-50-082918-1
- ⓐ 11:25 collect sample BAAAP-FFAP-SN-2-35-50
- ⓑ 11:00 collect sample BAAAP-FFAP-SN-2-20-50
- ⓐ 12:20 collect sample BAAAP-FFAP-SN-2-50-50
- ⓑ 12:45 collect sample BAAAP-FFAP-SN-2-65-50
- ⓐ 13:50 collect sample BAAAP-FFAP-SN-2-UT80-50
- 14:00 End BAAAP-FFAP-SN-2 Borehole at 87'  
Water Level 81-82' HSS
- 14:05 Mix 1st batch grout  
ⓐ ~~28 gal water~~ = 28 gal water / 5 Bgs Portland Cement / 10.2 Bgs Bentonite powder / pump into borehole into 6" casing through Tremie pipe, as before set @ 82' HSS
- 14:10 - Grout to pipetop / Begin pulling out 6" casing
- 14:17 Mix 2nd batch grout / pump into casing in borehole as before 28 gal water / 5 Bgs cement / 10.2 Bgs Bentonite powder
- 14:30 Mix 3rd batch grout & pump into 6" casing in borehole  
- pull 6" casing from borehole and Puff off grout to surface
- 14:45 Move Drill Rig over BAAAP-FFTA-SN-3 Location
- 14:55 Begin Hand Auger at BAAAP-FFTA-SN-3
- ⓐ 19:05 collect sample BAAAP-FFTA-SN-3-5.0-50
- ⓑ 19:30 collect sample BAAAP-FFTA-SN-3-20-50
- ⓐ Also collect sample Duplicate:  
BAAAP-FD-50-082918
- ⓑ 16:00 collect sample: BAAAP-FFTA-SN-3-35-50  
Also collect Matrix spike / Matrix spike Duplicate (3 sets)
- 16:30 End Borehole for day at sampled & cased depth of 45' / clean out casing  
- Finish logging
- 16:45 - Drill rig off site FOR DAY  
- TV goes to get FC



Subject <b>BAAAP / Brakboo, WI / 8-29-18</b>			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

- Pg 3/3
- BE preps samples / COC for shipping to Eurofins
  - 18:00 coolers packed & ready for shipping
  - Meet up with DF/KK from GW sampling
  - They are packing their samples and will deliver soil samples to FedEx in Madison for overnight delivery to Eurofins
  - 18:30 BE/TN offsite
  - 18:50 - AT hotel
  - Reporting

*M. E. Smith* 29 AUG 18

Subject <b>B AAP / DATA BOO, WI / 02118216.1000.7A800 / 8-30-18</b>			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

P9/2

THURSDAY 30 Aug 18

Purpose: Soil borings / soil sampling / GW sampling / Demob  
 Arcadis: Bruce Evans (BE) / Tess Nugent (TN)  
 weather: AM fog, Pthly cloudy, sun, calm, 56-66°F  
 PM: pthly cloudy, sun, W breeze, 66-72°F

06:40 Leave for site

07:00 Arrive site / Drilling / DK / KC also on site TN also

07:10 Hold Tailgate Health & Safety Meeting / see H&S Logs

07:20 GW Team off for GW sampling

- BE / TN Drilling to B AAP - FFTA - SN-3 / prep to drill

07:30 Resume Drilling B AAP - FFTA - SN-3 from 45'

07:40 collect sample:

B AAP - FFTA - SN-3 - 50-50

Note: check calibration PID / porometer / Min. RAE 3000  
 100 / 1m Iso-butylone @ calibration gHS  
Standard      Leaking

PID      100ppm

PID back-ground = 0.0ppm

08:15 collect sample:

B AAP - FFTA - SN-3 - 65-50

09:15 collect sample

B AAP - FFTA - SN-3 - WT 80-50

09:30 End B AAP - FFTA - SN-3 Borehole at 87'

09:40 Drill Rig problem - bracket for one of the controls broke / attempt repairs / 6" casing still in Borehole

10:10 Drill Rig Repaired

10:12 Mix first batch grout to a standard borehole using ~ 28 gal water from Bluffview MD hydrant mixed with 5 bags portland cement / industrial grade Infinity / mid-~~west~~ Africa salt / Morocco 926 lb bags 0.3 bag Bentonite powder / 10 lb bag Quick Gel Baroid / Italbrida

10:18 pump grout into 6" casing in borehole through at tremie pipe of 1.5" HDPE tubing set at ~ 80 ft

10:23 Begin pulling 6" casing from borehole / adding grout as needed to fill casing

10:30 Mix 2nd batch grout / as before 28/5/0.3 & pump into borehole

Subject <b>BAAP / BART100, WI / 8-30-18</b>			
Project No.		Sheet	
Calculations By	Date	Checked By	Date

pg 2/2

- 10:40 Mix 3rd batch grout / pump into borehole
- 10:45 6" casing removed from borehole
  - grout to ground surface
  - Drillers begin clean up / loading equipment
- 11:00 - continue drilling break down
  - BELTN prep sample coolers / COCS
- 11:15 - move DRILLING / water truck off drilling locations
  - Pick up drums of soil IPE for staging at fract tank
- 11:40 - go to fract tank to stage drums
- 12:05 - stage drums east side area where fract tank is

staged  
IDW: currently 6 Full Drums soil cuttings  
1 Full Drum PPF / core sleeves  
9 Empty Drums  
All IDW Drums Labeled Non-HAZARDOUS  
Empty Drums Labeled "Empty"

- 12:15 collect DRINK WATER ~~Blank~~ Equipment BLANK  
BAAP - EB-083018-3
- 12:30 Return TO FFTA Kevre station / continue Drilling clean up
- 12:50 BE GPS New soil boring locations  
TN helps with GW sampling crew
- 13:00 Drillers break for lunch  
BE picks up ~~more~~ more ice for coolers to ship samples
- 13:45 Drillers Return from lunch / final prep to leave
- 14:00 Drillers off site / Demob
- 14:30 Go to fract tank area
  - Drop off equipment to KE/DK
- 15:10 - off site / Demob to Milwaukee
- 16:10 - Drop off samples to FedEx in Madison
- 17:30 - Arriving MKE
  - Reporting

*[Handwritten signature]*

Subject <b>Badger</b>			
Project No.		Sheet	
Calculations By	Date <b>8-28-18</b>	Checked By	Date

P: GW Sampling BAAAP-PBGP-PBN-8201A  
 A: D. Kehoe, K. Keon, B. Evans  
 W: 70', mostly cloudy  
 700 onsite, H+S tailgate  
 740 onsite @ PBN-8202A/B/C - set up @ CA  
 0940 Start pump  
 0942 pump cavitating after purging 15 gal - shut pump off - no controller for redi-flow 3 so it's all or nothing  
 1100 set up @ PBN-8202B w/ 2" Grundfos  
 1110 Start pump @ PBN-8202B  
 $1 \text{ W.V.} = 24.2 \times 10 = 242 \text{ gals}$   
 1115 Pump will not start - GFCI circuit breaker on generator pops  
 Call Kevin Engle → contact eco-rentals tech  
 1120 Try 2nd 2" Grundfos → same issue w/ GFCI/generator  
 Eco-rentals tech recommends renting a new generator  
 1130 continue to purge well volumes from 8202C w/ redi-flow 3  
 - currently @ ~150 gal, target volume = 205 gal (10 W.V.)  
 1300 collect BAAAP-EB-GW-082818-3 from PBN-8201C bladder pump  
 1310 collect BAAAP-EB-GW-082818-1 from W.L.M.  
 1315 (complete purging 205 gal (10 W.V.) from PBN-8201C  
 - pull pump  
 1340 collect BAAAP-PBGP-PBN-8201C for PFC's (2 x 250 mL no pres.)  
 1400 collect BAAAP-EB-GW-082818-2  
 1500 stop work, lightning, heavy rain  
 1530 offsite, drive to Menards to buy parts/supplies

OK  
8-28-18

Subject <b>BAAP</b>			
Project No.		Sheet	
Calculations By	Date <b>8-29-18</b>	Checked By	Date

P: Groundwater Sampling  
A: D. Kehoe K. Keon  
W: 65, partly cloudy

0700 onsite, HTS tailgate  
0730 unload pump water to frac tank  
0800 offsite to pick up generator in Baraboo  
0830 checked at rental office to make sure 2" Grundfos works  
0900 onsite @ BAAP  
0915 set up @ 8201B w/ 2" Grundfos  
0930 collect BAAP-EB-GW-082918-1  
0942 Start pump  
1000 set up 2<sup>nd</sup> 2" Grundfos @ PBN-8201A  
1025 collect BAAP-EB-GW-082918-5  
1110 Start pump @ 8201A  
1140 collect BAAP-EB-GW-082918-3  
1145 shut off pump, purged ~90 gal (10 W.V.)  
1200 pull pump from well, clean up  
1240 collect BAAP-PBGP-PBN-8201A for PFC's 2 x 250 mL poly no pres  
shaker test = no bubbles  
1245 collect BAAP-PBGP-PBN-8201B for PFC's 2 x 250 mL poly no pres  
shaker test = no bubbles  
1250 pack up equipment/supplies  
1255 put dedicated pumps back in wells  
1310 pump water into frac tank  
1325 offsite to buy gas can/gas for generator  
1445 onsite @ PBN-8205A/B/C set up @ 8205B  
1513 start pump, 10 W.V. = 155 gal  
1540 set up 2<sup>nd</sup> 2" Grundfos in PBN-8205A  
1620 collect BAAP-EB-GW-082918-4  
1645 stop pump, total volume purged = 155 gal  
1710 collect BAAP-PBGP-PBN-8205B for PFC's, 2 x 250 mL poly no pres  
1725 pack up equipment/clean up  
1745 pump purge water to frac tank  
1800 pack cooler  
1835 Drive to madison, WI Fedex  
1920 Arrive @ fedex  
1935 Mob back to baraboo

OK 8-29-18

Subject <b>Badger GW Sampling</b>			
Project No.		Sheet	
Calculations By	Date <b>8-30-18</b>	Checked By	Date

P: GW Sampling  
A: D. Kehoe, K. Keon  
W: US, foggy

- 0700 onsite, H&S tailgate
- 0730 set up @ PBN-8205C w/ 2" grundfos  
10 w.v. = 210 gal
- 0805 start pump
- 0915 pull dedicated pump from PBN-8205C, set up w/ 2nd 2" grundfos
- 0940 stop pump @ 8205C, purged 210 gal
- 0945 start pump @ 8205A  
10 w.v. = 84 gal
- 1005 collect BAAP-PBGP-PBN-8205C for PFC's, 2 x 250 mL no pres.
- 1010 collect BAAP-FB-GW-083018, 2 x 250 mL poly
- 1025 shut pump off, purged 85 gal
- 1040 collect BAAP-PBGP-PBN-8205A for PFC's, 2 x 250 mL poly no pres.
- 1055 clean up equipment/supplies
- 1115 pump purge water into frac tank
- 1140 offsite to buy gas for generator
- 1215 onsite @ PBM-8203, set up w/ 2" grundfos
- 1245 start pump, 10 w.v. = 140 gal
- 1345 stop pump, purged 150 gal
- 1410 collect ~~BAAP~~ BAAP-PBGP-PBM-8203 for PFC's 2 x 250 mL poly  
collect MS/MSD and BAAP-FD-GW-083018 for PFC's  
↳ 2 x 250 mL poly      ↳ 2 x 250 mL poly
- 1425 clean up equipment/supplies
- 1500 pack cooler, Tess offsite to deliver sample cooler to field
- 1535 DK + KK to locate remaining wells + pond
- 1615 pond located, very small and shallow, more like a ditch  
see pictures
- 1640 remaining wells located, PBM-8201 is behind an 8ft fence  
and sandwiched between fence & corn field. It is  
not clear how to get on the other side of the fence  
and the fence is lined w/ poison ivy
- 1650 pump purge water into frac tank
- 1715 offsite

DK 8-30-18

Subject Badger GW Sampling			
Project No.		Sheet	
Calculations By	Date 8-31-18	Checked By	Date

P: GW sampling  
A: D. Kehoe, KJ Keon  
W: 65, sunny

- 0700 onsite, H&S tailgate
- 0725 set up @ PBN-1302A w/ 2" grundfos
- 0741 start pump, 10 W.V. = 59 gal
- 0750 set up pump @ PBN-1302D w/ 2" grundfos
- 0807 pump off @ 1302A, purged 20 gal
- 0825 set up pump @ PBN-1302B w/ 2" grundfos
- 0845 start pump @ PBN-1302D, 10 W.V. = 483 gal
- To avoid pumps overheating we will run them for 20 min then stop for 25 min, alternating between 1302D and 1302B
- 0905 ~~0910~~ stop pump @ 1302D
- 0915 start pump @ 1302B, 10 W.V. = 196 gal
- 0925 collect BAAP-PBGP-PBN-1302A for PFC's, 2 x 250 ml poly, no pres.
- 0935 stop pump @ 1302B, start pump @ 1302D (resume pumping)
- 0940 collect BAAP-EB-GW-083118-4, from 1302D screen/pump
- 1000 stop pump @ 1302D, resume pumping @ 1302B
- 1025 stop pump @ 1302B, resume pumping @ 1302D
- 1050 stop pump @ 1302D, resume pumping @ 1302B
- 1115 stop pump @ 1302B, resume pumping @ 1302D, 200 gal purged from 1302B
- 1135 collect BAAP-PBGP-PBN-1302B for PFC's 2 x 250 ml poly, no pres
- 1140 stop pump @ 1302D
- 1200 start pump @ 1302D
- 1210 pump off @ 1302D, total volume purged = 485 gal poly
- 1225 ~~0910~~ collect BAAP-PBGP-PBN-1302D for PFC's, 2 x 250 ml / no pres
- 1235 clean up equipment/supplies
- 1255 pump purge water into frac tank
- 1330 offsite, thob back to MIKE

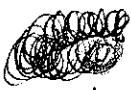
DK 8-31-18

Subject Badger GWS			
Project No.		Sheet	
Calculations By	Date 9-4-18	Checked By	Date

P: GW Sampling  
 A: D. Kehoe, K. Engle  
 W: 85, sunny

0700 K.E. leaves MAKE office  
 0930 K.E., D.K. onsite @ BAAP  
 0950 Pack up equipment/supplies  
 1040 onsite @ PBN-9301C/B  
 1050 set up 3"Grundfos @ 9301B  
 1122 start pump, 10 W.V. = 423 gal, start/stop well to allow recharge  
 1200 pull dedicated pump from 9301C, continue pumping 9301B  
 1230 Finish purging 9301B, purged 423 gal  
 1235 set up 3"Grundfos @ 9301C  
 1302 start pump, 842 gal = 10 W.V.  
~~1314~~ 1314 stop pump, purged 1st 250 gal, pause to empty tanks  
 1347 Resume pumping @ 9301C  
 1400 collect BAAP-PBGP-PBN-9301B for PFC's, 2 x 250 mL no pres  
 1425 End purge @ 9301C, purged 845 gal  
 1430 pull pump, clean up location  
 1500 collect BAAP-PBGP-PBN-9301C for PFC's, 2 x 250 mL, no pres  
 1525 pump purge water into frac tank  
 1600 onsite @ PBN-1302C, pull dedicated pump, set up 2"Grundfos  
 1620 start pump, 10 W.V. = ~~204~~ 204 gal  
 1745 finish purging, 205 gal purged  
 1755 collect BAAP-PBGP-PBN-1302C for PFC's, 2 x 250 mL no pres  
 1800 pack up equipment/supplies  
 1820 pump purge water into frac tank  
 1845 DK/KE offsite





9/5/18

P: Groundwater Sampling  
A: D. Kehoe, K. Engle  
W: 70, cloudy, light rain

- 0800 onsite, HAS tailgate
- 0830 onsite @ PBN-9303A/B/C
- 0900 set up @ 9303C, 10 W.V. = 603 gal
- 0925 start 3" Grundfos pump
- 0955 stop pump
- 1010 pump purge water into frac tank
- 1030 set up 3" Grundfos @ 9303D
- 1050 start pump, 10 W.V. =
- 1118 pause pumping, go to pump purge water into frac tank
- 1200 Resume pumping @ 9303D
- 1211 Finish purging 9303D, pull pump
- 1230 set up 3" Grundfos @ 9303B
- 1300 start pump, 10 W.V. = 243 gal
- 1310 stop pump, 260 gal purged
- 1320 collect BAAP-PBGP-PBN-9303D for PFC's, 2 x 250 mL, no pres
- 1330 collect BAAP-PBGP-PBN-9303C for PFC's, 2 x 250 mL, no pres
- 1340 collect BAAP-PBGP-PBN-9303B for PFC's, 2 x 250 mL, no pres
- 1420 pump purge water into frac tank
- 1445 onsite @ PBM-8201, set up 3" Grundfos
- 1540 start purging 8201, 10 W.V. = 114 gal
- 1547 stop pump, total volume purged = 420 gal
- 1550 pull pump/clean up
- 1605 collect BAAP-PBGP-PBM-8201 for PFC's, 2 x 250 mL no pres

9/6/18

P: SW and Sediment Sampling

A: D. Kehoe, K. Engle

W: 75°, sunny

0730 onsite, HHS tailgate

0800 clean up/drum contaminated waste/supplies

1000 onsite @ pond to collect surface ~~water~~ water and sediment

1100 collect BAAP-POND-1-SE, includes MS/MSD for PFAS 3 x 250 mL poly

1105 collect BAAP-FB-SE-090618 for PFC'S, 2 x 250 mL poly, no pres.

1110 collect BAAP-POND-2-SE for PFC'S, 1 x 250 mL poly, no pres, and DUP

1115 collect BAAP-POND-3-SE for PFC'S, 1 x 250 mL poly, no pres

~~1120 collect BAAP-FD-SE-090618 for PFC'S, 1 x 250 mL poly, no pres DK~~

BAAP-FD-SE-090618 1 x 250 mL poly, no pres ←

1130 collect BAAP-POND-1-SW for PFC'S, 6 x 250 mL poly, no pres (MS/MSD)

1140 collect BAAP-FB-SW-090618 for PFC'S 2 x 250 mL poly, no pres

1150 collect BAAP-POND-2-SW for PFC'S, 2 x 250 mL poly, no pres

collect BAAP-FD-SW-090618 for PFC'S 2 x 250 mL poly, no pres

1200 collect BAAP-POND-3-SW for PFC'S, 2 x 250 mL poly, no pres

## **Attachment 3**

Field Forms

DRAFT

ARCADIS

1 Sample/Core Log

Boring/Well BAAAP-PTA-SU1 Project/No. BAAAP/02118216, 1000/HAD00 Page 1 of 3

Site Location PARABOO, WF Drilling Started 10:10 8/28/10 Drilling Completed 09:00 8/29/10

Total Depth Drilled 95 Feet Hole Diameter 6 inches Type of Sample/ Coring Device Rotosonic Core Barrel

Length and Diameter of Coring Device 10' x 4" Sampling Interval continuous feet

Drilling Fluid Used NONE Drilling Method Rotosonic

Drilling Contractor CASCADE Driller Ben Price Helper Roy Buckenbeger, Trevor Veibank

Prepared By BRUCE EVANS Hammer Weight NA Drop NA ins.

Sample/Core Depth (feet below land surface) 0-2' SAND/SILT: brown (7.5 YR 4/4), little silt, trace subrounded to subangular gravel from 0.25" to 0.5" diameter, fine to coarse sand, predominately fine, moderately sorted, black staining, loose, no to low cohesiveness, saturated, slight odor.

PID Background = 0.011u

Time

From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
0	9	5		0-0.5: top soil/grass: very dark brown (7.5YR 2/2) silty/clayey top soil with grass/ rootlets/ organic material, silty firm-loose, v moist 0.5-9: silt: strong brown (7.5YR 5/6) clayey, some vf - fgn sand, silty firm-loose, very silty/plastic, trace rootlets, moist
9	10	5		9-7: silt: a/a moist 7-8.5 SAND: strong brown (7.5YR 5/6) vf - fgn, well sorted some silt, TR clay, loose, moist
				8.5-10 SAND/Gravel: reddish brown (7.5YR 6/6) vf - cgs g r sd, poorly sorted TR silt, f - cgs gravel, angular - subround, with cobble to 3" dia, loose, moist-dry
10	15	2		SAND/Gravel: g/a, moist-dry
15	20	5		SAND/Gravel: g/a moist-dry 2" GRAY (7.5YR 6/1) layer ~19.5'
20	25	5		20-21: SAND/Gravel: g/a moist 21-24: SAND: very pale brown (10YR 7/3) vf - fgn, well sorted, loose, moist
				24-24.5 SAND/Gravel: light brown (7.5YR 6/4) vf - cgs g r sand / f - cgs gravel angular - subround, cobble to 3" dia, poorly sorted, 100% c, moist
				24.5-25 SAND: pink (7.5YR 7/3) vf g r well sorted, loose, moist
25	30	5		25-29: SAND/Gravel: strong brown (7.5YR 6/6) vf - cgs g r sand, f - cgs gravel, angular - subround, cobble to 4" dia, poorly sorted, loose, moist

Sample/Core Log (Cont.d)

Boring/Well BAAP-FFA-SU-1

Page 2 of 3

Prepared by DE

Sample/Core Depth (feet below land surface)      Time/Hydraulic Pressure or Blows per 6 Inches

From      To      Core Recovery (feet)

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
29	30	S		29-30: Sand: Strong Brown (7.5yr 5/6) vf-fgr, well sorted, TR gravel 9/9 loose, moist
30	39	S		30-34: Sand/gravel: Light Brown (7.5yr 6/4) vf-CRSG sand, f-CRSG gravel angular-subround, some cobbles to 2" dia, poorly sorted, loose, moist. 34-35: Sand/gravel: Pink (7.5yr 4/3) mostly vf-fgr, some med-CRSG, moderately well sorted, <del>some</del> f-CRSG gravel, angular-subround, loose, moist
39	40	S		39-39.5 Sand/gravel: Brown (7.5yr 5/4) to dark yellowish brown (7.5yr 4/4) vf-CRSG sand, some silt, f-CRSG gravel, angular-subround TR cobbles to 2" dia, poorly sorted, loose, moist-dry 39.5-40 Sand/gravel: g/a but Brown (7.5yr 4/4) Loose, gravel, dry
40	49	S		40-41: Sand/gravel: g/a dry 41-49: Sand: Pink (7.5yr 4/3) mostly vf-fgr, some med-CRSG, moderately sorted, trace f gravel, angular-subround, loose moist 44.5-49: Sand/gravel: Sand pink g/a, gravel f-CRSG, cobbles to 3" dia + broken rock chips, loose, moist
49	50	S		49-50: Sand/gravel: Light Brown (7.5yr 6/3) vf-CRSG sand, poorly sorted, f-CRSG gravel, moist subangular-subround, cobbles to 2" dia, loose, (stuff?)
50	55	S		Sand: Pink (7.5yr 2/3) mostly vf-fgr, some med-CRSG, moderately sorted, some f-CRSG gravel, subangular-subround, varying % gravel, loose, dry-moist

Sample/Core Log (Cont.d)

Boring/Well DAAA-P-FFTA-SU-1

Page 3 of 3

Prepared by TN/BE

Sample/Core Depth (feet below land surface)      Core Recovery (feet)      Time/Hydraulic Pressure or Blows per 6 Inches

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description <sup>SAMPLE</sup>
55	60	S		NO Recovery / Sluff Material
60	65	S		SAND: Pink g/a varying to gravel
8/29/18 65	70	S		SAND: Pink (7.5yr 7/3) mostly VF-Egr, some med-CRS gr, moderately sorted, trace gravel, f-CRS, angular-subround, loose, moist <del>to moist at 57.5'</del> @
				66-67' more med-CRS gr sd
				73-73.5 VF-Egr well sorted sd
08:20 70	75	S		SAND: g/a ← moist to vmoist @ ≈ 73.5'
				75-80 SAND: very pale brown (10yr 7/3) VF-VCRS gr, higher to VF-Egr, poorly sorted, some too much f-CRS gravel, angular-subround, trace cobbles to 2" dia, loose, vmoist
				80-83.5 SAND: light brown (7.5yr 6/3) med-CRS gr, some VF-Egr, moderately well sorted, trace f-CRS gravel, angular-subround, loose, vmoist
				83.5-84.2: silt: brown (7.5yr 5/4) some VF-Egr sand, sli firm-loose, vmoist-wet
				84.2-85 SAND: pink (7.5yr 7/3) VF-med gr moderately well sorted, trace f-CRS gravel, angular-subround, loose, vmoist-wet
8:50 85	90	S		85-87 SAND: light brown (7.5yr 6/4) med-CRS gr, some VF-Egr, moderately well sorted, loose, wet
				87-90: silt: brown (7.5yr 5/4) firm-slightly loose, some of gr sand, wet
				90-92: silt: g/a, wet
				92-95: SAND: light brown (7.5yr 6/4) med-CRS gr, some VF-Egr, moderately well sorted, v. sli, trace f-med gravel, angular-subround, loose, wet

09:00 End borehole at 95'

DRAFT

ARCADIS

Sample/Core Log

Boring/Well BAAP-FFTA-SV-2 Project/No. BAAP / 02118216.1000.7AD00 Page 1 of 3

Site Location HAHA 600, WI Drilling Started 10:10 8/29/18 Drilling Completed 14:00 8/29/18

Total Depth Drilled 87 Feet Hole Diameter 6 inches Type of Sample/ Coring Device Kota Sonic Core Barrel

Length and Diameter of Coring Device 10" x 4" Sampling Interval continuous

Drilling Fluid Used None Drilling Method Kota Sonic  
 Contractor Cascade Driller Bon Price Helper Roy Backenbasa Travis Weikert

Prepared By Bruce Evans / Tess Nugent Hammer Weight NA Drop NA ins.

Sample/Core Depth (feet below land surface) From To Core Recovery (feet) PID/FID (ppm) Sample/Core Description  
 0-2' SAND/SILT: brown (7.5 YR 4/4), little silt, trace subrounded to subangular gravel from 0.25" to 0.5" diameter, fine to coarse sand, predominately fine, moderately sorted, black staining, loose, no to low cohesiveness, saturated, slight odor. PID BAC F gravel = 0.0ppm

From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
0	5	5		Auger Cuttings: 0-0.5 Top soil (vegetation): Very dark brown (7.5YR 2.5/3) silty/clayey soil with grass, organic material, rootlets, loose - g/l, firm, very moist 0.5-5: Silty: strong brown (7.5YR 4/6) clayey, slightly plastic, firm - loose trace veg soil, v moist
5	10	5		SAND/GRAVEL: light brown (7.5YR 6/4) v-f-cr ss sand, very poorly sorted same silt, f-cr ss gravel, angular - subround, and cobbles to 3", loose, moist
10	15	5		SAND/GRAVEL: g/a moist-dry sand: very pale brown (7.5YR 7/3) v-f-gr, some med gr, well sorted, trace f-cr ss gravel, angular - subround, loose, moist
15	20	5		20-23 SAND/GRAVEL: yellowish brown (7.5YR 5/4) to grayish brown (10YR 5/2) v-f-cr ss sand, v. poorly sorted, f-cr ss gravel angular - subround, and cobbles to 4" diam rock chips, loose, moist-dry
20	25	5		23-25: SAND: light brown (7.5YR 6/4) f-med gr, some veg, well sorted, loose, trace f-cr ss gravel, angular - subround, moist
25	30	5		25-27: / stuff - no sample 27-28: SAND: g/a, moist 28-30: SAND/GRAVEL: light brown (7.5YR 6/4) v-f-cr ss sand, poorly sorted, with f-cr ss gravel, angular - subround and cobbles to 3" dia, loose, moist-dry

Sample/Core Log (Cont.d)

Boring/Well BMAP-FFTA-SN-2

Page 2 of 3

Prepared by BE/TN

Sample/Core Depth  
(feet below land surface) Core  
Recovery (feet) Time/Hydraulic  
Pressure or  
Blows per 6  
Inches

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
<del>29</del> 30	<del>30</del> 35	5		30-31: SAND/Gravel g/g, moist 31-33 SAND: light brown (7.5 yr 6/4) mostly vf-fgr, some med-crs gr, moderately well sorted, loose, moist 33-34: SAND: color g/g med-crs gr vr vf-fgr, moderately well sorted, to x-med gravel, angular-subangular, & loose, moist 34-34.5 SAND: Pink (7.5 yr 7/4) vf-fgr well sorted, loose, moist-dry 34.5-35 SAND/Gravel: Brown (7.5 yr 5/4) mostly med-crs gr sd, some vf-fgr, moderately sorted, loose, f-crs gravel angular-subrounded, sluff - no sample
35	40	5		
40	45	5		SAND/Gravel: Pink (7.5 yr 7/3) mostly vf-fgr sand, some med-crs, moderately well sorted, loose, f-crs gravel angular-subround, with cobbles to 2+ dia moist-dry
45	50	5		45-47: sluff - no sample 47-50: SAND: Pink (7.5 yr 7/3) f-med gr some vf-fgr, moderately well sorted, loose, some f-crs gravel, ang-subrad, moist-dry
50	55	5		50-51: SAND/Gravel: g/g, dry 51-55: SAND/Gravel: Pinkish white (7.5 yr 8/2) mostly vf-gr sand, some f-med below 54', moderately well sorted, gravel f-crs, ang-subrounded, loose, DRY-moist



Sample/Core Log (Cont.d)

Boring/Well BAAP-FFTA-SN-2

Page 3 of 3

Prepared by J E/TN

Sample/Core Depth (feet below land surface) Core Recovery (feet) Time/Hydraulic Pressure or Blows per 6 Inches

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
59	60	5		59-57: Sluff - no sample
				57-60: SAND/gravel: g/g dry
60	63.5	5		60-63.5 SAND: Pink (7.5yr 7/3) <sup>TRACE CRS GR</sup> mostly f-med gr, some vfgr, <sup>TRACE CRS GR</sup> moderately well sorted, trace f-crs gravel, ang-suband, loose, moist-dry
				63.5-65: SAND: Pink (7.5yr 7/3) vf-fgr, well sorted, sli trace f-crs gravel, ang-suband, loose, moist-dry
65	70	5		SAND: Light Brown (7.5yr 6/3) vf-fgr some silt, moderately well sorted with much f-crs gravel, angular-suband, loose moist-dry
70	75	0		NO RECOVERY
75	80	5		SAND: Pink (7.5yr 7/3) f-med gr, some vf-crs gr, moderately well sorted Loose, trace f-crs gravel, angular-suband vmoist
80	87	7		SAND: g/a more med gr, vmoist to wat at ≈ 81-82', decreasing gravel %.
				14:00 End Borehole at 87'

ARCADIS

DAFT

Sample/Core Log

Boring/Well BAAP-FFTA-SU-3 Project/No. BAAP/02118216.1080.7AD00 Page 1 of 4

Site Location BATAHOO, WI Drilling Started 14:55 8/29/18 Drilling Completed 09:30 8/30/18

Total Depth Drilled 87 Feet Hole Diameter 6 inches Type of Sample/ Coring Device Rotasonic core barrel

Length and Diameter of Coring Device 10' x 4" Sampling Interval continuous feet

Drilling Fluid Used None Drilling Method Rotasonic

Drilling Contractor Cascade Driller Ben Helper ROY

Prepared By Grace Evans / Jess Nugent Hammer Weight NA Drop WIT ins.

Sample/Core Depth (feet below land surface) 0-2' SAND/SILT: brown (7.5 YR 4/4), little silt, trace subrounded to subangular gravel from 0.25" to 0.5" diameter, fine to coarse sand, predominately fine, moderately sorted, black staining, loose, no to low cohesiveness, saturated, slight odor.

From To Core Recovery (feet) PID/FID (ppm) Sample/Core Description PID blank from 4 = 0.0ppm

From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
0	5	5		Hand Auger: 0-0.5 Top soil/vegetation: very dark brown (7.5YR 2.5/3) silty/clayey topsoil with grass, organic material, rootlets, loose-silty, moist
5	10	5		0.5-9 silt: gray brown (7.5YR 4/6) clayey silty plastic, firm-loose, moist sand/gravel: strong brown (7.5YR 4/6) ve-cas sand, fine-cas gravel, angular-subround, cobbles to 3" dia and broken rock chips, poorly sorted, loose, moist
10	15	5		sand/gravel: g/a moist
15	20	5		sand/gravel: g/a moist
20	25	5		20-23: SAND: Light brown (7.5YR 6/3), mostly medium gr some f-f, well sorted, much f-cas gravel, angular-subround, with cobbles to 2" dia, loose, moist
				23-24: SAND: Pink (7.5YR 7/4) v f-cg, some med gr, moderately well sorted, loose, moist
25	30	5		25-29 SAND: g/a (20-23) much gravel, moist 25-26: SAND: g/a w/ gravel, moist 26-27: SAND: Pink (7.5YR 7/3), f ga well sorted, some v f & med gr, loose, moist 27-30 SAND/Gravel: light brown (7.5YR 6/3) v f-cas gr sand, poorly sorted w/ f-cas gravel, cas-subround, and cobbles to 2" dia, loose, moist

Sample/Core Log (Cont.d)

Boring/Well BAAW-FFTA-SN-3

Page 2 of 4

Prepared by DE/TU

Sample/Core Depth (feet below land surface)      Core Recovery (feet)      Time/Hydraulic Pressure or Blows per 6 Inches      Sample/Core Description

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
30	35	5		30-30.5: SAND/Gravel: g/a moist 30.5-34: SAND: Light Brown (7.5yr 6/4) mostly med gr, some vf-fc CRS gr, moderately well sorted, trace f-CRS gravel, ang-sub sand, loose, moist
				34-35: SAND/gravel: Light Brown (7.5yr 6/4) vf-CRS gr sand, f-CRS gravel, angular- sub sand, some cobbles to 2", poorly sorted, loose, moist
35	40	5		35-37: Sluff - no sample 37-40: SAND: Pink (7.5yr 7/4) f-med gr, some vf gr, moderately well sorted, some f-CRS gravel, ang-sub sand, loose moist-dry
40	45	5		40-42.5 SAND: pink (7.5yr 7/4) mostly f-gr with some vf med gr, moderately well sorted, loose, trace f-CRS gravel, ang-sub sand, moist 42.5-45: SAND: color g/a mostly med f-gr, some CRS gr, somewhat <sup>well</sup> sorted, some f-CRS gravel, ang-sub sand, loose, moist
8/30/18	45	50	5	16:30 END & Likly for day at 45' 45-49 SAND: g/a but light brown (7.5yr 8/3) moist 49-50 SAND: pink (7.5yr 7/3) mostly vf-fgr, some med-CRS gr, moderately well sorted, some f-CRS gravel, angular-sub sand Loose, moist

Sample/Core Log (Cont.d)

Boring/Well BATH-FFTH-9N-3

Page 3 of 4

Prepared by BE/TU

Sample/Core Depth (feet below land surface)	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
59	59	5	SAND: g/a pink, moist
59	60	5	59-56: Sluff/No sample
			56-59: SAND: Pink (7.5yn 7/3) vf-fgr, well sorted, loose, moist
			59-60: SAND: Light brown (7.5yn 6/4) vf-crsgr, poorly sorted, some f-crs gravel, ang-subang, loose, moist
60	69	5	60-62: SAND: Pink (7.5yn 7/3) f-medgr, some vf/crsgr, moderately well sorted 2" layer @ 61' of f-gravel, angular-subangular crs sand, loose moist
			62-62.5: SAND: Light Brown (7.5yn 6/4) med-crsgr, some vf-fgr, moderately sorted, some fine gravel angular-subang loose, moist
			62.5-69 SAND: Pink (7.5yn 7/3) vf-fgr, well sorted, very SLI trace f-crs gravel, angular-subang, loose, moist
69	70	5	69-69 Sluff: No sample
			69-70: SAND/gravel/cobbles: Brown (7.5yn 5/4) mostly med-v-crsgr sand, some vf-f, poorly sorted, with f-crs gravel, ang-subang, cobbles to 2" dia, also broken rock pieces, loose, moist
70	79	5	70-72 SAND/gravel/cobbles: g/a moist
			72-79 SAND/gravel: Brown (7.5yn 4/3) vf-crsgr SAND, f-crs gravel, ang-subang, broken rock fragments, loose, moist-dry



### Sample/Core Log (Cont.d)

Boring/Well

HAAAP-FFTA-SN-3

Page

4 of 4

Prepared by

RE/TU

Sample/Core Depth

(feet below land surface)

Core

Recovery

(feet)

Time/Hydraulic

Pressure or

Blows per 6

Inches

Sample/Core Description

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
79	80	5		SAND: P.M.F (7.5yr 2/4) mostly med gr, some VE-F/CRS gr, moderately well sorted, Trace F-CRS gravel, Angular-subang, loose, v moist-moist
80	87	7		80-86: SAND: color g/a, f-med gr, some VEGr, moderately well sorted, loose, v moist-wet <del>81-82</del> 86-86.5: Silt: Brown (7.5yr 9/4) sandy wt vrgn sand, mostly firm - slightly loose, wet 86.5-87 SAND: Light brown (7.5yr 6/4) vreegr, some med-CRSGr, moderately well sorted, loose, wet
				09:30 End Borehole at 87'

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_

Well ID PBN-8205<sup>C</sup>

Date 8-30-18

Project Name/Location Bodger

Weather \_\_\_\_\_

Measuring Pt. Description TDC Screen Setting (ft-bmp) 131.5-133.5 Casing Diameter (in.) 4

Well Material  PVC  SS

Static Water Level (ft-bmp) 100.20 Total Depth (ft-bmp) 133.5 Water Column/ Gallons in Well 21.6 x 10 = 216 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 127.5 Purge Method: 2" Grundfos

Sample Method PVC Bailer

Pump On/Off 805/940 Volumes Purged 10 Centrifugal  Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_  
Start \_\_\_\_\_  
End 1005

Sampled by KK

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1005</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>216</u>	<u>7.47</u>	<u>0.390</u>	<u>10.7</u>	<u>9.29</u>	<u>11.9</u>	<u>172.1</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC'S</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>
<u>shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Condition of Well: <u>very difficult to remove PVC cap</u>	Well Locked at Departure: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Well Completion: <u>Flush Mount / Sick Up</u>	Key Number To Well: _____

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_ Well ID PBU-8205A Date 8-30-18

Project Name/Location Badger Weather 65, Sunny

Measuring Pt. TOC Screen Setting (ft-bmp) 102.5-112.5 Casing Diameter (in.) 4 Well Material  PVC  SS

Static Water Level (ft-bmp) 99.53 Total Depth (ft-bmp) 112.50 Water Column/ Gallons in Well 8.4 x 10 = 84 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 107.50 Purge Method: 2" Grundfos Sample Method PVC Bailor

Pump On/Off 945/1025 Volumes Purged 10 Centrifugal  Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_

Start \_\_\_\_\_ End 1040 Sampled by KK

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1040</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>85</u>	<u>7.44</u>	<u>0.74</u>	<u>2.63</u>	<u>8.31</u>	<u>13.4</u>	<u>155.5</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>
<u>shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: \_\_\_\_\_ Well Locked at Arrival:  Yes /  No

Condition of Well: Good Well Locked at Departure:  Yes /  No

Well Completion: \_\_\_\_\_ Flush Mount /  Stick Up Key Number To Well: \_\_\_\_\_

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_ Well ID PBM-8203 Date 8-30-18

Project Name/Location Badger Weather 70° Sunny

Measuring Pt. TOC Screen Setting (ft-bmp) \_\_\_\_\_ Casing Diameter (in.) 4 Well Material  PVC  SS

Static Water Level (ft-bmp) 90.16 Total Depth (ft-bmp) 112.80 Water Column/ Gallons in Well 14.7 x 10 = 147 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 107.80 Purge Method: \_\_\_\_\_ Sample Method \_\_\_\_\_

Pump On/Off \_\_\_\_\_ Volumes Purged 10 Centrifugal \_\_\_\_\_ Submersible \_\_\_\_\_ Other \_\_\_\_\_

Sample Time: Label 1410 Replicate/ Code No. \_\_\_\_\_

Start \_\_\_\_\_ End \_\_\_\_\_ Sampled by \_\_\_\_\_

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1410</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>~150</u>	<u>7.25</u>	<u>0.680</u>	<u>9.72</u>	<u>8.44</u>	<u>14.3</u>	<u>131.6</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC'S</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: \_\_\_\_\_ Well Locked at Arrival:  Yes /  No

Condition of Well: Good Well Locked at Departure:  Yes /  No

Well Completion: Flush Mount / Stick Up Key Number To Well: \_\_\_\_\_



**GROUNDWATER SAMPLING LOG**

PBW-

Page 1 of 1

Project No. \_\_\_\_\_

Well ID 8201A

Date 8-29-18

Project Name/Location Badger

Weather 65, P.C

Measuring Pt. TOC Screen Setting (ft-bmp) 108-118

Casing Diameter (in.) 4

Well Material  PVC  SS

Static Water Level (ft-bmp) 104.40 Total Depth (ft-bmp) 118.07

Water Column/ Gallons in Well 8.9 x 10 = 89 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 113

Purge Method: 2" Grundfos

Sample Method PVC Baiter

Pump On/Off ~~1110/1140~~ Volumes Purged 10

Centrifugal   
Submersible   
Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_  
Start \_\_\_\_\_  
End 1740

Sampled by RK

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1240</u>	<u>-</u>	<u>-</u>		<u>90</u>	<u>7.36</u>	<u>0.06</u>	<u>13.6</u>	<u>8.46</u>	<u>12.8</u>	<u>72.4</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>
<u>shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <u>Yes</u> / No
Condition of Well: <u>Good / Wasps</u>	Well Locked at Departure: <u>Yes</u> / No
Well Completion: <u>Flush Mount / <u>Stick Up</u></u>	Key Number To Well: _____

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_ Well ID PBN-8201B Page 1 of 1  
 Date 8-29-18  
 Project Name/Location Badger Weather 65° partly cloudy  
 Measuring Pt. TOC Screen Setting (ft-bmp) 129.5-131.5 Casing Diameter (in.) 4 Well Material  PVC  SS  
 Static Water Level (ft-bmp) 103.72 Total Depth (ft-bmp) 141 Water Column/ Gallons in Well 24.2 x 10 = 242  
 MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 131 Purge Method: 2" Grundfos Sample Method PVC Driller  
 Pump On/Off 0950/1105 Volumes Purged 10 Centrifugal  Submersible  Other \_\_\_\_\_  
 Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_ Sampled by KK  
 Start \_\_\_\_\_ End 1245

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1245</u>	<del>1245</del>	<u>-</u>	<u>-</u>	<u>245</u>	<u>7.93</u>	<u>0.72</u>	<u>1.13</u>	<u>7.78</u>	<u>13.3</u>	<u>84.6</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>
<u>shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / No
Condition of Well: <u>Good</u>	Well Locked at Departure: <input checked="" type="checkbox"/> Yes / No
Well Completion: Flush Mount / <u>Stick Up</u>	Key Number To Well: _____

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_

Well ID PBW-8205B

Date 8-29-18

Project Name/Location Badger

Weather 70° P.C.

Measuring Pt. Description TDC

Screen Setting (ft-bmp) 1223 - 1243

Casing Diameter (in.) 4

Well Material  PVC  SS

Static Water Level (ft-bmp) 99.92

Total Depth (ft-bmp) 123.75

Water Column/ Gallons in Well 15.5 x 10 = 155 gal

MP Elevation \_\_\_\_\_

Pump Intake (ft-bmp) 118

Purge Method: 2" grundfos  
 Centrifugal  
 Submersible  
 Other \_\_\_\_\_

Sample Method PVC Bailer

Pump On/Off 1513

Volumes Purged 10

Sample Time: Label \_\_\_\_\_ Replicate/ Start \_\_\_\_\_ Code No. \_\_\_\_\_ End ~~1710~~ 1710

Sampled by KK

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1710</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>155</u>	<u>7.28</u>	<u>0.71</u>	<u>5.71</u>	<u>9.04</u>	<u>13.1</u>	<u>120.6</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>

Shaker test = no bubbles

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: <u>good</u>	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / No
Condition of Well: <u>good</u>	Well Locked at Departure: <input checked="" type="checkbox"/> Yes / No
Well Completion: Flush Mount / <u>Stick Up</u>	Key Number To Well: _____

## GROUNDWATER SAMPLING LOG

Page \_\_\_ of \_\_\_

Project No. \_\_\_\_\_

Well ID PBN-B201C

Date 8-28-18

Project Name/Location Badger

Weather 75, cloudy

Measuring Pt. Screen  
Description Setting (ft-bmp)

Casing Diameter (in.) 4

Well Material  PVC  
 SS

Static Water Level (ft-bmp) 103.57 Total Depth (ft-bmp) 135.15

Water Column/ Gallons in Well 20.527 x 10 = 205.27

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 125

Purge Method: Redi-Flo 3

Sample Method PVC Bailer

Pump On/Off 0940 Volumes Purged 10

Centrifugal   
Submersible   
Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/Code No. \_\_\_\_\_  
Start \_\_\_\_\_  
End 1340

Sampled by \_\_\_\_\_

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
1340	-	-	-	205	7.37	0.104	16.3	8.75	15.3		clear	no

Constituents Sampled	Container	Number	Preservative
<u>PFC'S 2 x 250 mL Poly</u>	<u>250 mL Poly</u>	<u>2</u>	<u>None</u>
<u>SHAKE TEST = No bubbles/Foam</u>			

**Well Casing Volumes**

Gallons/foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Condition of Well: <u>Good, No SPs</u>	Well Locked at Departure: <input type="checkbox"/> Yes / <input type="checkbox"/> No
Well Completion: <u>Flush Mount / <u>Stick Up</u></u>	Key Number To Well: _____

### GROUNDWATER SAMPLING LOG

Project No. \_\_\_\_\_ Well ID PBW-9301C Page 1 of 1  
 Project Name/Location Badger Date 9-4-18  
 Measuring Pt. TDC Screen Setting (ft-bmp) 217.5-227.5 Casing Diameter (in.) 4 Weather BS, Sunny  
 Description \_\_\_\_\_ Well Material  PVC  SS  
 Static Water Level (ft-bmp) 98.00 Total Depth (ft-bmp) ~227 Water Column/ Gallons in Well 84.2 x 10 = 842  
 MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) \_\_\_\_\_ Purge Method: 3" Grundfos Sample Method PVC Bailer  
 Pump On/Off 1302/1425 Volumes Purged 10 Centrifugal Submersible  Other \_\_\_\_\_  
 Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_  
 Start \_\_\_\_\_ End 1500 Sampled by KE

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
1500	-	-	-	845	7.53	0.00	10.38	7.14	13.9	62.3	clear	none

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 ml poly</u>	<u>2</u>	<u>None</u>
<u>shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: \_\_\_\_\_ Well Locked at Arrival:  Yes /  No  
 Condition of Well: Good Well Locked at Departure:  Yes /  No  
 Well Completion: Stick Up /  Flush Mount Key Number To Well: \_\_\_\_\_



**GROUNDWATER SAMPLING LOG**

Page 1 of 1

Project No. \_\_\_\_\_ Well ID DBV-13020 Date 9-4-18

Project Name/Location Badger Weather 85, P.C.

Measuring Pt. 70C Screen Setting (ft-bmp) 182.6-187.6 Casing Diameter (in.) 2 1/8" 2 Well Material  PVC  SS

Static Water Level (ft-bmp) 59.88 Total Depth (ft-bmp) 187.60 Water Column/ Gallons in Well 20.4 204 gal  
~~20.4~~ x 10 = ~~204~~

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 182.6 Purge Method: 2" Grundfos Sample Method PVC Bailer

Pump On/Off 1620/1745 Volumes Purged 10 Centrifugal  Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_ Start \_\_\_\_\_ End 1755 Sampled by KE

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1755</u>				<u>205</u>	<u>7.72</u>	<u>0.70</u>	<u>6.38</u>	<u>6.34</u>	<u>14.3</u>	<u>92.6</u>	<u>Clear</u>	<u>None</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC'S</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>
<u>Shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: \_\_\_\_\_ Well Locked at Arrival:  Yes /  No

Condition of Well: Great Well Locked at Departure:  Yes /  No

Well Completion: Flush Mount / Stick Up Key Number To Well: \_\_\_\_\_

**GROUNDWATER SAMPLING LOG**

Page 1 of 1

Project No. \_\_\_\_\_

Well ID PBN-9301B

Date 9-4-18

Project Name/Location Badger

Weather 85°, sunny

Measuring Pt. TOC Screen Setting (ft-bmp) 150.5 - 160.5

Casing Diameter (in.) 4 1 w.v.

Well Material  PVC  SS

Static Water Level (ft-bmp) 98.32 Total Depth (ft-bmp) 163.51

Water Column/ Gallons in Well 423 x 10 = 423 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 158.5

Purge Method: 3" Grundfos

Sample Method PVC Bailor

Pump On/Off 1122/1230 Volumes Purged 10

Centrifugal  Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_  
Start \_\_\_\_\_  
End 1400

Sampled by \_\_\_\_\_

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1400</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>425</u>	<u>7.37</u>	<u>0.70</u>	<u>6.20</u>	<u>6.42</u>	<u>14.2</u>	<u>110.7</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC'S</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>

shaker test = no bubbles

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <u>Yes</u> / No
Condition of Well: <u>Good</u>	Well Locked at Departure: <u>Yes</u> / No
Well Completion: _____ Flush Mount / <u>Stick Up</u>	Key Number To Well: _____

## GROUNDWATER SAMPLING LOG

Project No. \_\_\_\_\_ Well ID PBW-1302D Date 8-31-18

Project Name/Location Badger Weather 65, sunny

Measuring Pt. 70C Screen Setting (ft-bmp) 241.1 - 245.1 Casing Diameter (in) 2.5 Well Material  PVC  SS

Static Water Level (ft-bmp) 59.17 Total Depth (ft-bmp) 245.1 Water Column/ Gallons in Well 48.3 x 10 = 483

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 230 Purge Method: 2" grundfos Sample Method DVC Bailer

Pump On/Off 0845/1210 Volumes Purged 10 Centrifugal Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_

Start \_\_\_\_\_ End 1225 Sampled by KK

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1225</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>485</u>	<u>7.24</u>	<u>0.472</u>	<u>4.29</u>	<u>1.40</u>	<u>14.0</u>	<u>80.7</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL Poly</u>	<u>2</u>	<u>None</u>

Shaker test = no bubbles

**Well Casing Volumes**

Gallons/Foot	1" = 0.04 1.25" = 0.06	1.5" = 0.09 2" = 0.16	2.5" = 0.26 3" = 0.37	3.5" = 0.50 4" = 0.65	6" = 1.47
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**Well Information**

Well Location: <u>Great</u>	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Condition of Well: <u>Great</u>	Well Locked at Departure: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Well Completion: <u>Stick Up</u>	Key Number To Well: _____



GROUNDWATER SAMPLING LOG

Page 1 of 1

Project No. \_\_\_\_\_

Well ID PBN-1302B

Date 8-31-18

Project Name/Location Badger

Weather 65, Sunny

Measuring Pt. Description TDC

Screen Setting (ft-bmp) 131.2 - 136.2 Casing Diameter (in.) 2.5

Well Material  PVC  SS

Static Water Level (ft-bmp) 160.48

Total Depth (ft-bmp) 136.20 Water Column/Gallons in Well 19.6 x 10 = 196 gal

MP Elevation \_\_\_\_\_

Pump Intake (ft-bmp) 131.20

Purge Method: 2" Grundfos  
 Centrifugal  
 Submersible  
 Other \_\_\_\_\_

Sample Method PVC Bailor

Pump On/Off 0915/1115

Volumes Purged 10

Sample Time: Label \_\_\_\_\_  
 Start \_\_\_\_\_  
 End 1135

Replicate/Code No. \_\_\_\_\_

Sampled by KK

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1135</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>200</u>	<u>7.42</u>	<u>0.73</u>	<u>2.83</u>	<u>6.03</u>	<u>13.0</u>	<u>118.7</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL Poly</u>	<u>2</u>	<u>None</u>
<u>shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Condition of Well: <u>Great</u>	Well Locked at Departure: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Well Completion: Flush Mount / <input checked="" type="checkbox"/> <u>Stick Up</u>	Key Number To Well: _____

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_ Well ID PBN-1302A Date 8-31-18

Project Name/Location Badger Weather 65, sunny

Measuring Pt. TOC Screen Setting (ft-bmp) \_\_\_\_\_ Casing Diameter (in.) 2.5 Well Material  PVC  ~~Stainless~~

Static Water Level (ft-bmp) 61.09 Total Depth (ft-bmp) 83.8 Water Column/ Gallons in Well 5.9 x 10 = 59 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 78.8 Purge Method: 2" Grundfos Sample Method PVC Bailor

Pump On/Off 0741/0907 Volumes Purged 10 Centrifugal \_\_\_\_\_ Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_

Start \_\_\_\_\_ End 0925 Sampled by KK

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>0925</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>10</u>	<u>7.50</u>	<u>0.74</u>	<u>5.20</u>	<u>9.67</u>	<u>13.2</u>	<u>118.7</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL Poly</u>	<u>2</u>	<u>None</u>

Shaker test = no bubbles

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: \_\_\_\_\_ Well Locked at Arrival:  Yes / No

Condition of Well: Great Well Locked at Departure:  Yes / No

Well Completion: Flush Mount /  Stick Up Key Number To Well: \_\_\_\_\_

GROUNDWATER SAMPLING LOG

Project No. \_\_\_\_\_ Well ID PBN-9303<sup>C</sup> Page 1 of 1  
 Project Name/Location Badger Date 9-5-18  
 Measuring Pt. TBC Screen Setting (ft-bmp) 154.5-164.5 Casing Diameter (in.) 3.5" Weather 70°  
 Description \_\_\_\_\_ Well Material  PVC  SS  
 Static Water Level (ft-bmp) 43.90 Total Depth (ft-bmp) 164.5 Water Column/ Gallons in Well 60.3 x 10 = 603 gal  
 MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 159.5 Purge Method: 3" Grundfos Sample Method PVC Bailor  
 Pump On/Off 0925/0955 Volumes Purged 10 Centrifugal   
 Other   
 Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_  
 Start \_\_\_\_\_  
 End 1330 Sampled by KE

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
1330	—	—	—	610	7.79	0.595	12.1	4.88	12.5	-1.9	clear	none

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>

Shaker test = no bubbles

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <input checked="" type="radio"/> Yes / <input type="radio"/> No
Condition of Well: <u>Good</u>	Well Locked at Departure: <input checked="" type="radio"/> Yes / <input type="radio"/> No
Well Completion: <u>Flush Mount / <input checked="" type="radio"/> Stick Up</u>	Key Number To Well: _____

**GROUNDWATER SAMPLING LOG**

Page 1 of 1

Project No. \_\_\_\_\_

Well ID PBM-8201

Date 9-5-18

Project Name/Location Badger

Weather 70°, light rain

Measuring Pt. TDC Screen Setting (ft-bmp) 80.7-100.7 Casing Diameter (in.) 3.5"

Well Material  PVC  SS

Static Water Level (ft-bmp) 77.94 Total Depth (ft-bmp) 100.7 Water Column/ Gallons in Well 11.4 x 10 = 114 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) 95.7 Purge Method:  3" Grundfos

Sample Method PVC Bailer

Pump On/Off 1540/1547 Volumes Purged 10

Centrifugal  Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_  
Start \_\_\_\_\_  
End 11005

Sampled by KE

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>11005</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>120</u>	<u>7.59</u>	<u>0.68</u>	<u>12.7</u>	<u>9.89</u>	<u>13.0</u>	<u>60.6</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL poly</u>	<u>2</u>	<u>None</u>

Shaker test = no bubbles

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Condition of Well: <u>Good</u>	Well Locked at Departure: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Well Completion: Flush Mount / <u>Stick Up</u>	Key Number To Well: _____

GROUNDWATER SAMPLING LOG

Project No. \_\_\_\_\_ Well ID PBN-9303D Date 9-5-18

Project Name/Location Badger Weather 70', cloudy

Measuring Pt. TDC Screen Setting (ft-bmp) 214.5-224.5 Casing Diameter (in.) 3.5" Well Material  PVC  SS

Static Water Level (ft-bmp) 42.98 Total Depth (ft-bmp) 224.5 Water Column/ Gallons in Well 90.8 x 10 = 908 gal

MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) ~~224.5~~ 180 Purge Method: 3" Grundfos Sample Method PVC Bailor

Pump On/Off 1050/1118/ Volumes Purged 10 Centrifugal  Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_ Replicate/ Code No. \_\_\_\_\_ Sampled by KE

Start \_\_\_\_\_ End 1320

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1320</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>910</u>	<u>8.14</u>	<u>0.469</u>	<u>22.1</u>	<u>5.00</u>	<u>13.1</u>	<u>-103.7</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 mL Poly</u>	<u>2</u>	<u>None</u>
<u>Shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Condition of Well: <u>Good</u>	Well Locked at Departure: <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No
Well Completion: <u>Flush Mount</u> / <u>Stick Up</u>	Key Number To Well: _____

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_

Well ID PBN-9303B

Date 9-5-18

Project Name/Location Badger

Weather 70°, cloudy

Measuring Pt. TDC

Screen Setting (ft-bmp) 83.5 - 93.5

Casing Diameter (in.) 3.5

Well Material  PVC  SS

Static Water Level (ft-bmp) 44.90

Total Depth (ft-bmp) 93.5

Water Column/ Gallons in Well 24.3 x 10 = 243 gal

MP Elevation \_\_\_\_\_

Pump Intake (ft-bmp) 88.5

Purge Method: 3" Grundfos

Sample Method PVC Bailor

Pump On/Off 1300/1310

Volumes Purged 10

Centrifugal  Submersible  Other \_\_\_\_\_

Sample Time: Label \_\_\_\_\_  
Start \_\_\_\_\_  
End 1340

Replicate/ Code No. \_\_\_\_\_

Sampled by KE

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1340</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>240</u>	<u>7.81</u>	<u>0.72</u>	<u>13.2</u>	<u>7.58</u>	<u>12.4</u>	<u>6.0</u>	<u>clear</u>	<u>none</u>

Constituents Sampled	Container	Number	Preservative
<u>PFC's</u>	<u>250 ml poly</u>	<u>2</u>	<u>None</u>
<u>shaker test = no bubbles</u>			

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location:	<u>Good</u>	Well Locked at Arrival:	<u>Yes</u> / No
Condition of Well:		Well Locked at Departure:	<u>Yes</u> / No
Well Completion:	Flush Mount / <u>Stick Up</u>	Key Number To Well:	

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_ Well ID POWD-1 (*Surface water*) Page 1 of 1  
 Project Name/Location BADGER Date 9-6-18  
 Measuring Pt. \_\_\_\_\_ Screen \_\_\_\_\_ Casing \_\_\_\_\_ Weather 75, Sunny  
 Description \_\_\_\_\_ Setting (ft-bmp) \_\_\_\_\_ Diameter (in.) \_\_\_\_\_ Well Material PVC  
 Static Water \_\_\_\_\_ Total Depth (ft-bmp) \_\_\_\_\_ Gallons in Well \_\_\_\_\_  
 Level (ft-bmp) \_\_\_\_\_ Pump Intake (ft-bmp) \_\_\_\_\_ Purge Method: \_\_\_\_\_  
 MP Elevation \_\_\_\_\_ Pump On/Off \_\_\_\_\_ Volumes Purged \_\_\_\_\_ Centrifugal \_\_\_\_\_  
 Pump On/Off \_\_\_\_\_ Other \_\_\_\_\_ Submersible \_\_\_\_\_  
 Sample Time: Label 1130 Replicate/ \_\_\_\_\_ Other \_\_\_\_\_  
 Start 1100 Code No. \_\_\_\_\_ Sample Method grab  
 End \_\_\_\_\_ Sampled by KF

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1100</u> <u>1130</u>	-	-	-	-	<u>7.32</u>	<u>0.300</u>	<u>71000</u>	<u>0.99</u>	<u>19.7</u>	<u>194.8</u>	<u>turbid</u>	<u>none</u>
											<u>broken</u>	

Constituents Sampled	Container	Number	Preservative
<u>PFL's</u>	<u>750mL poly</u>	<u>2</u>	<u>None</u>
<u>MS/MSD</u>	<u>250 mL poly</u>	<u>4</u>	<u>None</u>

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: Yes / No
Condition of Well: _____	Well Locked at Departure: Yes / No
Well Completion: _____	Key Number To Well: _____

**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_ Well ID POND-2 (surface water) Page 1 of 1  
 Date 9.6.18  
 Project Name/Location Badger Weather 75, sunny  
 Measuring Pt. Description \_\_\_\_\_ Screen Setting (ft-bmp) \_\_\_\_\_ Casing Diameter (in.) \_\_\_\_\_ Well Material      PVC      SS  
 Static Water Level (ft-bmp) \_\_\_\_\_ Total Depth (ft-bmp) \_\_\_\_\_ Water Column/ Gallons in Well \_\_\_\_\_  
 MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) \_\_\_\_\_ Purge Method: \_\_\_\_\_ Sample Method grab  
 Pump On/Off \_\_\_\_\_ Volumes Purged \_\_\_\_\_ Centrifugal \_\_\_\_\_ Submersible \_\_\_\_\_ Other \_\_\_\_\_  
 Sample Time: Label 1150 Replicate/ Code No. \_\_\_\_\_ Start \_\_\_\_\_ End \_\_\_\_\_  
 Sampled by KE

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C) (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1110</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>7.07</u>	<u>0.266</u>	<u>71000</u>	<u>0.80</u>	<u>19.5</u>	<u>176.7</u>	<u>turbid</u>	<u>none</u>
<u>1150</u>											<u>brown</u>	

Constituents Sampled	Container	Number	Preservative
<u>PFL's</u>	<u>250ml poly</u>	<u>2</u>	<u>none</u>
<u>Duplicate</u>	<u>250ml poly</u>	<u>2</u>	<u>none</u>

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: <u>Yes</u> / <u>  </u> / <u>No</u>
Condition of Well: _____	Well Locked at Departure: <u>Yes</u> / <u>  </u> / <u>No</u>
Well Completion: <u>Flush Mount</u> / <u>Stick Up</u>	Key Number To Well: _____



**GROUNDWATER SAMPLING LOG**

Project No. \_\_\_\_\_ Well ID POND-3 (surface water) Page 1 of 1  
 Date 9.6.18  
 Project Name/Location Badyen Weather 75, sunny  
 Measuring Pt. Description \_\_\_\_\_ Screen Setting (ft-bmp) \_\_\_\_\_ Casing Diameter (in.) \_\_\_\_\_ Well Material PVC  
 Static Water Level (ft-bmp) \_\_\_\_\_ Total Depth (ft-bmp) \_\_\_\_\_ Water Column/ Gallons in Well \_\_\_\_\_  
 MP Elevation \_\_\_\_\_ Pump Intake (ft-bmp) \_\_\_\_\_ Purge Method: \_\_\_\_\_ Sample Method grab  
 Pump On/Off \_\_\_\_\_ Volumes Purged \_\_\_\_\_ Centrifugal \_\_\_\_\_ Submersible \_\_\_\_\_ Other \_\_\_\_\_  
 Sample Time: Label 1200 Replicate/ Code No. \_\_\_\_\_ Start \_\_\_\_\_ End \_\_\_\_\_  
 Sampled by KE

Time	Minutes Elapsed	Rate (gpm) (mL/min)	Depth to Water (ft)	Gallons Purged	pH	Cond. (mMhos) (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°F)	Redox (mV)	Appearance	
											Color	Odor
<u>1145</u> <u>1200</u>	-	-	-	-	<u>7.16</u>	<u>0.308</u>	<u>7000</u>	<u>1.03</u>	<u>18.2</u>	<u>101.5</u>	<u>turbid</u> <u>brown</u>	<u>None</u>

Constituents Sampled	Container	Number	Preservative

**Well Casing Volumes**

Gallons/Foot	1" = 0.04	1.5" = 0.09	2.5" = 0.26	3.5" = 0.50	6" = 1.47
	1.25" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65	

**Well Information**

Well Location: _____	Well Locked at Arrival: Yes / No
Condition of Well: _____	Well Locked at Departure: Yes / No
Well Completion: _____	Key Number To Well: _____

# SOIL/SEDIMENT/SLUDGE SAMPLING LOG

Project/ Site Location Badger Date 9-6-18  
 Sample No. Pond - 1 Project No. \_\_\_\_\_  
 Time \_\_\_\_\_ Coded \_\_\_\_\_  
 Sampling Began 1100 Replicate No. \_\_\_\_\_  
 Time \_\_\_\_\_  
 Sampling Ended \_\_\_\_\_

Sampling Method and Material: Loran tube - grab

From	To	Soil/Sediment/Sludge Description
0	10cm	sed - sludge combination. some clay, soft, black, trace organics, wet

OTHER (OVA; HNu; etc.) \_\_\_\_\_

Constituents Sampled	Container Description	Preservative
PFLs	1x 250ml poly	none
MS/MSD	2x 250ml poly	none

Remarks \_\_\_\_\_

Sample Personnel KE/DK

# SOIL/SEDIMENT/SLUDGE SAMPLING LOG

Project/ Site Location Badger Date 9-6-18  
 Sample No. Pond - 2 Project No. \_\_\_\_\_  
 Time \_\_\_\_\_ Coded \_\_\_\_\_  
 Sampling Began 11:12 Replicate No. \_\_\_\_\_  
 Time \_\_\_\_\_  
 Sampling Ended \_\_\_\_\_

Sampling Method and Material: lexan tube - grab

From	To	Soil/Sediment/Sludge Description
0	10 cm	sed - sludge combination. some clay, soft, black, trace organics, wet

OTHER (OVA; HNu; etc.) \_\_\_\_\_

Constituents Sampled	Container Description	Preservative
PFLs	1 x 250ml poly	none
Duplicate	1 x 250ml poly	none

Remarks \_\_\_\_\_

Sample Personnel KE/DK

# SOIL/SEDIMENT/SLUDGE SAMPLING LOG

Project/ Site Location: Baldwin Date: 9-6-18  
 Sample No.: Pond - 3 Project No.: \_\_\_\_\_  
 Time Sampling Began: 1115 Coded Replicate No.: \_\_\_\_\_  
 Time Sampling Ended: \_\_\_\_\_

Sampling Method and Material: Lexan tube - grab

From	To	Soil/Sediment/Sludge Description
0	10cm	Sed - Sludge combinations. some clay, soft, black, trace organics, wet

OTHER (OVA; HNu; etc.) \_\_\_\_\_

Constituents Sampled	Container Description	Preservative
PFLs	1x250ml poly	none

Remarks \_\_\_\_\_

Sample Personnel \_\_\_\_\_

## **Attachment 4**

Data Usability Summary Report (provided under separate cover)

USACE Baltimore PFAS PA/SI  
Badger Army Ammunition Plant

# DATA USABILITY SUMMARY REPORT

Summer 2018 Sampling Event

January 16, 2019

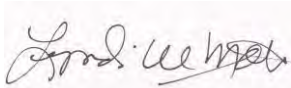
A large orange geometric shape, consisting of a triangle and a rectangle, is positioned in the bottom right corner of the page. A thin white diagonal line runs from the bottom left to the top right of the orange shape. A thin white horizontal line runs across the page, intersecting the orange shape.

## DATA USABILITY SUMMARY REPORT

Summer 2018 Sampling Event

Prepared for:

U.S. Army Environmental Command  
U.S. Army Corps of Engineers Baltimore District  
Badger Army Ammunition Plant



---

Lyndi Mott  
Program Chemist

Prepared by:

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Our Ref.:

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Arcadis Project: 02118216

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Table 1. Data Usability Summary Table

## ATTACHMENTS

Laboratory Analytical Reports  
Data Validation Reports



## ACRONYMS AND ABBREVIATIONS

%D	percent difference
%R	percent recovery
Arcadis	Arcadis U.S., Inc.
BAAP	Badger Army Ammunition Plant
DoD	Department of Defense
DUA	data usability assessment
DUSR	data usability summary report
EIS	extracted internal standards
ELAP	Environmental Laboratory Approval Program
ELLE	Eurofins Lancaster Laboratories Environmental
ICV/CCV	initial calibration verification/continuing calibration verification
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
LOQ	limit of quantitation
MS/MSD	matrix spike/matrix spike duplicate
PFAS	per/polyfluoroalkyl substances
QSM	Quality System Manual
RPD	relative percent difference
SDG	sample delivery group
TOC	total organic carbon
USDOD	United States Department of Defense
USEPA	United States Environmental Protection Agency

## EXECUTIVE SUMMARY

This Data Usability Summary Report (DUSR) Report for Badger Army Ammunition Plant located Baraboo, Wisconsin for the Summer 2018 sampling event describes the findings of the data review and validation and is provided to document the quality of the analytical data used for project decisions. A Data Usability Summary Table at the end of this DUSR lists the data that was qualified and the reason for qualification. Only the sample locations associated with this site and sampling event in the associated laboratory data packages and data validation reports are addressed in this report. The text below adds details where further discussion is warranted. The project-specific sampling and analysis, overall quality control (QC), and quality assurance protocols are presented in the Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP Arcadis 2018b), and the Uniform Federal Policy-Quality Assurance Project Plan Addendum for Badger Army Ammunition Plant (QAPP Addendum Arcadis 2018).

Samples were shipped to Eurofins Lancaster Laboratories Environmental (ELLE) located in Lancaster, Pennsylvania for analysis. ELLE is a United States Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) and National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory. The analytical sample delivery groups (SDGs) and associated Arcadis validation reports are listed in the table below. Summaries of the sample IDs and their associated laboratory IDs, SDGs, sampling dates, and analyses performed are provided in the laboratory reports and data validation reports.

In accordance with the project QAPP data review requirements, Stage 3, and 10 percent Stage 4 validation of the analytical data was performed by Arcadis project chemists that are independent of the project team. The validation was performed in accordance with the guidelines and control criteria specified in the following documents:

USDOD. Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1. January 2017.

USDOD. Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1.1 February 2018.

USACE. Engineer Manual (EM) 200-1-10. June 2005.

Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP Arcadis 2018b).

The laboratory data packages and validation reports that were reviewed for this DUA are listed below.

Sample Delivery Groups (SDG)	Validation Report	Matrix	Parameters	Validation Level
PF010 1981941	30867R	Water	PFAS	Stage 3: 3 field samples; Stage 4: 1 field sample
PF012 1981996 PF014 1982466 PF015 1982468	30868R	Soil	PFAS, TOC, pH	Stage 3: 18 field samples; Stage 4: 1 field sample

## DATA USABILITY SUMMARY REPORT

Sample Delivery Groups (SDG)	Validation Report	Matrix	Parameters	Validation Level
PF016 1982474	30870R	Water	PFAS	Stage 3: 3 field samples
PF019 1984962	30871R	Sediment, Water, Surface water	PFAS	Stage 3: 16 field samples; Stage 4: 1 field sample
PF011 1981995	30872R	Soil	PFAS, TOC, pH	Stage 3: 7 field samples; Stage 4: 1 field sample

## PRECISION

Precision is expressed as a relative percent difference (RPD) between the results of replicate sample analyses: sample duplicates, laboratory control sample duplicates (LCSDs), and matrix spike duplicates (MSDs). Field duplicates were collected at a frequency of 5 percent. Unless documented below or in the Data Usability Summary table, the RPD between the parent samples and associated field duplicates were within acceptable limits.

Soil sample BAAP-FFTA-SN-3-20-SO was identified as the parent sample to field duplicate BAAP-FD-SO-082918. The evaluation of the parent sample and field duplicate indicate precision within the data quality objectives (DQO) of less than 50% RPD.

Soil sample BAAP-FFTA-SN-1-50-SO was identified as the parent sample to field duplicate BAAP-FD-SO-082818. The evaluation of the parent sample and field duplicate indicate precision was within criteria except for TOC. The RPD between the parent sample and field duplicate TOC results was greater than 50%. The TOC results for the parent sample and field duplicate were qualified as estimated.

Water sample BAAP-PBGP-PBM-8203 was identified as the parent sample to field duplicate BAAP-FD-GW-083018. The evaluation of the parent sample and field duplicate indicate precision was within criteria.

Sediment sample BAAP-POND-2-SE was identified as the parent sample to field duplicate BAAP-FD-SE-090618. The evaluation of the parent sample and field duplicate indicate precision was within criteria.

Surface water sample BAAP-POND-2-SW was identified as the parent sample to field duplicate BAAP-FD-SW-090618. The evaluation of the parent sample and field duplicate indicate precision was within criteria.

## ACCURACY

Accuracy is demonstrated by recovery of target analytes from fortified blank and sample matrices, LCS/LCSDs and MS/MSDs, respectively. The recovery of target analytes from fortified samples is compared to acceptance criteria. In addition, Stage 4 validation of initial and continuing calibration results provide information on analytical accuracy. Unless documented below or in the Data Usability Summary table, the recoveries of LCS, MS/MSD, and extracted internal standards (EIS), and calibration criteria, were within acceptable limits.

## DATA USABILITY SUMMARY REPORT

As part of the PFAS analysis by isotope dilution, EIS are added to all samples, as required by the DoD QSM 5.1 and 5.1.1. Since the EIS are used for quantitation of the sample results, the calculation of sample concentrations is adjusted for the EIS recoveries. The data was not be qualified for EIS recoveries outside control limits unless EIS recoveries were less than 25%.

### **SENSITIVITY**

Sensitivity describes the relationship between the laboratory quantitation limits and the project action limits. Reported laboratory quantitation limits are compared to the project detection limits to ensure that the analytical methods are capable of quantifying target analytes to a level that would satisfy DQOs.

The detection limits for the sediment samples were elevated due to correction for percent moisture. Some surface water and groundwater samples have elevated detection limits due to particulates in the sample, limiting the sample volume that could be filtered through the SPE cartridge. Otherwise, the reported quantitation limits met sensitivity requirements.

### **COMPLETENESS**

The completeness for this data set met the criteria of at least 90 percent. Six results were rejected due to low EIS recoveries.

### **CONCLUSIONS**

The overall assessment of the field samples, QA/QC data review by manual validation of the Summer 2018 data set from BAAP met project requirements and completeness goals. Based upon the Stage 3 and Stage 4 data validation, all results are considered valid except for the six rejected results listed in the Data Usability Summary table. The results that are qualified as estimated are usable with caution.

# DATA USABILITY SUMMARY TABLE



**DATA USABILITY SUMMARY TABLE**  
**Badger Army Ammunition Plant; Summer 2018**

Sample Locations	Compound	Qualifier	Reason
BAAP-FFTA-SN-2-20-SO BAAP-FFTA-SN-3-5.0-SO BAAP-FFTA-SN-1-5.0-SO	NEtFOSAA NMeFOSAA	R	Extracted Internal Standards (EIS) %R less than 25% for the initial and re-extracted analyses
BAAP-PBGP-PBM-8203	Perfluoropentanoic acid	J	MS/MSD %R; low bias
BAAP-FFTA-SN-2-65-SO	TOC	J	Laboratory duplicate RPD > 35%
BAAP-FFTA-SN-1-50-SO BAAP-FD-SO-082818	TOC	J	Field duplicate RPD > 50%
BAAP-FFTA-SN-2-5.0-SO BAAP-FFTA-SN-2-20-SO BAAP-FFTA-SN-2-35-SO BAAP-FFTA-SN-2-50-SO BAAP-FFTA-SN-2-65-SO BAAP-FFTA-SN-2-WT80-SO BAAP-FFTA-SN-3-5.0-SO BAAP-FFTA-SN-3-20-SO BAAP-FFTA-SN-3-35-SO BAAP-FD-SO-082918 BAAP-FFTA-SN-3-50-SO BAAP-FFTA-SN-3-65-SO BAAP-FFTA-SN-3-WT80-SO BAAP-FFTA-SN-1-5.0-SO BAAP-FFTA-SN-1-20-SO BAAP-FFTA-SN-1-35-SO BAAP-FFTA-SN-1-50-SO BAAP-FFTA-SN-1-65-SO BAAP-FD-SO-082818 BAAP-FFTA-SN-1-80-SO BAAP-FFTA-SN-1-WT84-SO	pH	J	Analysis was not performed within QAPP specified hold time. Impact on the pH value is unknown.

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however, the reported concentration is estimated due to non-conformances discovered during data validation.
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however, the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- U (Blank contamination): The compound or analyte was found in an associated blank above one half the LOQ, as well as in the sample.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

# LEVEL 2 LABORATORY ANALYTICAL REPORTS





## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: September 18, 2018 18:35

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1981941  
SDG: PF010  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

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To view our laboratory's current scopes of accreditation please go to <http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/>. Historical copies may be requested through your project manager.





## SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-PBGP-PBN-8201A Grab Groundwater	08/29/2018 12:40	9779469
BAAP-PBGP-PBN-8201B Grab Groundwater	08/29/2018 12:45	9779470
BAAP-PBGP-PBN-8201C Grab Groundwater	08/28/2018 13:40	9779471
BAAP-PBGP-PBN-8205B Grab Groundwater	08/29/2018 17:10	9779472
BAAP-EB-GW-082918-1 Grab Water	08/29/2018 09:30	9779473
BAAP-EB-GW-082818-2 Grab Water	08/28/2018 14:00	9779474
BAAP-EB-GW-082918-3 Grab Water	08/29/2018 11:40	9779475
BAAP-EB-GW-082918-4 Grab Water	08/29/2018 16:20	9779476
BAAP-EB-GW-082918-5 Grab Water	08/29/2018 10:25	9779477

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1981941

**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: 9779472**

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

**Sample #s: 9779474**

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate

**Sample #s: 9779470**

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

**Sample #s: 9779469**

Extraction standard recoveries are outside QC acceptance criteria as noted on the QC Summary. The sample was reextracted and extraction standard recoveries were again outside acceptance criteria. Both sets of data are reported in the data package.

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary.

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid, Perfluorodecanoic acid, Perfluoroundecanoic acid, Perfluorohexanoic acid,  
Perfluoro-octanesulfonate, Perfluorobutanoic acid

Sample #s: 9779471

The extraction standard recovery of 13C2-PFTeDA was below QC acceptance criteria as noted on the QC Summary. The sample was reextracted and 13C2-PFTeDA was again outside acceptance criteria.

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

Batch #: 18244002 (Sample number(s): 9779469)

The recovery(ies) for the following analyte(s) in the LCS and/or LCSD exceeded the acceptance window indicating a positive bias: Perfluorododecanoic acid, Perfluorobutanesulfonate, Perfluoroundecanoic acid, Perfluoropentanoic acid

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) 9779469

Batch #: 18249001 (Sample number(s): 9779470-9779477)

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) 9779471

**Sample Description:** BAAP-PBGP-PBN-8201A Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779469  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 12:40  
**SDG#:** PF010-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	2.5	5.1	7.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.7	5.1	5.9	1
14434	NEtFOSAA	2991-50-6	N.D.	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.7	4.0	5.1	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	0.38 J	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.3 J	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.66 J	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	4.0	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.42	1.0	1.7	1

Extraction standard recoveries are outside QC acceptance criteria as noted on the QC Summary. The sample was reextracted and extraction standard recoveries were again outside acceptance criteria. Both sets of data are reported in the data package.

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18244002	09/05/2018 06:04	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18244002	09/01/2018 10:25	Danielle D McCully	1

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

**Sample Description:** BAAP-PBGP-PBN-8201B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779470  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 12:45  
**SDG#:** PF010-02

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.90	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.90	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	N.D.	0.90	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.90	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	0.99	1.8	1
14434	Perfluorobutanoic acid	375-22-4	1.9 J	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	0.61 J	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.36	0.99	1.8	1
14434	Perfluorohexanoic acid	307-24-4	1.4 J	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.72 J	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	1.6 J	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:28	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-PBGP-PBN-8201C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779471  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 13:40  
**SDG#:** PF010-03

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.94	1.9	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.94	1.9	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.94	2.3	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.94	2.3	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.9	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.9	4.5	5.6	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.47	1.1	1.9	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.47	1.1	1.9	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.38	1.1	1.9	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.38	1.0	1.9	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.47	1.1	1.9	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.38	1.1	1.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.47	1.1	1.9	1
14434	Perfluorooctanoic acid	335-67-1	0.78 J	0.47	1.1	1.9	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.9	4.5	5.6	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.56	1.1	1.9	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.56	1.1	1.9	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.47	1.1	1.9	1

The extraction standard recovery of 13C2-PFTeDA was below QC acceptance criteria as noted on the QC Summary. The sample was reextracted and 13C2-PFTeDA was again outside acceptance criteria.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:37	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-PBGP-PBN-8205B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779472  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 17:10  
**SDG#:** PF010-04

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.84	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.84	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	N.D.	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	1.9 J	1.7	4.1	5.1	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.42	1.0	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	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.42	1.0	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.	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.47 J	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	4.1	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:46	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-1 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779473  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 09:30  
**SDG#:** PF010-05EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.92	1.8	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.92	1.8	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.92	2.2	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.92	2.2	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.4	5.5	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.37	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.37	1.0	1.8	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.37	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.4	5.5	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.55	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.55	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:55	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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



**Sample Description:** BAAP-EB-GW-082818-2 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779474  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 14:00  
**SDG#:** PF010-06EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	N.D.	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	0.97	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.44	1.1	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	Perfluorohexanoic acid	307-24-4	N.D.	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.50 J	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:04	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-3 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779475  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 11:40  
**SDG#:** PF010-07EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
	<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>		<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.93	1.9	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.93	1.9	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.93	2.2	2.8	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.						
14434	NMeFOSAA	2355-31-9	N.D.	0.93	2.2	2.8	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.						
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.9	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.9	4.5	5.6	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.9	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.9	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.37	1.1	1.9	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.37	1.0	1.9	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.9	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.37	1.1	1.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.9	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.9	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.9	4.5	5.6	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.56	1.1	1.9	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.56	1.1	1.9	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.9	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:13	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-4 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779476  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 16:20  
**SDG#:** PF010-08EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.86	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.86	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	N.D.	0.86	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.86	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.95	1.7	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.7	4.2	5.2	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.35	0.95	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	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
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	4.2	5.2	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.52	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.52	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.43	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:31	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-5 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779477  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:25  
**SDG#:** PF010-09EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.91	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.91	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	N.D.	0.91	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.91	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	1.0	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.4	5.5	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.36	1.0	1.8	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.4	5.5	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.55	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.55	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:40	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:35

Group Number: 1981941

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 ng/l	DL** ng/l	LOD ng/l	LOQ ng/l
Batch number: 18244002	Sample number(s): 9779469			
6:2 fluorotelomersulfonate	N.D.	3.0	6.1	9.0
8:2 fluorotelomersulfonate	N.D.	2.0	6.1	7.0
NETFOSAA	N.D.	1.0	2.4	3.0
NMeFOSAA	N.D.	1.0	2.4	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.1	2.0
Perfluorobutanoic acid	N.D.	2.0	4.8	6.0
Perfluorodecanoic acid	N.D.	0.50	1.2	2.0
Perfluorododecanoic acid	N.D.	0.50	1.2	2.0
Perfluoroheptanoic acid	N.D.	0.40	1.2	2.0
Perfluorohexanesulfonate	N.D.	0.40	1.1	2.0
Perfluorohexanoic acid	N.D.	0.50	1.2	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
Perfluoropentanoic acid	N.D.	2.0	4.8	6.0
Perfluorotetradecanoic acid	N.D.	0.60	1.2	2.0
Perfluorotridecanoic acid	N.D.	0.60	1.2	2.0
Perfluoroundecanoic acid	N.D.	0.50	1.2	2.0
Batch number: 18249001	Sample number(s): 9779470-9779477			
6:2 fluorotelomersulfonate	N.D.	1.0	2.0	3.0
8:2 fluorotelomersulfonate	N.D.	1.0	2.0	3.0
NETFOSAA	N.D.	1.0	2.4	3.0
NMeFOSAA	N.D.	1.0	2.4	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.1	2.0
Perfluorobutanoic acid	N.D.	2.0	4.8	6.0
Perfluorodecanoic acid	N.D.	0.50	1.2	2.0
Perfluorododecanoic acid	N.D.	0.50	1.2	2.0
Perfluoroheptanoic acid	N.D.	0.40	1.2	2.0
Perfluorohexanesulfonate	N.D.	0.40	1.1	2.0
Perfluorohexanoic acid	N.D.	0.50	1.2	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
Perfluoropentanoic acid	N.D.	2.0	4.8	6.0
Perfluorotetradecanoic acid	N.D.	0.60	1.2	2.0
Perfluorotridecanoic acid	N.D.	0.60	1.2	2.0
Perfluoroundecanoic acid	N.D.	0.50	1.2	2.0

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:35

Group Number: 1981941

### 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: 18244002	Sample number(s): 9779469								
6:2 fluorotelomersulfonate	15.17	18.92	15.17	18.54	125	122	70-130	2	30
8:2 fluorotelomersulfonate	15.33	17.1	15.33	16.58	112	108	70-130	3	30
NEtFOSAA	5.44	5.60	5.44	5.24	103	96	60-131	7	30
NMeFOSAA	5.44	6.62	5.44	5.71	122	105	67-124	15	30
Perfluorobutanesulfonate	4.81	6.68	4.81	6.30	139*	131*	72-127	6	30
Perfluorobutanoic acid	5.44	6.89	5.44	6.98	127	128	70-130	1	30
Perfluorodecanoic acid	5.44	6.76	5.44	6.39	124	117	67-141	6	30
Perfluorododecanoic acid	5.44	8.06	5.44	7.88	148*	145*	72-137	2	30
Perfluoroheptanoic acid	5.44	6.85	5.44	6.61	126	121	75-139	4	30
Perfluorohexanesulfonate	5.14	6.64	5.14	5.84	129	114	71-130	13	30
Perfluorohexanoic acid	5.44	6.91	5.44	7.19	127	132	77-132	4	30
Perfluorononanoic acid	5.44	6.55	5.44	6.83	120	126	73-144	4	30
Perfluoro-octanesulfonate	5.20	6.40	5.20	6.83	123	131	67-134	7	30
Perfluorooctanoic acid	5.44	7.26	5.44	6.94	134	128	76-136	5	30
Perfluoropentanoic acid	5.44	7.22	5.44	7.04	133*	129	70-130	3	30
Perfluorotetradecanoic acid	5.44	6.63	5.44	7.63	122	140	70-142	14	30
Perfluorotridecanoic acid	5.44	6.91	5.44	7.40	127	136	57-137	7	30
Perfluoroundecanoic acid	5.44	7.28	5.44	6.81	134*	125	83-132	7	30
Batch number: 18249001	Sample number(s): 9779470-9779477								
6:2 fluorotelomersulfonate	15.17	16.68	15.17	19.44	110	128	70-130	15	30
8:2 fluorotelomersulfonate	15.33	16.33	15.33	17.25	107	113	70-130	5	30
NEtFOSAA	5.44	4.62	5.44	5.17	85	95	60-131	11	30
NMeFOSAA	5.44	4.94	5.44	5.57	91	102	67-124	12	30
Perfluorobutanesulfonate	4.81	4.83	4.81	5.03	100	105	72-127	4	30
Perfluorobutanoic acid	5.44	5.60	5.44	6.09	103	112	70-130	8	30
Perfluorodecanoic acid	5.44	6.06	5.44	6.44	111	118	67-141	6	30
Perfluorododecanoic acid	5.44	5.80	5.44	6.35	107	117	72-137	9	30
Perfluoroheptanoic acid	5.44	5.36	5.44	5.76	99	106	75-139	7	30
Perfluorohexanesulfonate	5.14	5.36	5.14	5.67	104	110	71-130	6	30
Perfluorohexanoic acid	5.44	5.33	5.44	5.84	98	107	77-132	9	30
Perfluorononanoic acid	5.44	5.20	5.44	5.46	96	100	73-144	5	30
Perfluoro-octanesulfonate	5.20	5.35	5.20	6.07	103	117	67-134	13	30
Perfluorooctanoic acid	5.44	5.79	5.44	5.81	107	107	76-136	0	30
Perfluoropentanoic acid	5.44	6.00	5.44	6.40	110	118	70-130	6	30
Perfluorotetradecanoic acid	5.44	5.98	5.44	5.95	110	109	70-142	1	30
Perfluorotridecanoic acid	5.44	5.66	5.44	6.26	104	115	57-137	10	30
Perfluoroundecanoic acid	5.44	5.24	5.44	5.83	96	107	83-132	11	30

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:35

Group Number: 1981941

### 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: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18244002

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779469	83	8.4	73	2.5	73	8.4	86	1.7	79	8.4	82	1.7
Blank	88	10	87	3.0	88	10	91	2.0	94	10	94	2.0
LCS	82	10	81	3.0	79	10	81	2.0	83	10	83	2.0
LCSD	83	10	82	3.0	78	10	90	2.0	99	10	94	2.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779469	81	8.4	85	1.7	78	8.4	87	1.7	75	1.7	66	5.1
Blank	93	10	90	2.0	90	10	89	2.0	101	2.0	95	6.0
LCS	82	10	82	2.0	84	10	81	2.0	87	2.0	78	6.0
LCSD	92	10	93	2.0	80	10	78	2.0	87	2.0	86	6.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEIFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779469	54	6.7	61	3.4	46*	6.7	51	4.2	28*	4.2
Blank	89	8.0	96	4.0	88	8.0	88	5.0	82	5.0
LCS	76	8.0	75	4.0	81	8.0	82	5.0	72	5.0
LCSD	84	8.0	85	4.0	81	8.0	81	5.0	69	5.0
Limits:	50-150		50-150		50-150		50-150		50-150	

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18249001

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779470	82	9.0	81	2.7	79	9.0	84	1.8	83	9.0	81	1.8
9779471	78	9.4	75	2.8	74	9.4	77	1.9	74	9.4	76	1.9
9779472	81	8.4	76	2.5	79	8.4	83	1.7	81	8.4	83	1.7
9779473	78	9.2	78	2.8	77	9.2	80	1.8	82	9.2	80	1.8
9779474	84	8.9	83	2.7	82	8.9	86	1.8	87	8.9	84	1.8
9779475	84	9.3	85	2.8	83	9.3	81	1.9	81	9.3	84	1.9
9779476	80	8.6	78	2.6	82	8.6	84	1.7	88	8.6	89	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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:35

Group Number: 1981941

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18249001

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779477	79	9.1	76	2.7	77	9.1	79	1.8	79	9.1	80	1.8
Blank	88	10	88	3.0	89	10	87	2.0	90	10	95	2.0
LCS	79	10	78	3.0	82	10	81	2.0	84	10	83	2.0
LCSD	80	10	81	3.0	83	10	86	2.0	85	10	86	2.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	
	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779470	93	9.0	81	1.8	75	9.0	82	1.8	79	1.8	83	5.4
9779471	80	9.4	69	1.9	64	9.4	70	1.9	64	1.9	62	5.6
9779472	84	8.4	81	1.7	79	8.4	88	1.7	82	1.7	88	5.1
9779473	90	9.2	84	1.8	78	9.2	80	1.8	78	1.8	88	5.5
9779474	92	8.9	84	1.8	80	8.9	82	1.8	83	1.8	89	5.3
9779475	89	9.3	83	1.9	81	9.3	80	1.9	79	1.9	88	5.6
9779476	99	8.6	85	1.7	77	8.6	87	1.7	86	1.7	94	5.2
9779477	87	9.1	74	1.8	73	9.1	75	1.8	78	1.8	89	5.5
Blank	105	10	89	2.0	85	10	82	2.0	86	2.0	94	6.0
LCS	90	10	76	2.0	78	10	78	2.0	79	2.0	89	6.0
LCSD	85	10	83	2.0	81	10	80	2.0	79	2.0	84	6.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	
	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA			
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)		
9779470	80	7.2	86	3.6	95	7.2	83	4.5	75	4.5		
9779471	58	7.5	53	3.8	55	7.5	52	4.7	41*	4.7		
9779472	81	6.8	86	3.4	81	6.8	71	4.2	66	4.2		
9779473	84	7.4	78	3.7	78	7.4	71	4.6	63	4.6		
9779474	80	7.1	78	3.5	74	7.1	78	4.4	71	4.4		
9779475	73	7.4	77	3.7	71	7.4	70	4.6	61	4.6		
9779476	95	6.9	90	3.5	89	6.9	83	4.3	72	4.3		
9779477	79	7.3	90	3.6	83	7.3	86	4.6	72	4.6		
Blank	83	8.0	84	4.0	90	8.0	82	5.0	75	5.0		
LCS	72	8.0	74	4.0	70	8.0	74	5.0	59	5.0		
LCSD	70	8.0	77	4.0	72	8.0	73	5.0	72	5.0		

\*- 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.



## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:35

Group Number: 1981941

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18249001

Limits:	50-150	50-150	50-150	50-150	50-150
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\*- 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.

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981941 Sample # 9779469-77

COC # 561239

Client Information				Matrix				Analysis Requested								For Lab Use Only	
Client: <u>Arcadis</u>		Acct. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input checked="" type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/>		Preservation and Filtration Codes								FSC: _____	
Project Name/#: <u>Badger / 08118216.1000</u>		PWSID #:		Water <input type="checkbox"/> NPDES <input type="checkbox"/> Other: _____		Total # of Containers		PFAS - EPA METHOD 537								SCR#: _____	
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:		Other: _____		Total # of Containers										Preservation Codes	
Sampler: <u>Drew Kehoe / Kendra Keon</u>		Quote #:		Other: _____		Total # of Containers		H=HCl T=Thiosulfate		*RUSH*							
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Other: _____		Total # of Containers		N=HNO <sub>3</sub> B=NaOH									
Sample Identification		Collected		Grab		Composite		S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub>									
		Date Time						F=Field Filtered O=Other									
<del>PBN 8-21 BAAP-PBN-8021 1/2 B</del>																	
BAAP-PBGP-PBN-8201A		8-28-18 1240		X				2 X		SHAKER TEST = NO BUBBLES							
BAAP-PBGP-PBN-8201B		<del>8-28-18 1340</del>		X				2 X		TIME: 1245 DATE: 8-29-18							
BAAP-PBGP-PBN-8201C		<del>8-28-18 1340</del>		X				2 X		TIME: 1340 DATE: 8-28-18							
BAAP-PBGP-PBN-8205A		8-29-18 1710		X				2 X									
BAAP-EB-GW-082918-1		8-29-18 0930		X				2 X									
BAAP-EB-GW-082818-2		8-28-18 1400		X				2 X									
BAAP-EB-GW-082918-3		8-29-18 1140		X				2 X									
BAAP-EB-GW-082918-4		8-29-18 1620		X				2 X									
BAAP-EB-GW-082918-5		8-29-18 1025		X				2 X									

Turnaround Time (TAT) Requested (please circle) Standard _____ <u>Rush</u> _____ (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAY TAT</u>  E-mail address: <u>Kimmie.Schrupp@arcadis.com</u>	Relinquished by <u>[Signature]</u>	Date <u>8-29-18</u>	Time <u>1815</u>	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____

Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only) Type III (Reduced non-CLP) NJ DKQP TX TRRP-13 NYSDEC Category A or B MA MCP CT RCP		EDD Required? <u>Yes</u> No If yes, format: _____ Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)	Relinquished by Commercial Carrier: UPS _____ FedEx <u>X</u> Other _____  Temperature upon receipt <u>0.6</u> °C
---	--	--	---

1981941

**Katherine Klinefelter**

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Wednesday, September 05, 2018 3:09 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*

See below in Red.

Thanks!  
Kimmie

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Wednesday, September 5, 2018 12:51 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Kowalski, Joe <Joseph.Kowalski@arcadis.com>  
**Subject:** RE: Badger AAP project

Are these samples all Equipment Blanks? Yep we'll have a lot of EBs on this program.

BAAP-EB-GW-082918-1	8-29-18	0930
BAAP-EB-GW-082818-2	8-28-18	1400
BAAP-EB-GW-082918-3	8-29-18	1140
BAAP-EB-GW-082918-4	8-29-18	1620
BAAP-EB-GW-082918-5	8-29-18	1025

Should these sample IDs begin with BAAP rather than BAAAP? Yes if it's not too much trouble, other wise we can fix during validation.

**From:** Schrupp, Kimmie [mailto:Kimberley.Schrupp@arcadis.com]  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*

1981941

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanCLabsEnv](http://www.EurofinsUS.com/LanCLabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

EXTERNAL EMAIL\*

Hi Kathy,  
So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!  
Thanks  
Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

1981941

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# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981941 Sample # 9779469-77

COC # 561239

Client Information					Matrix			Analysis Requested										For Lab Use Only							
Client: <b>Arcadis</b>		Acct. #			<input type="checkbox"/> Tissue <input type="checkbox"/> Sediment <input type="checkbox"/> Potable <input type="checkbox"/> Water <input checked="" type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> NPDES <input type="checkbox"/> Other:	Total # of Containers	PPMS-EPA METHOD 537	Preservation and Filtration Codes										FSC: _____	SCR#: _____						
Project Name: <b>Badger / 08118216 1000</b>		PWSID #:																<b>Preservation Codes</b> H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other							
Project Manager: <b>Kimmie Schrupp</b>		P.O. #:													<b>Remarks</b> <div style="text-align: center; font-weight: bold;">* RUSH *</div>										
Sampler: <b>Drew Kehoe / Kendra Keon</b>		Quote #:																							
State where samples were collected: <b>WI</b>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>																							
Sample Identification		Collected		Grab	Composite	Soil	Water	Other:	Total # of Containers	PPMS-EPA METHOD 537															
		Date	Time																						
<del>PBN # 8201A</del>																									
BAAP-PBGP-PBN-8201A		8-28-18	1240	X					2	X															SHAKER TEST = NO BUBBLES
BAAP-PBGP-PBN-8201B		<del>8-28-18</del>	<del>1340</del>	X					2	X															TIME: 1245 DATE: 8-29-18
BAAP-PBGP-PBN-8201C		<del>8-28-18</del>	<del>1340</del>	X					2	X															TIME: 1340 DATE: 8-28-18
BAAP-PBGP-PBN-8205A		8-29-18	1710	X					2	X															
BAAP-EB-GW-082918-1		8-29-18	0930	X					2	X															
BAAP-EB-GW-082818-2		8-28-18	1400	X					2	X															
BAAP-EB-GW-082918-3		8-29-18	1140	X					2	X															
BAAP-EB-GW-082918-4		8-29-18	1620	X					2	X															
BAAP-EB-GW-082918-5		8-29-18	1025	X					2	X															

Turnaround Time (TAT) Requested (please circle)			Relinquished by: <i>Mudster</i>	Date	Time	Received by	Date	Time
Standard <input checked="" type="radio"/> Rush <input type="radio"/> (Rush TAT is subject to laboratory approval and surcharge.)				8-29-18	1815			
Date results are needed: <u>5 DAY TAT</u>			Relinquished by	Date	Time	Received by	Date	Time
E-mail address: <u>Kimmie.Schrupp@arcadis.com</u>			Relinquished by	Date	Time	Received by	Date	Time
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP			Relinquished by	Date	Time	Received by	Date	Time
EDD Required? <input checked="" type="radio"/> Yes <input type="radio"/> No If yes, format: _____			Relinquished by Commercial Carrier:			UPS _____ FedEx <input checked="" type="checkbox"/> Other _____		
Site-Specific QC (MS/MSD/Dup)? Yes <input type="checkbox"/> No <input type="checkbox"/> (If yes, indicate QC sample and submit triplicate sample volume.)			Temperature upon receipt _____ °C					

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The white copy should accompany samples to Eurofins Lancaster Laboratories Environmental. The yellow copy should be retained by the client.

7044 0717

1981941

**Katherine Klinefelter**

---

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Friday, September 14, 2018 10:56 AM  
**To:** Katherine Klinefelter  
**Subject:** FW: 1981941 - BAAP - Collection date clarification. ---> Please advise.

EXTERNAL EMAIL\*

Thanks for checking on us Kathy.

**From:** Keon, Kendra  
**Sent:** Friday, September 14, 2018 6:07 AM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Engle, Kevin <Kevin.Engle@arcadis.com>; Kehoe, Drew <Drew.Kehoe@arcadis.com>  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

The date is 8-29-18 for 8201A

The correct ID should be 8205B for the date/time listed – the COC is incorrect

I double checked the field logs/notes

**From:** Schrupp, Kimmie  
**Sent:** Thursday, September 13, 2018 6:26 PM  
**To:** Kehoe, Drew <Drew.Kehoe@arcadis.com>; Keon, Kendra <Kendra.Keon@arcadis.com>  
**Cc:** Engle, Kevin <Kevin.Engle@arcadis.com>  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Here is the COC she is referring to

**From:** Schrupp, Kimmie  
**Sent:** Thursday, September 13, 2018 5:20 PM  
**To:** Kehoe, Drew <Drew.Kehoe@arcadis.com>; Keon, Kendra <Kendra.Keon@arcadis.com>  
**Cc:** Engle, Kevin <Kevin.Engle@arcadis.com>  
**Subject:** FW: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Can you guys please confirm the questions below?

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Thursday, September 13, 2018 5:03 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Please also confirm that the correct ID is per the COC as BAAP-PBGP-PBN-8205A Grab Groundwater. Per the sample receipt doc log, the labels had BAAP-PBGP-PBN-8205B.

---

**From:** Katherine Klinefelter  
**Sent:** Thursday, September 13, 2018 7:00 PM

1981941

**To:** 'Schrupp, Kimmie'  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Were you able to check the field notes to confirm?

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Thursday, September 13, 2018 6:59 PM  
**To:** Katherine Klinefelter  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

EXTERNAL EMAIL\*

It look like 8/29/18 to me.

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Thursday, September 13, 2018 4:57 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Subject:** 1981941 - BAAP - Collection date clarification. ---> Please advise.

Hello Kimmie,

The collection date for BAAP-PBGP-PBN-8201A Grab Groundwater is unclear on COC# 561239. Which is correct: 8/28/18 or 8/29/18?

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

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[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanCLabsEnv](http://www.EurofinsUS.com/LanCLabsEnv)

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Notify us [here](#) to report this email as spam.





Client: Arcadis

**Badger/08118216.1000**

**Delivery and Receipt Information**

Delivery Method: Fed Ex                      Arrival Timestamp: 08/30/2018 10:15  
 Number of Packages: 1                      Number of Projects: 1  
 State/Province of Origin: WI

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	No
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	Yes		
Discrepancy in Container Qty on COC:	Yes		

*Unpacked by Nicole Reiff (25 684) at 12:44 on 08/30/2018*

**Samples Chilled Details: Badger/08118216.1000**

Thermometer Types:    *DT = Digital (Temp. Bottle)    IR = Infrared (Surface Temp)    All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT131	0.6	DT	Wet	Y	Bagged	N

**Extra Sample Details: Badger/08118216.1000**

Sample ID on Label	Number of Extra Containers	Date on Label	Comments
BAAAP-EB-GW-082818 -1	1	8/28/2018 13:10	

**Container Quantity Discrepancy Details: Badger/08118216.1000**

Sample ID on COC	Container Qty. Received	Container Qty. on COC	Comments
BAAP-EB-GW-082918- 1	1	2	

**Sample ID Discrepancy Details: Badger/08118216.1000**

Sample ID on COC	Sample ID on Label	Comments
BAAP-PBGP-PBN-8205A	BAAP-PBGP-PBN-8205B	

# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: October 15, 2018 15:04

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1981995  
SDG: PF011  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

(717) 556-7256

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### SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-FFTA-SN-1-5.0-SO Grab Soil	08/28/2018 10:20	9779602
BAAP-FFTA-SN-1-20-SO Grab Soil	08/28/2018 13:25	9779603
BAAP-FFTA-SN-1-35-SO Grab Soil	08/28/2018 13:40	9779604
BAAP-FFTA-SN-1-50-SO Grab Soil	08/28/2018 14:35	9779605
BAAP-FFTA-SN-1-65-SO Grab Soil	08/28/2018 15:15	9779606
BAAP-FFTA-SN-1-65-SOMS Grab Soil	08/28/2018 15:15	9779607
BAAP-FFTA-SN-1-65-SOMSD Grab Soil	08/28/2018 15:15	9779608
BAAP-FFTA-SN-1-65-SODUP Grab Soil	08/28/2018 15:15	9779609
BAAP-FB-SO-082818 Grab Water	08/28/2018 10:30	9779610
BAAP-FD-SO-082818 Grab Soil	08/28/2018	9779611
BAAP-FFTA-SN-1-80-SO Grab Soil	08/29/2018 08:20	9779612
BAAP-FFTA-SN-1-WT84-SO Grab Soil	08/29/2018 08:50	9779613

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1981995

**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 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: 9779611, 9779613

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid

Sample #s: 9779607

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

Sample #s: 9779603, 9779605, 9779606, 9779612

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

Sample #s: 9779608

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

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

Sample #s: 9779602

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid

Batch #: 18248026 (Sample number(s): 9779602-9779608, 9779611-9779613 UNSPK: 9779606)

The recovery(ies) for the following analyte(s) in the MS and/or MSD were below the acceptance window:  
Perfluorooctanoic acid

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) 9779602, 9779603, 9779605, 9779606, 9779608, 9779612, MSD

### **SW-846 9060A modified, Wet Chemistry**

Batch #: 18247667632A (Sample number(s): 9779604 UNSPK: 9779604 BKG: 9779604)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: TOC Solids/Sludges Combustion

Batch #: 18250667632A (Sample number(s): 9779603 UNSPK: 9779603 BKG: 9779603)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: TOC Solids/Sludges Combustion

Batch #: 18250667632B (Sample number(s): 9779612 UNSPK: 9779612 BKG: 9779612)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: TOC Solids/Sludges Combustion

Batch #: 18250667633A (Sample number(s): 9779602, 9779605-9779609 UNSPK: 9779606 BKG: 9779606)

The relative percent difference(s) for the following analyte(s) in the MS/MSD were outside acceptance windows: TOC Solids/Sludges Combustion

The duplicate RPD for the following analyte(s) exceeded the acceptance window: TOC Solids/Sludges Combustion

### **SW-846 9045D Nov 2004, Wet Chemistry**

Sample #s: 9779606, 9779609

The pH was measured in water at 19.6 C.

Sample #s: 9779604

The pH was measured in water at 19.7 C.

Sample #s: 9779602, 9779603, 9779613

The pH was measured in water at 19.8 C.

Sample #s: 9779605, 9779611, 9779612

The pH was measured in water at 19.9 C.

### **SM 2540 G-2011 %Moisture Calc, Wet Chemistry**

Batch #: 18243820003B (Sample number(s): 9779602-9779609, 9779611-9779613 BKG: 9779606)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: Moisture, Moisture,

Moisture Duplicate



**Sample Description:** BAAP-FFTA-SN-1-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779602  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 10:20  
SDG#: PF011-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.2	0.68	2.2	2.3	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.2	0.57	2.2	2.3	1
14478	NEtFOSAA	2991-50-6	< 2.3	0.57	2.3	3.4	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.3	0.57	2.3	3.4	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.68	0.23	0.68	0.91	1
14478	Perfluorobutanoic acid	375-22-4	< 0.78	0.23	0.78	0.91	1
14478	Perfluorodecanoic acid	335-76-2	< 0.78	0.34	0.78	1.1	1
14478	Perfluorododecanoic acid	307-55-1	< 0.78	0.23	0.78	0.91	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.78	0.23	0.78	0.91	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.73	0.23	0.73	0.91	1
14478	Perfluorohexanoic acid	307-24-4	< 0.78	0.23	0.78	0.91	1
14478	Perfluorononanoic acid	375-95-1	< 0.78	0.23	0.78	0.91	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.74	0.23	0.74	0.91	1
14478	Perfluorooctanoic acid	335-67-1	0.76 J	0.23	0.78	0.91	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.78	0.23	0.78	0.91	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.78	0.23	0.78	0.91	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.78	0.23	0.78	0.91	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.78	0.23	0.78	0.91	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	mg/kg	mg/kg	mg/kg	mg/kg
02079	TOC Solids/Sludges Combustion	n.a.	1,490	162	486	486

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	Std. Units	Std. Units	Std. Units	Std. Units
00394	pH	n.a.	6.12	0.0100	0.0100	0.0100
The pH was measured in water at 19.8 C.						

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%
00111	Moisture	n.a.	14.9	0.50	0.50	0.50
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779602  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 10:20  
SDG#: PF011-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
---------	---------------	------------	------------	----------------------	------------------------	---------------------------	----

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 12:36	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633A	09/08/2018 12:16	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779603  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 13:25  
**SDG#:** PF011-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.60	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.50	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.50	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.50	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.60	0.20	0.60	0.80	1
14478	Perfluorobutanoic acid	375-22-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorodecanoic acid	335-76-2	< 0.68	0.30	0.68	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.68	0.20	0.68	0.80	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.64	0.20	0.64	0.80	1
14478	Perfluorohexanoic acid	307-24-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorononanoic acid	375-95-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.65	0.20	0.65	0.80	1
14478	Perfluorooctanoic acid	335-67-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.68	0.20	0.68	0.80	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	13,500	854	2,560	2,560	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.21	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.8 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.3	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779603  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 13:25  
SDG#: PF011-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 12:45	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667632A	09/10/2018 16:18	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779604  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 13:40  
**SDG#:** PF011-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.59	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.49	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.49	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.49	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.59	0.20	0.59	0.79	1
14478	Perfluorobutanoic acid	375-22-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorodecanoic acid	335-76-2	< 0.67	0.30	0.67	0.99	1
14478	Perfluorododecanoic acid	307-55-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.67	0.20	0.67	0.79	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.63	0.20	0.63	0.79	1
14478	Perfluorohexanoic acid	307-24-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorononanoic acid	375-95-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.64	0.20	0.64	0.79	1
14478	Perfluorooctanoic acid	335-67-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.67	0.20	0.67	0.79	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	2,480	104	311	311	1
<b>SW-846 9045D Nov 2004</b>							
00394	pH	n.a.	9.29	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	2.6	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779604  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 13:40  
SDG#: PF011-03

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 12:54	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18247667632A	09/04/2018 23:09	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779605  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 14:35  
**SDG#:** PF011-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.61	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.51	2.0	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.51	2.0	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.61	0.20	0.61	0.82	1
14478	Perfluorobutanoic acid	375-22-4	< 0.69	0.20	0.69	0.82	1
14478	Perfluorodecanoic acid	335-76-2	< 0.69	0.31	0.69	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.69	0.20	0.69	0.82	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.69	0.20	0.69	0.82	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.65	0.20	0.65	0.82	1
14478	Perfluorohexanoic acid	307-24-4	< 0.69	0.20	0.69	0.82	1
14478	Perfluorononanoic acid	375-95-1	< 0.69	0.20	0.69	0.82	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.66	0.20	0.66	0.82	1
14478	Perfluorooctanoic acid	335-67-1	1.1	0.20	0.69	0.82	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.69	0.20	0.69	0.82	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.69	0.20	0.69	0.82	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.69	0.20	0.69	0.82	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.69	0.20	0.69	0.82	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	3,730	108	325	325	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.39	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.0	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779605  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 14:35  
SDG#: PF011-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:03	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	2	18250667633A	09/08/2018 12:29	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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



**Sample Description:** BAAP-FFTA-SN-1-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779606  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 15:15  
**SDG#:** PF011-05BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.64	0.28	0.64	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.64	0.19	0.64	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.61	0.19	0.61	0.76	1
14478	Perfluorooctanoic acid	335-67-1	1.1	0.19	0.64	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.64	0.19	0.64	0.76	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	1,770	104	312	312	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.41	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.6 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.9	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779606  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 15:15  
SDG#: PF011-05BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:12	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633A	09/08/2018 12:42	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SOMS Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779607  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 15:15  
**SDG#:** PF011-05MS

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	4.4	0.59	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	4.0	0.49	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	1.4 J	0.49	2.0	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	1.4 J	0.49	2.0	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	1.1	0.20	0.59	0.79	1
14478	Perfluorobutanoic acid	375-22-4	1.4	0.20	0.67	0.79	1
14478	Perfluorodecanoic acid	335-76-2	1.4	0.29	0.67	0.98	1
14478	Perfluorododecanoic acid	307-55-1	1.5	0.20	0.67	0.79	1
14478	Perfluoroheptanoic acid	375-85-9	1.2	0.20	0.67	0.79	1
14478	Perfluorohexanesulfonate	355-46-4	1.4	0.20	0.63	0.79	1
14478	Perfluorohexanoic acid	307-24-4	1.3	0.20	0.67	0.79	1
14478	Perfluorononanoic acid	375-95-1	1.3	0.20	0.67	0.79	1
14478	Perfluoro-octanesulfonate	1763-23-1	1.4	0.20	0.64	0.79	1
14478	Perfluorooctanoic acid	335-67-1	2.0	0.20	0.67	0.79	1
14478	Perfluoropentanoic acid	2706-90-3	1.4	0.20	0.67	0.79	1
14478	Perfluorotetradecanoic acid	376-06-7	1.5	0.20	0.67	0.79	1
14478	Perfluorotridecanoic acid	72629-94-8	1.4	0.20	0.67	0.79	1
14478	Perfluoroundecanoic acid	2058-94-8	1.2	0.20	0.67	0.79	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	7,660	246	737	737	1
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00118	Moisture	n.a.	3.9	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:21	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633A	09/08/2018 12:55	Drew M Gerhart	1

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SOMS Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779607  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 15:15  
SDG#: PF011-05MS

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SOMSD Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779608  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 15:15  
SDG#: PF011-05MSD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	4.7	0.62	2.0	2.1	1
14478	8:2 fluorotelomersulfonate	39108-34-4	4.7	0.52	2.0	2.1	1
14478	NEtFOSAA	2991-50-6	1.7 J	0.52	2.1	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	1.3 J	0.52	2.1	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	1.3	0.21	0.62	0.83	1
14478	Perfluorobutanoic acid	375-22-4	1.4	0.21	0.71	0.83	1
14478	Perfluorodecanoic acid	335-76-2	1.4	0.31	0.71	1.0	1
14478	Perfluorododecanoic acid	307-55-1	1.3	0.21	0.71	0.83	1
14478	Perfluoroheptanoic acid	375-85-9	1.4	0.21	0.71	0.83	1
14478	Perfluorohexanesulfonate	355-46-4	1.4	0.21	0.67	0.83	1
14478	Perfluorohexanoic acid	307-24-4	1.3	0.21	0.71	0.83	1
14478	Perfluorononanoic acid	375-95-1	1.4	0.21	0.71	0.83	1
14478	Perfluoro-octanesulfonate	1763-23-1	1.5	0.21	0.68	0.83	1
14478	Perfluorooctanoic acid	335-67-1	2.2	0.21	0.71	0.83	1
14478	Perfluoropentanoic acid	2706-90-3	1.5	0.21	0.71	0.83	1
14478	Perfluorotetradecanoic acid	376-06-7	1.6	0.21	0.71	0.83	1
14478	Perfluorotridecanoic acid	72629-94-8	1.4	0.21	0.71	0.83	1
14478	Perfluoroundecanoic acid	2058-94-8	1.3	0.21	0.71	0.83	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
02079	TOC Solids/Sludges Combustion	n.a.	9,870	243	730	730

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
00118	Moisture	n.a.	3.9	0.50	0.50	0.50

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:30	Joshua P Trost	1

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SOMSD Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779608  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 15:15  
SDG#: PF011-05MSD

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633A	09/08/2018 13:08	Drew M Gerhart	1
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SODUP Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779609  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 15:15  
**SDG#:** PF011-05DUP

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	1,570	105	315	315	1
		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH The pH was measured in water at 19.6 C.	n.a.	9.41	0.0100	0.0100	0.0100	1
<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00118	Moisture	n.a.	3.9	0.50	0.50	0.50	1
00121	Moisture Duplicate	n.a.	4.3	0.50	0.50	0.50	1
The duplicate moisture value is provided to assess the precision of the moisture test. For comparability purposes, the initial moisture determination is the value used to perform dry weight calculations.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633A	09/08/2018 13:21	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1
00121	Moisture Duplicate	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

REVISED

**Sample Description:** BAAP-FB-SO-082818 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779610  
**ELLE Group #:** 1981995  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 10:30  
**SDG#:** PF011-06FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.97	0.26	0.97	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.2	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.97	0.35	0.97	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.2	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:49	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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



**Sample Description:** BAAP-FD-SO-082818 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779611  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018  
**SDG#:** PF011-07FD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.64	0.28	0.64	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.64	0.19	0.64	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.62	0.19	0.62	0.76	1
14478	Perfluorooctanoic acid	335-67-1	2.5	0.19	0.64	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.64	0.19	0.64	0.76	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	2,040	102	307	307	1
<b>SW-846 9045D Nov 2004</b>							
00394	pH	n.a.	9.44	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	2.2	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FD-SO-082818 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779611  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018  
SDG#: PF011-07FD

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:48	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 13:34	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779612  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 08:20  
**SDG#:** PF011-08

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.56	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.56	0.19	0.56	0.75	1
14478	Perfluorobutanoic acid	375-22-4	< 0.63	0.19	0.63	0.75	1
14478	Perfluorodecanoic acid	335-76-2	< 0.63	0.28	0.63	0.93	1
14478	Perfluorododecanoic acid	307-55-1	< 0.63	0.19	0.63	0.75	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.63	0.19	0.63	0.75	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.60	0.19	0.60	0.75	1
14478	Perfluorohexanoic acid	307-24-4	< 0.63	0.19	0.63	0.75	1
14478	Perfluorononanoic acid	375-95-1	< 0.63	0.19	0.63	0.75	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.61	0.19	0.61	0.75	1
14478	Perfluorooctanoic acid	335-67-1	0.25 J	0.19	0.63	0.75	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.63	0.19	0.63	0.75	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.63	0.19	0.63	0.75	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.63	0.19	0.63	0.75	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.63	0.19	0.63	0.75	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	1,690	103	308	308	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.38	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	1.7	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779612  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 08:20  
SDG#: PF011-08

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:57	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667632B	09/08/2018 09:15	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-WT84-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779613  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 08:50  
**SDG#:** PF011-09

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.60	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.50	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.50	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.50	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.60	0.20	0.60	0.80	1
14478	Perfluorobutanoic acid	375-22-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorodecanoic acid	335-76-2	< 0.68	0.30	0.68	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.68	0.20	0.68	0.80	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.64	0.20	0.64	0.80	1
14478	Perfluorohexanoic acid	307-24-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorononanoic acid	375-95-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.65	0.20	0.65	0.80	1
14478	Perfluorooctanoic acid	335-67-1	5.0	0.20	0.68	0.80	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.68	0.20	0.68	0.80	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	822	104	311	311	1
<b>SW-846 9045D Nov 2004</b>							
00394	pH	n.a.	9.24	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.8 C.							
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	1.5	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-WT84-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779613  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 08:50  
SDG#: PF011-09

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 14:06	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 14:13	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

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/g	ng/g	ng/g	ng/g
Batch number: 18248026	Sample number(s): 9779602-9779608,9779611-9779613			
6:2 fluorotelomersulfonate	< 1.9	0.60	1.9	2.0
8:2 fluorotelomersulfonate	< 1.9	0.50	1.9	2.0
NETFOSAA	< 2.0	0.50	2.0	3.0
NMeFOSAA	< 2.0	0.50	2.0	3.0
Perfluorobutanesulfonate	< 0.60	0.20	0.60	0.80
Perfluorobutanoic acid	< 0.68	0.20	0.68	0.80
Perfluorodecanoic acid	< 0.68	0.30	0.68	1.0
Perfluorododecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroheptanoic acid	< 0.68	0.20	0.68	0.80
Perfluorohexanesulfonate	< 0.64	0.20	0.64	0.80
Perfluorohexanoic acid	< 0.68	0.20	0.68	0.80
Perfluorononanoic acid	< 0.68	0.20	0.68	0.80
Perfluoro-octanesulfonate	< 0.65	0.20	0.65	0.80
Perfluorooctanoic acid	< 0.68	0.20	0.68	0.80
Perfluoropentanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotetradecanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotridecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroundecanoic acid	< 0.68	0.20	0.68	0.80
	ng/l	ng/l	ng/l	ng/l
Batch number: 18249001	Sample number(s): 9779610			
6:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
8:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
NETFOSAA	< 2.4	1.0	2.4	3.0
NMeFOSAA	< 2.4	1.0	2.4	3.0
Perfluorobutanesulfonate	< 1.1	0.30	1.1	2.0
Perfluorobutanoic acid	< 4.8	2.0	4.8	6.0
Perfluorodecanoic acid	< 1.2	0.50	1.2	2.0
Perfluorododecanoic acid	< 1.2	0.50	1.2	2.0
Perfluoroheptanoic acid	< 1.2	0.40	1.2	2.0
Perfluorohexanesulfonate	< 1.1	0.40	1.1	2.0
Perfluorohexanoic acid	< 1.2	0.50	1.2	2.0
Perfluorononanoic acid	< 1.2	0.40	1.2	2.0
Perfluoro-octanesulfonate	< 1.2	0.50	1.2	2.0
Perfluorooctanoic acid	< 1.2	0.50	1.2	2.0
Perfluoropentanoic acid	< 4.8	2.0	4.8	6.0
Perfluorotetradecanoic acid	< 1.2	0.60	1.2	2.0
Perfluorotridecanoic acid	< 1.2	0.60	1.2	2.0
Perfluoroundecanoic acid	< 1.2	0.50	1.2	2.0

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

### Method Blank (continued)

Analysis Name	Result	DL**	LOD	LOQ
	ng/l	ng/l	ng/l	ng/l
	mg/kg	mg/kg	mg/kg	mg/kg
Batch number: 18247667632A TOC Solids/Sludges Combustion	Sample number(s): 9779604 < 300	100	300	300
Batch number: 18250667632A TOC Solids/Sludges Combustion	Sample number(s): 9779603 < 300	100	300	300
Batch number: 18250667632B TOC Solids/Sludges Combustion	Sample number(s): 9779612 < 300	100	300	300
Batch number: 18250667633A TOC Solids/Sludges Combustion	Sample number(s): 9779602,9779605-9779609 < 300	100	300	300
Batch number: 18250667633B TOC Solids/Sludges Combustion	Sample number(s): 9779611,9779613 < 300	100	300	300

### LCS/LCSD

Analysis Name	LCS Spike Added	LCS Conc	LCSD Spike Added	LCSD Conc	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
	ng/g	ng/g	ng/g	ng/g					
Batch number: 18248026	Sample number(s): 9779602-9779608,9779611-9779613								
6:2 fluorotelomersulfonate	3.79	4.60			121		70-130		
8:2 fluorotelomersulfonate	3.83	4.37			114		70-130		
NEtFOSAA	1.36	1.31			96		70-130		
NMeFOSAA	1.36	1.22			89		70-130		
Perfluorobutanesulfonate	1.20	1.13			94		70-130		
Perfluorobutanoic acid	1.36	1.38			102		70-130		
Perfluorodecanoic acid	1.36	1.48			109		70-130		
Perfluorododecanoic acid	1.36	1.44			106		70-130		
Perfluoroheptanoic acid	1.36	1.35			99		70-130		
Perfluorohexanesulfonate	1.29	1.40			109		70-130		
Perfluorohexanoic acid	1.36	1.34			98		70-130		
Perfluorononanoic acid	1.36	1.20			88		70-130		
Perfluoro-octanesulfonate	1.30	1.41			108		70-130		
Perfluorooctanoic acid	1.36	1.43			105		70-130		
Perfluoropentanoic acid	1.36	1.42			105		70-130		
Perfluorotetradecanoic acid	1.36	1.41			103		70-130		
Perfluorotridecanoic acid	1.36	1.47			108		70-130		
Perfluoroundecanoic acid	1.36	1.29			95		70-130		
	ng/l	ng/l	ng/l	ng/l					
Batch number: 18249001	Sample number(s): 9779610								

\*- Outside of specification

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

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



## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

### LCS/LCSD (continued)

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
6:2 fluorotelomersulfonate	15.17	16.68	15.17	19.44	110	128	70-130	15	30
8:2 fluorotelomersulfonate	15.33	16.33	15.33	17.25	107	113	70-130	5	30
NEtFOSAA	5.44	4.62	5.44	5.17	85	95	60-131	11	30
NMeFOSAA	5.44	4.94	5.44	5.57	91	102	67-124	12	30
Perfluorobutanesulfonate	4.81	4.83	4.81	5.03	100	105	72-127	4	30
Perfluorobutanoic acid	5.44	5.60	5.44	6.09	103	112	70-130	8	30
Perfluorodecanoic acid	5.44	6.06	5.44	6.44	111	118	67-141	6	30
Perfluorododecanoic acid	5.44	5.80	5.44	6.35	107	117	72-137	9	30
Perfluoroheptanoic acid	5.44	5.36	5.44	5.76	99	106	75-139	7	30
Perfluorohexanesulfonate	5.14	5.36	5.14	5.67	104	110	71-130	6	30
Perfluorohexanoic acid	5.44	5.33	5.44	5.84	98	107	77-132	9	30
Perfluorononanoic acid	5.44	5.20	5.44	5.46	96	100	73-144	5	30
Perfluoro-octanesulfonate	5.20	5.35	5.20	6.07	103	117	67-134	13	30
Perfluorooctanoic acid	5.44	5.79	5.44	5.81	107	107	76-136	0	30
Perfluoropentanoic acid	5.44	6.00	5.44	6.40	110	118	70-130	6	30
Perfluorotetradecanoic acid	5.44	5.98	5.44	5.95	110	109	70-142	1	30
Perfluorotridecanoic acid	5.44	5.66	5.44	6.26	104	115	57-137	10	30
Perfluoroundecanoic acid	5.44	5.24	5.44	5.83	96	107	83-132	11	30
	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>					
Batch number: 18247667632A	Sample number(s): 9779604								
TOC Solids/Sludges Combustion	3890	4480.99			115		47-143		
Batch number: 18250667632A	Sample number(s): 9779603								
TOC Solids/Sludges Combustion	3890	3744.96			96		47-143		
Batch number: 18250667632B	Sample number(s): 9779612								
TOC Solids/Sludges Combustion	3890	3744.96			96		47-143		
Batch number: 18250667633A	Sample number(s): 9779602,9779605-9779609								
TOC Solids/Sludges Combustion	3890	3864.73			99		47-143		
Batch number: 18250667633B	Sample number(s): 9779611,9779613								
TOC Solids/Sludges Combustion	3890	3864.73			99		47-143		
	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>					
Batch number: 18250039402B	Sample number(s): 9779602-9779605,9779612-9779613								
pH	7.00	6.97	7.00	6.97	100	100	95-105	0	3
Batch number: 18250039403A	Sample number(s): 9779606,9779609,9779611								
pH	7.00	6.99			100		95-105		
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>					
Batch number: 18243820003B	Sample number(s): 9779602-9779609,9779611-9779613								
Moisture	89.5	89.45			100		99-101		
Moisture	89.5	89.45			100		99-101		

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

### LCS/LCSD (continued)

Analysis Name	LCS Spike Added %	LCS Conc %	LCSD Spike Added %	LCSD Conc %	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Moisture Duplicate	89.5	89.45			100		99-101		

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/g	MS Spike Added ng/g	MS Conc ng/g	MSD Spike Added ng/g	MSD Conc ng/g	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18248026	Sample number(s): 9779602-9779608,9779611-9779613 UNSPK: 9779606									
6:2 fluorotelomersulfonate	< 1.7	3.58	4.27	3.79	4.56	119	120	70-130	7	30
8:2 fluorotelomersulfonate	< 1.7	3.62	3.89	3.83	4.50	107	117	70-130	15	30
NEtFOSAA	< 1.8	1.28	1.36	1.36	1.68	106	123	70-130	21	30
NMeFOSAA	< 1.8	1.28	1.35	1.36	1.29	105	95	70-130	5	30
Perfluorobutanesulfonate	< 0.55	1.13	1.10	1.20	1.26	97	105	70-130	13	30
Perfluorobutanoic acid	< 0.62	1.28	1.33	1.36	1.34	104	99	70-130	1	30
Perfluorodecanoic acid	< 0.62	1.28	1.33	1.36	1.34	104	98	70-130	0	30
Perfluorododecanoic acid	< 0.62	1.28	1.42	1.36	1.27	110	94	70-130	11	30
Perfluoroheptanoic acid	< 0.62	1.28	1.20	1.36	1.32	93	97	70-130	10	30
Perfluorohexanesulfonate	< 0.58	1.21	1.30	1.29	1.31	107	102	70-130	0	30
Perfluorohexanoic acid	< 0.62	1.28	1.29	1.36	1.23	101	90	70-130	5	30
Perfluorononanoic acid	< 0.62	1.28	1.22	1.36	1.33	95	98	70-130	8	30
Perfluoro-octanesulfonate	< 0.59	1.23	1.36	1.30	1.41	111	108	70-130	4	30
Perfluorooctanoic acid	1.10	1.28	1.95	1.36	2.10	66*	73	70-130	8	30
Perfluoropentanoic acid	< 0.62	1.28	1.33	1.36	1.40	104	103	70-130	5	30
Perfluorotetradecanoic acid	< 0.62	1.28	1.41	1.36	1.49	110	110	70-130	6	30
Perfluorotridecanoic acid	< 0.62	1.28	1.33	1.36	1.37	103	101	70-130	3	30
Perfluoroundecanoic acid	< 0.62	1.28	1.19	1.36	1.23	92	91	70-130	4	30
	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>					
Batch number: 18247667632A	Sample number(s): 9779604 UNSPK: 9779604									
TOC Solids/Sludges Combustion	2414.21	7470	9078.03			89		47-143		
Batch number: 18250667632A	Sample number(s): 9779603 UNSPK: 9779603									
TOC Solids/Sludges Combustion	13022.3	109500	101021.9			80		47-143		
Batch number: 18250667632B	Sample number(s): 9779612 UNSPK: 9779612									
TOC Solids/Sludges Combustion	1658.89	9870	9908.02			84		47-143		
Batch number: 18250667633A	Sample number(s): 9779602,9779605-9779609 UNSPK: 9779606									
TOC Solids/Sludges Combustion	1697.17	7080	7361.6	7020	9480.58	80	111	47-143	25*	20

\*- Outside of specification

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

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

### Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc mg/kg	DUP Conc mg/kg	DUP RPD	DUP RPD Max
Batch number: 18247667632A TOC Solids/Sludges Combustion	Sample number(s): 9779604 BKG: 9779604 2414.21	2014.76	18*	7
Batch number: 18250667632A TOC Solids/Sludges Combustion	Sample number(s): 9779603 BKG: 9779603 13022.3	15616.2	18*	7
Batch number: 18250667632B TOC Solids/Sludges Combustion	Sample number(s): 9779612 BKG: 9779612 1658.89	1230.94	30* (1)	7
Batch number: 18250667633A TOC Solids/Sludges Combustion	Sample number(s): 9779602,9779605-9779609 BKG: 9779606 1697.17	1512.89	11* (1)	7
	<b>Std. Units</b>	<b>Std. Units</b>		
Batch number: 18250039403A pH	Sample number(s): 9779606,9779609,9779611 BKG: 9779606 9.41	9.41	0	3
	<b>%</b>	<b>%</b>		
Batch number: 18243820003B Moisture	Sample number(s): 9779602-9779609,9779611-9779613 BKG: 9779606 3.86	4.29	10*	5
Moisture	3.86	4.29	10*	5
Moisture Duplicate	3.86	4.29	10*	5

### 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: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18248026

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD	%Rec	LOD	%Rec	LOD	%Rec	LOD	%Rec	LOD	%Rec	LOD
	(ng/g)		(ng/g)		(ng/g)		(ng/g)		(ng/g)		(ng/g)	
9779602	80	0.58	78	0.58	81	0.58	82	0.39	92	0.58	82	0.58
9779603	79	0.58	74	0.58	77	0.58	79	0.39	79	0.58	75	0.58
9779604	87	0.58	85	0.58	83	0.58	90	0.38	90	0.58	91	0.58
9779605	81	0.59	77	0.59	76	0.59	82	0.40	85	0.59	86	0.59
9779606	85	0.55	82	0.55	80	0.55	84	0.36	86	0.55	90	0.55
9779607	93	0.57	92	0.57	86	0.57	91	0.38	93	0.57	96	0.57
9779608	71	1.2	69	1.2	67	1.2	71	0.80	70	1.2	71	1.2

\*- Outside of specification

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

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

### 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: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18248026

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9779611	113	0.56	106	0.56	109	0.56	112	0.37	110	0.56	112	0.56
9779612	89	0.55	85	0.55	83	0.55	87	0.37	88	0.55	92	0.55
9779613	88	0.59	86	0.59	85	0.59	86	0.39	91	0.59	86	0.59
Blank	88	1.2	84	1.2	80	1.2	94	0.80	93	1.2	95	1.2
LCS	90	1.2	88	1.2	85	1.2	95	0.80	96	1.2	95	1.2
MS	93	0.57	92	0.57	86	0.57	91	0.38	93	0.57	96	0.57
MSD	71	1.2	69	1.2	67	1.2	71	0.80	70	1.2	71	1.2
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9779602	76	0.87	81	0.58	82	0.87	77	0.39	90	0.58	77	0.87
9779603	67	0.87	75	0.58	86	0.87	80	0.39	80	0.58	66	0.87
9779604	85	0.87	86	0.58	85	0.87	84	0.38	92	0.58	90	0.87
9779605	72	0.89	81	0.59	78	0.89	78	0.40	86	0.59	69	0.89
9779606	79	0.82	83	0.55	86	0.82	83	0.36	87	0.55	72	0.82
9779607	87	0.85	89	0.57	95	0.85	97	0.38	96	0.57	83	0.85
9779608	70	1.8	72	1.2	72	1.8	73	0.80	79	1.2	69	1.8
9779611	111	0.83	113	0.56	110	0.83	106	0.37	112	0.56	100	0.83
9779612	79	0.83	88	0.55	87	0.83	82	0.37	95	0.55	91	0.83
9779613	86	0.88	90	0.59	87	0.88	85	0.39	94	0.59	84	0.88
Blank	89	1.8	87	1.2	84	1.8	88	0.80	86	1.2	80	1.8
LCS	94	1.8	92	1.2	91	1.8	96	0.80	92	1.2	92	1.8
MS	87	0.85	89	0.57	95	0.85	97	0.38	96	0.57	83	0.85
MSD	70	1.8	72	1.2	72	1.8	73	0.80	79	1.2	69	1.8
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9779602	9*	0.87	83	0.58	11*	0.87	86	0.58	80	0.58
9779603	25*	0.87	82	0.58	33*	0.87	78	0.58	78	0.58
9779604	67	0.87	89	0.58	65	0.87	88	0.58	81	0.58
9779605	39*	0.89	86	0.59	45*	0.89	87	0.59	84	0.59
9779606	42*	0.82	83	0.55	50	0.82	86	0.55	80	0.55
9779607	61	0.85	92	0.57	72	0.85	87	0.57	90	0.57
9779608	40*	1.8	79	1.2	50	1.8	78	1.2	71	1.2

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18248026

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9779611	67	0.83	116	0.56	73	0.83	104	0.56	104	0.56
9779612	42*	0.83	96	0.55	60	0.83	88	0.55	80	0.55
9779613	55	0.88	95	0.59	70	0.88	88	0.59	93	0.59
Blank	84	1.8	85	1.2	80	1.8	87	1.2	87	1.2
LCS	91	1.8	92	1.2	84	1.8	94	1.2	91	1.2
MS	61	0.85	92	0.57	72	0.85	87	0.57	90	0.57
MSD	40*	1.8	79	1.2	50	1.8	78	1.2	71	1.2
Limits:	50-150		50-150		50-150		50-150		50-150	

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18249001

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779610	89	8.8	89	2.6	89	8.8	89	1.8	88	8.8	93	1.8
Blank	88	10	88	3.0	89	10	87	2.0	90	10	95	2.0
LCS	79	10	78	3.0	82	10	81	2.0	84	10	83	2.0
LCSD	80	10	81	3.0	83	10	86	2.0	85	10	86	2.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779610	98	8.8	87	1.8	86	8.8	91	1.8	89	1.8	96	5.3
Blank	105	10	89	2.0	85	10	82	2.0	86	2.0	94	6.0
LCS	90	10	76	2.0	78	10	78	2.0	79	2.0	89	6.0
LCSD	85	10	83	2.0	81	10	80	2.0	79	2.0	84	6.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779610	76	7.1	78	3.5	79	7.1	74	4.4	59	4.4
Blank	83	8.0	84	4.0	90	8.0	82	5.0	75	5.0
LCS	72	8.0	74	4.0	70	8.0	74	5.0	59	5.0
LCSD	70	8.0	77	4.0	72	8.0	73	5.0	72	5.0

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 10/15/2018 15:04

Group Number: 1981995

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18249001

Limits:	50-150	50-150	50-150	50-150	50-150
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\*- 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.

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981995 Sample # 9779602-13

COC # 561230

Client Information				Matrix				Analysis Requested				For Lab Use Only									
Client: <u>ARCADIS</u>		Acct. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/>		Preservation and Filtration Codes				FSC: _____									
Project Name/ID: <u>BAAP/02118216.1000, 7AD00</u>		PWSID #:		Water <input type="checkbox"/> NPDES <input type="checkbox"/>		Other: <u>PFA-DI Lab Supplies</u>						SCR#: _____									
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:		Grab <input type="checkbox"/> Composite <input type="checkbox"/>		Total # of Containers						Preservation Codes									
Sampler: <u>Bruce Evans / Tees Nugent</u>		Quote #:		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		PFAS Group						H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered   O=Other									
State where samples were collected: <u>WI</u>		For Compliance:		Soil <input checked="" type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/>						Remarks									
Sample Identification		Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	PFAS Group	TOC/PA/Moisture	Moisture	SAMPLING								
Date	Time	Date	Time																		
<u>BAAP-FFTA-SN-1-50-50</u>	<u>8/28/18</u>	<u>10:20</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>34</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>								
<u>BAAP-FFTA-SN-1-20-50</u>	<u>8/28/18</u>	<u>13:25</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>34</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>								
<u>BAAP-FFTA-SN-1-35-50</u>	<u>8/28/18</u>	<u>13:40</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>34</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>								
<u>BAAP-FFTA-SN-1-50-50</u>	<u>8/28/18</u>	<u>14:35</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>34</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>								
<u>BAAP-FFTA-SN-1-65-50</u>	<u>8/28/18</u>	<u>15:15</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>912</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>							<u>MS/MSD</u>	
<u>BAAP-FB-50-082818</u>	<u>8/28/18</u>	<u>10:30</u>	<u>X</u>					<u>X</u>	<u>2</u>	<u>X</u>										<u>Field Blank</u>	
<del><u>BAAP-EB-50-082818-1</u></del>	<del><u>8/28/18</u></del>	<del><u>13:00</u></del>	<del><u>X</u></del>					<del><u>X</u></del>	<del><u>2</u></del>	<del><u>X</u></del>										<del><u>Equipment Blank</u></del>	
<u>BAAP-FD-50-082818</u>	<u>8/28/18</u>	<u>-</u>	<u>X</u>	<u>X</u>				<u>329</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>								
<u>BAAP-FFTA-SN-1-80-50</u>	<u>8/29/18</u>	<u>08:20</u>	<u>X</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>								
<u>BAAP-FFTA-SN-1-WT84-50</u>	<u>8/29/18</u>	<u>08:50</u>	<u>X</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>								
Turnaround Time (TAT) Requested (please circle)				Relinquished by <u>[Signature]</u>				Date <u>8/29/18</u> Time <u>17:00</u>		Received by _____		Date _____ Time _____									
Standard <u>Rush</u>				Relinquished by _____				Date _____ Time _____		Received by _____		Date _____ Time _____									
(Rush TAT is subject to laboratory approval and surcharge.)				Relinquished by _____				Date _____ Time _____		Received by _____		Date _____ Time _____									
Date results are needed: <u>5 DAYS</u>				Relinquished by _____				Date _____ Time _____		Received by _____		Date _____ Time _____									
E-mail address: <u>Kimmie.Schrupp@Arcadis.com</u>				Relinquished by _____				Date _____ Time _____		Received by _____		Date _____ Time _____									
Data Package Options (circle if required)				Relinquished by _____				Date _____ Time _____		Received by <u>[Signature]</u>		Date <u>8/30/18</u> Time <u>10:15</u>									
Type I (EPA Level 3 Equivalent/non-CLP)		Type VI (Raw Data Only)		EDD Required? <u>Yes</u> No				If yes, format: _____				Relinquished by Commercial Carrier: UPS _____ FedEx <u>X</u> Other _____									
Type III (Reduced non-CLP)		NJ DKQP TX TRRP-13		Site-Specific QC (MS/MSD/Dup)? <u>Yes</u> No				(If yes, indicate QC sample and submit triplicate sample volume.)				Temperature upon receipt <u>1.0-2.8</u> °C									
NYSDEC Category A or B		MA MCP CT RCP																			

1981995

**Katherine Klinefelter**

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Wednesday, September 05, 2018 3:09 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*

See below in Red.

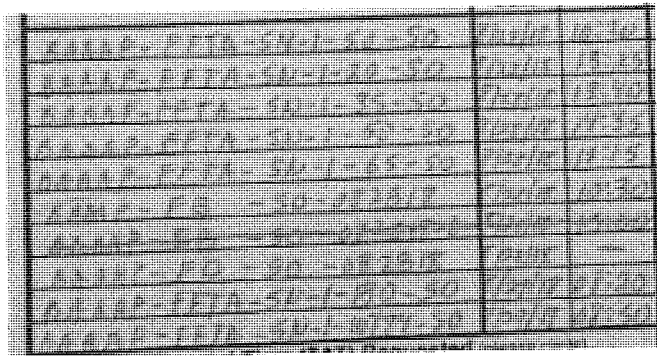
Thanks!  
Kimmie

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Wednesday, September 5, 2018 12:51 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Kowalski, Joe <Joseph.Kowalski@arcadis.com>  
**Subject:** RE: Badger AAP project

Are these samples all Equipment Blanks? Yep we'll have a lot of EBs on this program.

BAAP-EB-GW-082918-1	8-29-18	0930
BAAP-EB-GW-082818-2	8-28-18	1400
BAAP-EB-GW-082918-3	8-29-18	1140
BAAP-EB-GW-082918-4	8-29-18	1620
BAAP-EB-GW-082918-5	8-29-18	1025

Should these sample IDs begin with BAAP rather than BAAAP? Yes if it's not too much trouble, other wise we can fix during validation.



**From:** Schrupp, Kimmie [mailto:Kimberley.Schrupp@arcadis.com]  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*



1981995

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanCLabsEnv](http://www.EurofinsUS.com/LanCLabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

EXTERNAL EMAIL\*

Hi Kathy,  
So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!  
Thanks  
Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

1981995

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T. +1 720 344 3712 | M. + 1 303 916 1193

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Be green. leave it on the screen.

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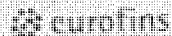
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# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

Account # 13129 Group # 1981995 Sample # 9779602-13

COC # 561230

Client Information				Matrix			Analysis Requested				For Lab Use Only						
Account #		Project #		Soil <input type="checkbox"/>	Sediment <input type="checkbox"/>	Tissue <input type="checkbox"/>	Preservation and Filtration Codes				PSC	SCR#					
Name		Address					Potable <input type="checkbox"/>	Ground <input type="checkbox"/>	Surface <input type="checkbox"/>					Preservation Codes			
City/State		Country		Water <input type="checkbox"/>	MPCDES <input type="checkbox"/>	Other <input type="checkbox"/>								H-HCl	T-Thiosulfate		
Phone		Fax					Total # of Containers								N-HCl	B-NaOH	
E-mail		Website										S-HCl	P-H <sub>2</sub> PO <sub>4</sub>				
Date of Sample		Time of Sample										F-Field Filtered	O-Other				
Sample ID		Collected										Remarks					
Date		Time															
Sample ID	Date	Time	Grab	Composite	Soil	Sediment	Tissue	Potable	Ground	Surface	Water	MPCDES	Other	Total # of Containers	Analysis Requested	For Lab Use Only	Remarks
6822P-PTA-SU-1-51-50	10/11	10:30	X		X									3			
6822P-PTA-SU-1-12-50	10/11	13:20	X		X									3			
6822P-PTA-SU-1-35-50	10/11	15:10	X		X									3			
6822P-PTA-SU-1-50-50	10/11	11:35	X		X									3			
6822P-PTA-SU-1-65-50	10/11	16:15	X		X									3			
6822P-PTA-SU-1-82-50	10/11	17:30	X		X									3			
6822P-PTA-SU-1-90-50	10/11	17:20	X		X									3			
6822P-PTA-SU-1-93-50	10/11	17:50	X		X									3			
6822P-PTA-SU-1-97-50	10/11	17:50	X		X									3			

Turnaround Time (TAT) Requested (please circle)  
Standard ~~Fast~~

Data results are needed SOON

E-mail address N. M. S. - S. H. 4000 Analysis

Data Package Options (circle if required)

Type I (EPA Level 3 Equivalent non-CLP)	Type VI (Raw Data Only)
Type III (Reduced non-CLP)	NJ DKOP TX TRRP-13
NYSDEC Category A or B	MA MCP CT RCP

Requested by	Date	Time	Received by	Date	Time
<i>[Signature]</i>	10/11	10:30			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time

EDD Required? (Yes) No

Site-Specific QC (MS/MSD/Dup)? (Yes) No

Relinquished by Commercial Carrier  
 UPS  FedEx  Other

Temperature upon receipt \_\_\_\_\_ °C

813348307567 813348307567

Eurofins Lancaster Laboratories Environmental  
 The white copy should accompany samples to Eurofins Ltd

Keep this liner for your records.



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/30/2018 10:15</u>
Number of Packages:	<u>2</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Zane Hollinger (10251) at 14:26 on 08/30/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-01	2.8	DT	Wet	Y	Bagged	N
2	DT131	1.0	DT	Wet	Y	Bagged	N

# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: September 18, 2018 18:47

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1981996  
SDG: PF012  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

(717) 556-7256

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## SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-FFTA-SN-2-5.0-SO Grab Soil	08/29/2018 10:20	9779614
BAAP-FFTA-SN-2-20-SO Grab Soil	08/29/2018 11:00	9779615
BAAP-FFTA-SN-2-35-SO Grab Soil	08/29/2018 11:25	9779616
BAAP-FFTA-SN-2-50-SO Grab Soil	08/29/2018 12:20	9779617
BAAP-FFTA-SN-2-65-SO Grab Soil	08/29/2018 12:45	9779618
BAAP-FFTA-SN-2-WT80-SO Grab Soil	08/29/2018 13:50	9779619
BAAP-EB-SO-082918-2 Grab Water	08/29/2018 09:45	9779620
BAAP-FB-SO-082918 Grab Water	08/29/2018 10:00	9779621
BAAP-EB-SO-082918-1 Grab Water	08/29/2018 10:30	9779622
BAAP-FFTA-SN-3-5.0-SO Grab Soil	08/29/2018 15:05	9779623
BAAP-FFTA-SN-3-20-SO Grab Soil	08/29/2018 15:30	9779624
BAAP-FFTA-SN-3-35-SO Grab Soil	08/29/2018 16:00	9779625
BAAP-FFTA-SN-3-35-SOMS Grab Soil	08/29/2018 16:00	9779626
BAAP-FFTA-SN-3-35-SOMSD Grab Soil	08/29/2018 16:00	9779627
BAAP-FFTA-SN-3-35-SODUP Grab Soil	08/29/2018 16:00	9779628
BAAP-FD-SO-082918 Grab Soil	08/29/2018	9779629

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1981996

**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 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: 9779616, 9779619

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid

Sample #s: 9779614, 9779623, 9779624, 9779625, 9779629

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

Sample #s: 9779626

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate, NEtFOSAA, NMeFOSAA

Sample #s: 9779615, 9779617, 9779618

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid

Sample #s: 9779627

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid, Perfluoroundecanoic acid, Perfluoro-octanesulfonate, 8:2 fluorotelomersulfonate

Batch #: 18248031 (Sample number(s): 9779614-9779619, 9779623-9779627, 9779629 UNSPK: 9779625)

The recovery(ies) for the following analyte(s) in the MS and/or MSD exceeded the acceptance window indicating a positive bias: 6:2 fluorotelomersulfonate

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) 9779614, 9779615, 9779617, 9779618, 9779623, 9779624, 9779625, 9779626, 9779627, 9779629, MS, MSD

**SW-846 9060A modified, Wet Chemistry**

Batch #: 18247667632B (Sample number(s): 9779618 UNSPK: 9779618 BKG: 9779618)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: TOC Solids/Sludges Combustion

**SW-846 9045D Nov 2004, Wet Chemistry**

Sample #s: 9779618

The pH was measured in water at 19.6 C.

Sample #s: 9779614, 9779617, 9779619, 9779623, 9779624

The pH was measured in water at 19.7 C.

Sample #s: 9779615, 9779616

The pH was measured in water at 19.8 C.

Sample #s: 9779628, 9779629

The pH was measured in water at 20.2 C.

Sample #s: 9779625

The pH was measured in water at 20.6 C.

**SM 2540 G-2011 %Moisture Calc, Wet Chemistry**

Batch #: 18243820004A (Sample number(s): 9779614-9779619, 9779623-9779629 BKG: 9779625)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: Moisture, Moisture, Moisture Duplicate

**Sample Description:** BAAP-FFTA-SN-2-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779614  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:20  
**SDG#:** PF012-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.1	0.65	2.1	2.2	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.1	0.54	2.1	2.2	1
14478	NEtFOSAA	2991-50-6	< 2.2	0.54	2.2	3.3	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.2	0.54	2.2	3.3	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.65	0.22	0.65	0.87	1
14478	Perfluorobutanoic acid	375-22-4	< 0.74	0.22	0.74	0.87	1
14478	Perfluorodecanoic acid	335-76-2	< 0.74	0.33	0.74	1.1	1
14478	Perfluorododecanoic acid	307-55-1	< 0.74	0.22	0.74	0.87	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.74	0.22	0.74	0.87	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.70	0.22	0.70	0.87	1
14478	Perfluorohexanoic acid	307-24-4	< 0.74	0.22	0.74	0.87	1
14478	Perfluorononanoic acid	375-95-1	< 0.74	0.22	0.74	0.87	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.71	0.22	0.71	0.87	1
14478	Perfluorooctanoic acid	335-67-1	< 0.74	0.22	0.74	0.87	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.74	0.22	0.74	0.87	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.74	0.22	0.74	0.87	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.74	0.22	0.74	0.87	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.74	0.22	0.74	0.87	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	2,090	160	481	481	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	7.59	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	16.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779614  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 10:20  
SDG#: PF012-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 14:42	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 14:26	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-2-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779615  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 11:00  
**SDG#:** PF012-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.48	1.9	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.48	1.9	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.65	0.29	0.65	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.65	0.19	0.65	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.62	0.19	0.62	0.76	1
14478	Perfluorooctanoic acid	335-67-1	0.38 J	0.19	0.65	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.65	0.19	0.65	0.76	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	4,570	926	2,780	2,780	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.24	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.8 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.5	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779615  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 11:00  
SDG#: PF012-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 14:51	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/10/2018 16:57	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-2-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779616  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 11:25  
**SDG#:** PF012-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.48	1.9	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.48	1.9	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.65	0.29	0.65	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.65	0.19	0.65	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.62	0.19	0.62	0.76	1
14478	Perfluorooctanoic acid	335-67-1	1.1	0.19	0.65	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.65	0.19	0.65	0.76	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	5,400	966	2,900	2,900	1
<b>SW-846 9045D Nov 2004</b>							
00394	pH	n.a.	9.22	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.8 C.							
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	3.8	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779616  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 11:25  
SDG#: PF012-03

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:00	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/10/2018 17:10	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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



**Sample Description:** BAAP-FFTA-SN-2-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779617  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 12:20  
SDG#: PF012-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.62	1.9	2.1	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.1	1
14478	NEtFOSAA	2991-50-6	< 2.1	0.51	2.1	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.1	0.51	2.1	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.62	0.21	0.62	0.82	1
14478	Perfluorobutanoic acid	375-22-4	< 0.70	0.21	0.70	0.82	1
14478	Perfluorodecanoic acid	335-76-2	< 0.70	0.31	0.70	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.70	0.21	0.70	0.82	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.70	0.21	0.70	0.82	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.66	0.21	0.66	0.82	1
14478	Perfluorohexanoic acid	307-24-4	< 0.70	0.21	0.70	0.82	1
14478	Perfluorononanoic acid	375-95-1	< 0.70	0.21	0.70	0.82	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.67	0.21	0.67	0.82	1
14478	Perfluorooctanoic acid	335-67-1	< 0.70	0.21	0.70	0.82	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.70	0.21	0.70	0.82	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.70	0.21	0.70	0.82	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.70	0.21	0.70	0.82	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.70	0.21	0.70	0.82	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	3,430	103	308	308	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.24	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.5	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779617  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 12:20  
SDG#: PF012-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:09	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:05	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-2-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779618  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 12:45  
**SDG#:** PF012-05

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.64	0.28	0.64	0.94	1
14478	Perfluorododecanoic acid	307-55-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.64	0.19	0.64	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.60	0.19	0.60	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.61	0.19	0.61	0.76	1
14478	Perfluorooctanoic acid	335-67-1	0.44 J	0.19	0.64	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.64	0.19	0.64	0.76	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	2,860	103	309	309	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	8.98	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.6 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.0	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779618  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 12:45  
SDG#: PF012-05

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:18	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18247667632B	09/05/2018 00:53	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-2-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779619  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 13:50  
**SDG#:** PF012-06

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.59	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.49	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.49	2.0	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.49	2.0	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.59	0.20	0.59	0.78	1
14478	Perfluorobutanoic acid	375-22-4	< 0.66	0.20	0.66	0.78	1
14478	Perfluorodecanoic acid	335-76-2	< 0.66	0.29	0.66	0.98	1
14478	Perfluorododecanoic acid	307-55-1	< 0.66	0.20	0.66	0.78	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.66	0.20	0.66	0.78	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.62	0.20	0.62	0.78	1
14478	Perfluorohexanoic acid	307-24-4	< 0.66	0.20	0.66	0.78	1
14478	Perfluorononanoic acid	375-95-1	< 0.66	0.20	0.66	0.78	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.63	0.20	0.63	0.78	1
14478	Perfluorooctanoic acid	335-67-1	0.67 J	0.20	0.66	0.78	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.66	0.20	0.66	0.78	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.66	0.20	0.66	0.78	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.66	0.20	0.66	0.78	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.66	0.20	0.66	0.78	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	937	105	314	314	1
<b>SW-846 9045D Nov 2004</b>							
00394	pH	n.a.	9.26	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	2.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779619  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 13:50  
SDG#: PF012-06

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:37	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:18	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-EB-SO-082918-2 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779620  
**ELLE Group #:** 1981996  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 09:45  
**SDG#:** PF012-07EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.98	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:58	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-FB-SO-082918 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779621  
**ELLE Group #:** 1981996  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:00  
**SDG#:** PF012-08FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.93	1.9	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.93	1.9	2.8	1
14434	NEtFOSAA	2991-50-6	< 2.2	0.93	2.2	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.2	0.93	2.2	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 1.0	0.28	1.0	1.9	1
14434	Perfluorobutanoic acid	375-22-4	< 4.4	1.9	4.4	5.6	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.46	1.1	1.9	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.46	1.1	1.9	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.37	1.1	1.9	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.0	0.37	1.0	1.9	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.46	1.1	1.9	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.37	1.1	1.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.46	1.1	1.9	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.46	1.1	1.9	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.4	1.9	4.4	5.6	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.56	1.1	1.9	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.56	1.1	1.9	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.46	1.1	1.9	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 13:07	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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



**Sample Description:** BAAP-EB-SO-082918-1 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779622  
**ELLE Group #:** 1981996  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:30  
**SDG#:** PF012-09EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.90	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.90	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.2	0.90	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.2	0.90	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.99	0.27	0.99	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.99	0.36	0.99	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 13:16	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-FFTA-SN-3-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779623  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 15:05  
**SDG#:** PF012-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.2	0.69	2.2	2.3	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.2	0.58	2.2	2.3	1
14478	NEtFOSAA	2991-50-6	< 2.3	0.58	2.3	3.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.3	0.58	2.3	3.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.69	0.23	0.69	0.92	1
14478	Perfluorobutanoic acid	375-22-4	< 0.78	0.23	0.78	0.92	1
14478	Perfluorodecanoic acid	335-76-2	< 0.78	0.35	0.78	1.2	1
14478	Perfluorododecanoic acid	307-55-1	< 0.78	0.23	0.78	0.92	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.78	0.23	0.78	0.92	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.74	0.23	0.74	0.92	1
14478	Perfluorohexanoic acid	307-24-4	< 0.78	0.23	0.78	0.92	1
14478	Perfluorononanoic acid	375-95-1	< 0.78	0.23	0.78	0.92	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.75	0.23	0.75	0.92	1
14478	Perfluorooctanoic acid	335-67-1	< 0.78	0.23	0.78	0.92	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.78	0.23	0.78	0.92	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.78	0.23	0.78	0.92	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.78	0.23	0.78	0.92	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.78	0.23	0.78	0.92	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	2,150	160	479	479	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	7.88	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	14.8	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-3-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779623  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 15:05  
SDG#: PF012-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:46	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:31	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-3-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779624  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 15:30  
SDG#: PF012-11

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.58	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.48	1.9	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.48	1.9	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.58	0.19	0.58	0.77	1
14478	Perfluorobutanoic acid	375-22-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorodecanoic acid	335-76-2	< 0.66	0.29	0.66	0.97	1
14478	Perfluorododecanoic acid	307-55-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.66	0.19	0.66	0.77	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.62	0.19	0.62	0.77	1
14478	Perfluorohexanoic acid	307-24-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorononanoic acid	375-95-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.63	0.19	0.63	0.77	1
14478	Perfluorooctanoic acid	335-67-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.66	0.19	0.66	0.77	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	12,500	874	2,620	2,620	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.24	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-3-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779624  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 15:30  
SDG#: PF012-11

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:55	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/10/2018 17:49	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779625  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 16:00  
**SDG#:** PF012-12BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.61	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.51	2.0	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.51	2.0	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.61	0.20	0.61	0.82	1
14478	Perfluorobutanoic acid	375-22-4	< 0.70	0.20	0.70	0.82	1
14478	Perfluorodecanoic acid	335-76-2	< 0.70	0.31	0.70	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.70	0.20	0.70	0.82	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.70	0.20	0.70	0.82	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.65	0.20	0.65	0.82	1
14478	Perfluorohexanoic acid	307-24-4	< 0.70	0.20	0.70	0.82	1
14478	Perfluorononanoic acid	375-95-1	< 0.70	0.20	0.70	0.82	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.67	0.20	0.67	0.82	1
14478	Perfluorooctanoic acid	335-67-1	< 0.70	0.20	0.70	0.82	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.70	0.20	0.70	0.82	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.70	0.20	0.70	0.82	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.70	0.20	0.70	0.82	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.70	0.20	0.70	0.82	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
02079	TOC Solids/Sludges Combustion	n.a.	3,130	105	316	316

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>
00394	pH	n.a.	9.36	0.0100	0.0100	0.0100
The pH was measured in water at 20.6 C.						

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
00111	Moisture	n.a.	4.2	0.50	0.50	0.50
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

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

**Sample Description:** BAAP-FFTA-SN-3-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779625  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 16:00  
SDG#: PF012-12BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 16:04	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:57	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SOMS Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779626  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 16:00  
SDG#: PF012-12MS

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	4.8	0.60	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	4.2	0.50	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	1.5 J	0.50	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	1.3 J	0.50	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	1.2	0.20	0.60	0.80	1
14478	Perfluorobutanoic acid	375-22-4	1.4	0.20	0.68	0.80	1
14478	Perfluorodecanoic acid	335-76-2	1.5	0.30	0.68	0.99	1
14478	Perfluorododecanoic acid	307-55-1	1.5	0.20	0.68	0.80	1
14478	Perfluoroheptanoic acid	375-85-9	1.3	0.20	0.68	0.80	1
14478	Perfluorohexanesulfonate	355-46-4	1.2	0.20	0.64	0.80	1
14478	Perfluorohexanoic acid	307-24-4	1.3	0.20	0.68	0.80	1
14478	Perfluorononanoic acid	375-95-1	1.3	0.20	0.68	0.80	1
14478	Perfluoro-octanesulfonate	1763-23-1	1.5	0.20	0.65	0.80	1
14478	Perfluorooctanoic acid	335-67-1	1.5	0.20	0.68	0.80	1
14478	Perfluoropentanoic acid	2706-90-3	1.4	0.20	0.68	0.80	1
14478	Perfluorotetradecanoic acid	376-06-7	1.5	0.20	0.68	0.80	1
14478	Perfluorotridecanoic acid	72629-94-8	1.5	0.20	0.68	0.80	1
14478	Perfluoroundecanoic acid	2058-94-8	1.2	0.20	0.68	0.80	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	mg/kg	mg/kg	mg/kg	mg/kg
02079	TOC Solids/Sludges Combustion	n.a.	9,790	263	789	789
<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%
00118	Moisture	n.a.	4.2	0.50	0.50	0.50

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 16:13	Joshua P Trost	1

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



**Sample Description:** BAAP-FFTA-SN-3-35-SOMS Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779626  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 16:00  
SDG#: PF012-12MS

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 16:10	Drew M Gerhart	1
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SOMSD Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779627  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 16:00  
SDG#: PF012-12MSD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	5.0	0.60	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	4.5	0.50	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	1.4 J	0.50	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	1.4 J	0.50	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	1.2	0.20	0.60	0.80	1
14478	Perfluorobutanoic acid	375-22-4	1.4	0.20	0.68	0.80	1
14478	Perfluorodecanoic acid	335-76-2	1.4	0.30	0.68	0.99	1
14478	Perfluorododecanoic acid	307-55-1	1.4	0.20	0.68	0.80	1
14478	Perfluoroheptanoic acid	375-85-9	1.3	0.20	0.68	0.80	1
14478	Perfluorohexanesulfonate	355-46-4	1.2	0.20	0.64	0.80	1
14478	Perfluorohexanoic acid	307-24-4	1.3	0.20	0.68	0.80	1
14478	Perfluorononanoic acid	375-95-1	1.3	0.20	0.68	0.80	1
14478	Perfluoro-octanesulfonate	1763-23-1	1.2	0.20	0.65	0.80	1
14478	Perfluorooctanoic acid	335-67-1	1.4	0.20	0.68	0.80	1
14478	Perfluoropentanoic acid	2706-90-3	1.5	0.20	0.68	0.80	1
14478	Perfluorotetradecanoic acid	376-06-7	1.4	0.20	0.68	0.80	1
14478	Perfluorotridecanoic acid	72629-94-8	1.5	0.20	0.68	0.80	1
14478	Perfluoroundecanoic acid	2058-94-8	1.4	0.20	0.68	0.80	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	mg/kg	mg/kg	mg/kg	mg/kg
02079	TOC Solids/Sludges Combustion	n.a.	8,200	256	767	767
<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%
00118	Moisture	n.a.	4.2	0.50	0.50	0.50

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 16:22	Joshua P Trost	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SOMSD Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779627  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 16:00  
**SDG#:** PF012-12MSD

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 16:48	Drew M Gerhart	1
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SODUP Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779628  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 16:00  
**SDG#:** PF012-12DUP

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	2,970	104	313	313	1
		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH The pH was measured in water at 20.2 C.	n.a.	9.33	0.0100	0.0100	0.0100	1
<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00118	Moisture	n.a.	4.2	0.50	0.50	0.50	1
00121	Moisture Duplicate	n.a.	3.8	0.50	0.50	0.50	1
The duplicate moisture value is provided to assess the precision of the moisture test. For comparability purposes, the initial moisture determination is the value used to perform dry weight calculations.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 17:01	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1
00121	Moisture Duplicate	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FD-SO-082918 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779629  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018  
**SDG#:** PF012-13FD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.58	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.48	1.9	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.48	1.9	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.58	0.19	0.58	0.77	1
14478	Perfluorobutanoic acid	375-22-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorodecanoic acid	335-76-2	< 0.66	0.29	0.66	0.96	1
14478	Perfluorododecanoic acid	307-55-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.66	0.19	0.66	0.77	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.62	0.19	0.62	0.77	1
14478	Perfluorohexanoic acid	307-24-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorononanoic acid	375-95-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.63	0.19	0.63	0.77	1
14478	Perfluorooctanoic acid	335-67-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.66	0.19	0.66	0.77	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	5,410	892	2,680	2,680	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.29	0.0100	0.0100	0.0100	1
The pH was measured in water at 20.2 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.9	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FD-SO-082918 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779629  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018  
SDG#: PF012-13FD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 16:31	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/10/2018 18:02	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:47

Group Number: 1981996

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/g	ng/g	ng/g	ng/g
Batch number: 18248031	Sample number(s): 9779614-9779619,9779623-9779627,9779629			
6:2 fluorotelomersulfonate	< 1.9	0.60	1.9	2.0
8:2 fluorotelomersulfonate	< 1.9	0.50	1.9	2.0
NETFOSAA	< 2.0	0.50	2.0	3.0
NMeFOSAA	< 2.0	0.50	2.0	3.0
Perfluorobutanesulfonate	< 0.60	0.20	0.60	0.80
Perfluorobutanoic acid	< 0.68	0.20	0.68	0.80
Perfluorodecanoic acid	< 0.68	0.30	0.68	1.0
Perfluorododecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroheptanoic acid	< 0.68	0.20	0.68	0.80
Perfluorohexanesulfonate	< 0.64	0.20	0.64	0.80
Perfluorohexanoic acid	< 0.68	0.20	0.68	0.80
Perfluorononanoic acid	< 0.68	0.20	0.68	0.80
Perfluoro-octanesulfonate	< 0.65	0.20	0.65	0.80
Perfluorooctanoic acid	< 0.68	0.20	0.68	0.80
Perfluoropentanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotetradecanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotridecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroundecanoic acid	< 0.68	0.20	0.68	0.80
	ng/l	ng/l	ng/l	ng/l
Batch number: 18249001	Sample number(s): 9779620-9779622			
6:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
8:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
NETFOSAA	< 2.4	1.0	2.4	3.0
NMeFOSAA	< 2.4	1.0	2.4	3.0
Perfluorobutanesulfonate	< 1.1	0.30	1.1	2.0
Perfluorobutanoic acid	< 4.8	2.0	4.8	6.0
Perfluorodecanoic acid	< 1.2	0.50	1.2	2.0
Perfluorododecanoic acid	< 1.2	0.50	1.2	2.0
Perfluoroheptanoic acid	< 1.2	0.40	1.2	2.0
Perfluorohexanesulfonate	< 1.1	0.40	1.1	2.0
Perfluorohexanoic acid	< 1.2	0.50	1.2	2.0
Perfluorononanoic acid	< 1.2	0.40	1.2	2.0
Perfluoro-octanesulfonate	< 1.2	0.50	1.2	2.0
Perfluorooctanoic acid	< 1.2	0.50	1.2	2.0
Perfluoropentanoic acid	< 4.8	2.0	4.8	6.0
Perfluorotetradecanoic acid	< 1.2	0.60	1.2	2.0
Perfluorotridecanoic acid	< 1.2	0.60	1.2	2.0
Perfluoroundecanoic acid	< 1.2	0.50	1.2	2.0

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:47

Group Number: 1981996

### Method Blank (continued)

Analysis Name	Result	DL**	LOD	LOQ
	ng/l	ng/l	ng/l	ng/l
	mg/kg	mg/kg	mg/kg	mg/kg
Batch number: 18247667632B TOC Solids/Sludges Combustion	Sample number(s): 9779618 < 300	100	300	300
Batch number: 18250667633B TOC Solids/Sludges Combustion	Sample number(s): 9779614-9779617,9779619,9779623-9779628 < 300	100	300	300
Batch number: 18250667634A TOC Solids/Sludges Combustion	Sample number(s): 9779629 < 300	100	300	300

### LCS/LCSD

Analysis Name	LCS Spike Added	LCS Conc	LCSD Spike Added	LCSD Conc	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
	ng/g	ng/g	ng/g	ng/g					
Batch number: 18248031 6:2 fluorotelomersulfonate	3.79	4.57			120		70-130		
8:2 fluorotelomersulfonate	3.83	4.58			120		70-130		
NEtFOSAA	1.36	1.67			123		70-130		
NMeFOSAA	1.36	1.38			102		70-130		
Perfluorobutanesulfonate	1.20	1.20			100		70-130		
Perfluorobutanoic acid	1.36	1.41			104		70-130		
Perfluorodecanoic acid	1.36	1.51			111		70-130		
Perfluorododecanoic acid	1.36	1.34			98		70-130		
Perfluoroheptanoic acid	1.36	1.41			104		70-130		
Perfluorohexanesulfonate	1.29	1.42			111		70-130		
Perfluorohexanoic acid	1.36	1.30			95		70-130		
Perfluorononanoic acid	1.36	1.35			100		70-130		
Perfluoro-octanesulfonate	1.30	1.32			102		70-130		
Perfluorooctanoic acid	1.36	1.45			107		70-130		
Perfluoropentanoic acid	1.36	1.45			107		70-130		
Perfluorotetradecanoic acid	1.36	1.49			109		70-130		
Perfluorotridecanoic acid	1.36	1.41			104		70-130		
Perfluoroundecanoic acid	1.36	1.21			89		70-130		
	ng/l	ng/l	ng/l	ng/l					
Batch number: 18249001 6:2 fluorotelomersulfonate	15.17	16.68	15.17	19.44	110	128	70-130	15	30
8:2 fluorotelomersulfonate	15.33	16.33	15.33	17.25	107	113	70-130	5	30
NEtFOSAA	5.44	4.62	5.44	5.17	85	95	60-131	11	30
NMeFOSAA	5.44	4.94	5.44	5.57	91	102	67-124	12	30
Perfluorobutanesulfonate	4.81	4.83	4.81	5.03	100	105	72-127	4	30

\*- 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.



## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:47

Group Number: 1981996

### LCS/LCSD (continued)

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
Perfluorobutanoic acid	5.44	5.60	5.44	6.09	103	112	70-130	8	30
Perfluorodecanoic acid	5.44	6.06	5.44	6.44	111	118	67-141	6	30
Perfluorododecanoic acid	5.44	5.80	5.44	6.35	107	117	72-137	9	30
Perfluoroheptanoic acid	5.44	5.36	5.44	5.76	99	106	75-139	7	30
Perfluorohexanesulfonate	5.14	5.36	5.14	5.67	104	110	71-130	6	30
Perfluorohexanoic acid	5.44	5.33	5.44	5.84	98	107	77-132	9	30
Perfluorononanoic acid	5.44	5.20	5.44	5.46	96	100	73-144	5	30
Perfluoro-octanesulfonate	5.20	5.35	5.20	6.07	103	117	67-134	13	30
Perfluorooctanoic acid	5.44	5.79	5.44	5.81	107	107	76-136	0	30
Perfluoropentanoic acid	5.44	6.00	5.44	6.40	110	118	70-130	6	30
Perfluorotetradecanoic acid	5.44	5.98	5.44	5.95	110	109	70-142	1	30
Perfluorotridecanoic acid	5.44	5.66	5.44	6.26	104	115	57-137	10	30
Perfluoroundecanoic acid	5.44	5.24	5.44	5.83	96	107	83-132	11	30
	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>					
Batch number: 18247667632B	Sample number(s): 9779618								
TOC Solids/Sludges Combustion	3890	4480.99			115		47-143		
Batch number: 18250667633B	Sample number(s): 9779614-9779617,9779619,9779623-9779628								
TOC Solids/Sludges Combustion	3890	3864.73			99		47-143		
Batch number: 18250667634A	Sample number(s): 9779629								
TOC Solids/Sludges Combustion	3890	3682.2			95		47-143		
	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>					
Batch number: 18250039402B	Sample number(s): 9779614								
pH	7.00	6.97	7.00	6.97	100	100	95-105	0	3
Batch number: 18250039403A	Sample number(s): 9779615-9779619,9779623-9779624								
pH	7.00	6.99			100		95-105		
Batch number: 18253039401A	Sample number(s): 9779625,9779628-9779629								
pH	7.00	6.95			99		95-105		
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>					
Batch number: 18243820004A	Sample number(s): 9779614-9779619,9779623-9779629								
Moisture	89.5	89.43			100		99-101		
Moisture	89.5	89.43			100		99-101		
Moisture Duplicate	89.5	89.43			100		99-101		

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:47

Group Number: 1981996

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/g	MS Spike Added ng/g	MS Conc ng/g	MSD Spike Added ng/g	MSD Conc ng/g	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18248031	Sample number(s): 9779614-9779619,9779623-9779627,9779629 UNSPK: 9779625									
6:2 fluorotelomersulfonate	< 1.9	3.61	4.59	3.61	4.81	127	133*	70-130	5	30
8:2 fluorotelomersulfonate	< 1.9	3.65	4.00	3.65	4.34	109	119	70-130	8	30
NETFOSAA	< 2.0	1.30	1.42	1.30	1.37	110	105	70-130	4	30
NMeFOSAA	< 2.0	1.30	1.28	1.30	1.36	99	105	70-130	7	30
Perfluorobutanesulfonate	< 0.59	1.15	1.17	1.15	1.18	102	103	70-130	1	30
Perfluorobutanoic acid	< 0.67	1.30	1.29	1.30	1.32	100	102	70-130	2	30
Perfluorodecanoic acid	< 0.67	1.30	1.40	1.30	1.33	108	103	70-130	5	30
Perfluorododecanoic acid	< 0.67	1.30	1.40	1.30	1.32	108	102	70-130	6	30
Perfluoroheptanoic acid	< 0.67	1.30	1.27	1.30	1.28	98	99	70-130	1	30
Perfluorohexanesulfonate	< 0.63	1.23	1.15	1.23	1.19	94	97	70-130	3	30
Perfluorohexanoic acid	< 0.67	1.30	1.24	1.30	1.29	96	100	70-130	4	30
Perfluorononanoic acid	< 0.67	1.30	1.25	1.30	1.25	96	97	70-130	0	30
Perfluoro-octanesulfonate	< 0.64	1.24	1.41	1.24	1.17	114	94	70-130	19	30
Perfluorooctanoic acid	< 0.67	1.30	1.41	1.30	1.38	109	106	70-130	3	30
Perfluoropentanoic acid	< 0.67	1.30	1.38	1.30	1.44	107	111	70-130	4	30
Perfluorotetradecanoic acid	< 0.67	1.30	1.44	1.30	1.31	112	101	70-130	10	30
Perfluorotridecanoic acid	< 0.67	1.30	1.41	1.30	1.47	109	114	70-130	4	30
Perfluoroundecanoic acid	< 0.67	1.30	1.20	1.30	1.32	92	102	70-130	10	30
	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>					
Batch number: 18247667632B	Sample number(s): 9779618 UNSPK: 9779618									
TOC Solids/Sludges Combustion	2801.9	9150	9343.51			71		47-143		
Batch number: 18250667633B	Sample number(s): 9779614-9779617,9779619,9779623-9779628 UNSPK: 9779625									
TOC Solids/Sludges Combustion	2997.38	7560	9379.41	7350	7854.17	84	66	47-143	18	20

### Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc mg/kg	DUP Conc mg/kg	DUP RPD	DUP RPD Max
Batch number: 18247667632B	Sample number(s): 9779618 BKG: 9779618			
TOC Solids/Sludges Combustion	2801.9	4333.74	43*	7
Batch number: 18250667633B	Sample number(s): 9779614-9779617,9779619,9779623-9779628 BKG: 9779625			
TOC Solids/Sludges Combustion	2997.38	2843.09	5	7
	<b>Std. Units</b>	<b>Std. Units</b>		

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:47

Group Number: 1981996

### Laboratory Duplicate (continued)

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc Std. Units	DUP Conc Std. Units	DUP RPD	DUP RPD Max
Batch number: 18253039401A pH	Sample number(s): 9779625,9779628-9779629 BKG: 9779625 9.36	9.33	0	3
	%	%		
Batch number: 18243820004A Moisture	Sample number(s): 9779614-9779619,9779623-9779629 BKG: 9779625 4.25	3.79	11*	5
Moisture	4.25	3.79	11*	5
Moisture Duplicate	4.25	3.79	11*	5

### 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: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18248031

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9779614	83	0.55	80	0.55	82	0.55	80	0.36	87	0.55	83	0.55
9779615	82	0.55	79	0.55	77	0.55	81	0.37	87	0.55	80	0.55
9779616	80	0.55	77	0.55	75	0.55	78	0.37	76	0.55	80	0.55
9779617	80	1.2	77	1.2	74	1.2	84	0.80	85	1.2	85	1.2
9779618	83	0.56	85	0.56	79	0.56	81	0.37	82	0.56	88	0.56
9779619	83	0.57	80	0.57	79	0.57	81	0.38	83	0.57	84	0.57
9779623	81	0.59	79	0.59	80	0.59	81	0.39	88	0.59	84	0.59
9779624	83	0.57	83	0.57	81	0.57	89	0.38	92	0.57	88	0.57
9779625	80	0.59	77	0.59	74	0.59	78	0.39	84	0.59	85	0.59
9779626	81	0.57	78	0.57	79	0.57	79	0.38	79	0.57	80	0.57
9779627	80	0.57	75	0.57	73	0.57	77	0.38	81	0.57	85	0.57
9779629	76	0.56	72	0.56	77	0.56	78	0.37	89	0.56	84	0.56
Blank	82	1.2	78	1.2	74	1.2	78	0.80	78	1.2	76	1.2
LCS	86	1.2	83	1.2	80	1.2	87	0.80	88	1.2	88	1.2
MS	81	0.57	78	0.57	79	0.57	79	0.38	79	0.57	80	0.57
MSD	80	0.57	75	0.57	73	0.57	77	0.38	81	0.57	85	0.57
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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:47

Group Number: 1981996

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18248031

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9779614	70	0.82	80	0.55	89	0.82	83	0.36	84	0.55	72	0.82
9779615	71	0.83	81	0.55	83	0.83	78	0.37	85	0.55	71	0.83
9779616	76	0.83	77	0.55	78	0.83	78	0.37	77	0.55	72	0.83
9779617	81	1.8	86	1.2	80	1.8	79	0.80	82	1.2	72	1.8
9779618	79	0.83	85	0.56	85	0.83	77	0.37	84	0.56	76	0.83
9779619	72	0.86	83	0.57	80	0.86	81	0.38	88	0.57	79	0.86
9779623	75	0.88	85	0.59	84	0.88	79	0.39	86	0.59	73	0.88
9779624	79	0.85	89	0.57	87	0.85	82	0.38	86	0.57	73	0.85
9779625	80	0.88	78	0.59	82	0.88	76	0.39	86	0.59	85	0.88
9779626	74	0.86	78	0.57	75	0.86	78	0.38	82	0.57	79	0.86
9779627	73	0.86	78	0.57	82	0.86	78	0.38	82	0.57	70	0.86
9779629	64	0.83	75	0.56	77	0.83	77	0.37	79	0.56	74	0.83
Blank	79	1.8	78	1.2	79	1.8	80	0.80	88	1.2	86	1.8
LCS	89	1.8	87	1.2	90	1.8	90	0.80	84	1.2	81	1.8
MS	74	0.86	78	0.57	75	0.86	78	0.38	82	0.57	79	0.86
MSD	73	0.86	78	0.57	82	0.86	78	0.38	82	0.57	70	0.86

Limits: 50-150 50-150 50-150 50-150 50-150 50-150

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9779614	26*	0.82	78	0.55	33*	0.82	87	0.55	81	0.55
9779615	19*	0.83	86	0.55	23*	0.83	81	0.55	85	0.55
9779616	63	0.83	81	0.55	62	0.83	75	0.55	73	0.55
9779617	44*	1.8	81	1.2	52	1.8	76	1.2	73	1.2
9779618	44*	0.83	85	0.56	51	0.83	86	0.56	80	0.56
9779619	64	0.86	83	0.57	65	0.86	82	0.57	80	0.57
9779623	16*	0.88	81	0.59	20*	0.88	83	0.59	79	0.59
9779624	38*	0.85	80	0.57	51	0.85	76	0.57	80	0.57
9779625	36*	0.88	82	0.59	44*	0.88	79	0.59	84	0.59
9779626	45*	0.86	89	0.57	49*	0.86	80	0.57	78	0.57
9779627	42*	0.86	77	0.57	48*	0.86	75	0.57	80	0.57
9779629	18*	0.83	82	0.56	28*	0.83	83	0.56	80	0.56
Blank	86	1.8	89	1.2	82	1.8	82	1.2	84	1.2
LCS	74	1.8	87	1.2	79	1.8	93	1.2	82	1.2
MS	45*	0.86	89	0.57	49*	0.86	80	0.57	78	0.57
MSD	42*	0.86	77	0.57	48*	0.86	75	0.57	80	0.57

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:47

Group Number: 1981996

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18248031

Limits: 50-150 50-150 50-150 50-150 50-150

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18249001

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779620	87	8.9	83	2.7	82	8.9	84	1.8	83	8.9	83	1.8
9779621	84	9.3	84	2.8	86	9.3	85	1.9	82	9.3	85	1.9
9779622	92	9.0	92	2.7	88	9.0	93	1.8	93	9.0	94	1.8
Blank	88	10	88	3.0	89	10	87	2.0	90	10	95	2.0
LCS	79	10	78	3.0	82	10	81	2.0	84	10	83	2.0
LCSD	80	10	81	3.0	83	10	86	2.0	85	10	86	2.0

Limits: 50-150 50-150 50-150 50-150 50-150 50-150

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779620	84	8.9	80	1.8	75	8.9	76	1.8	86	1.8	93	5.3
9779621	90	9.3	86	1.9	82	9.3	80	1.9	81	1.9	90	5.6
9779622	101	9.0	90	1.8	87	9.0	84	1.8	94	1.8	94	5.4
Blank	105	10	89	2.0	85	10	82	2.0	86	2.0	94	6.0
LCS	90	10	76	2.0	78	10	78	2.0	79	2.0	89	6.0
LCSD	85	10	83	2.0	81	10	80	2.0	79	2.0	84	6.0

Limits: 50-150 50-150 50-150 50-150 50-150 50-150

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9779620	79	7.1	79	3.6	79	7.1	73	4.5	66	4.5
9779621	77	7.4	83	3.7	78	7.4	74	4.6	68	4.6
9779622	91	7.2	84	3.6	95	7.2	83	4.5	82	4.5
Blank	83	8.0	84	4.0	90	8.0	82	5.0	75	5.0
LCS	72	8.0	74	4.0	70	8.0	74	5.0	59	5.0
LCSD	70	8.0	77	4.0	72	8.0	73	5.0	72	5.0

Limits: 50-150 50-150 50-150 50-150 50-150

\*- Outside of specification

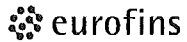
\*\* - This limit was used in the evaluation of the final result for the blank

(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.

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981996 Sample # 9779614-29

COC # 561233

Pg 1/2

Client Information				Matrix				Analysis Requested				For Lab Use Only		
Client: <u>Acadis</u>		Acct. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/>		Preservation and Filtration Codes				FSC:		
Project Name/ID: <u>BAAP/02118216.1000.7AD00</u>		PWSID #:		Water <input type="checkbox"/> NPDES <input type="checkbox"/>		Other: <u>LAB DIWATER</u>						SCR#:		
Project Manager: <u>Kimmi Schrupp</u>		P.O. #:										Preservation Codes		
Sampler: <u>Bounce Evans/Tess Nugent</u>		Quote #:										H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other		
State where samples were collected: <u>WI</u>		For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Grab <input type="checkbox"/> Composite <input type="checkbox"/>		Total # of Containers						Remarks		
Sample Identification (FFTA)		Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	PFAS Group	Toc/pH/Moisture	Moisture		
Date	Time													
<u>BAAP-FFTA-SN-2-50-50</u>	<u>8/29/18</u>	<u>10:20</u>	<u>X</u>	<u>X</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>		
<u>BAAP-FFTA-SN-2-20-50</u>	<u>8/29/18</u>	<u>11:00</u>	<u>X</u>	<u>X</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>		
<u>BAAP-FFTA-SN-2-35-50</u>	<u>8/29/18</u>	<u>11:25</u>	<u>X</u>	<u>X</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>		
<u>BAAP-FFTA-SN-2-50-50</u>	<u>8/29/18</u>	<u>12:20</u>	<u>K</u>	<u>K</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>		
<u>BAAP-FFTA-SN-2-65-50</u>	<u>8/29/18</u>	<u>12:45</u>	<u>K</u>	<u>K</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>		
<u>BAAP-FFTA-SN-2-180-50</u>	<u>8/29/18</u>	<u>13:50</u>	<u>X</u>	<u>X</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>		
<u>BAAP-EB-SO-082918-2</u>	<u>8/29/18</u>	<u>09:45</u>	<u>X</u>					<u>X</u>	<u>2</u>	<u>X</u>				<u>Equipment blank</u>
<u>BAAP-FB-SO-082918</u>	<u>8/29/18</u>	<u>10:00</u>	<u>X</u>					<u>X</u>	<u>2</u>	<u>X</u>				<u>Field Equipment blank</u>
<u>BAAP-EB-SO-082918-1</u>	<u>8/29/18</u>	<u>10:30</u>	<u>X</u>					<u>X</u>	<u>2</u>	<u>X</u>				<u>Equipment blank</u>
<u>BAAP-FFTA-SN-3-50-50</u>	<u>8/29/18</u>	<u>15:05</u>	<u>K</u>	<u>K</u>	<u>X</u>				<u>3</u>	<u>X</u>	<u>X</u>	<u>X</u>		

Turnaround Time (TAT) Requested (please circle) Standard <u>Rush</u> (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAYS</u>  E-mail address: <u>Kimmi.Schrupp@Acadis.com</u>	Relinquished by <u>[Signature]</u>	Date <u>8/29/18</u>	Time <u>17:00</u>	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by <u>[Signature]</u>	Date <u>8/30/18</u>	Time <u>10:15</u>

Type I (EPA Level 3 Equivalent/non-CLP)	Type VI (Raw Data Only)	EDD Required? <u>Yes</u> No	Relinquished by Commercial Carrier: UPS <input type="checkbox"/> FedEx <input checked="" type="checkbox"/> Other <input type="checkbox"/>
Type III (Reduced non-CLP)	NJ DKQP TX TRRP-13	If yes, format:	Temperature upon receipt <u>1.0-2.8</u> °C
NYSDEC Category A or B	MA MCP CT RCP	Site-Specific QC (MS/MSD/Dup)? Yes No	(If yes, indicate QC sample and submit triplicate sample volume.)

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981996 Sample # 9779614-29

**COC # 561234**

*pg 2/2*

Client Information				Matrix				Analysis Requested				For Lab Use Only			
Client: <u>Arcadis</u>		Acct. #:		<input type="checkbox"/> Tissue <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Sediment <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Water <input type="checkbox"/> Other:		Total # of Containers <u>PFAS Group</u> <u>TOC/PA/Ammonia</u> <u>Moisture</u>				Preservation and Filtration Codes				SCR#:	
Project Name/#: <u>BAAP</u>		PWSID #:								Preservation Codes				SCR#:	
Project Manager: <u>see page 1</u>		P.O. #:								H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other				Remarks	
Sampler:		Quote #:								<u>RUSH</u>					
State where samples were collected:		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Grab		Composite									
Sample Identification		Collected													
		Date	Time												
<u>BAAP-FFTA-SN-3-20-50</u>		<u>8/29/18</u>	<u>15:30</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>3</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
<u>BAAP-FFTA-SN-3-35-50</u>		<u>8/29/18</u>	<u>16:00</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>9</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>MS/MSD sample</u>			
<u>BAAP-FD-50-082918</u>		<u>8/29/18</u>	<u>-</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>3</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				

Turnaround Time (TAT) Requested (please circle) Standard (Rush TAT is subject to laboratory approval and surcharge.)		Date		Time		Received by		Date		Time	
<u>Rush</u>		<u>8/29/18</u>		<u>17:00</u>		<u>[Signature]</u>					
Date results are needed: <u>5 DAYS</u>		Date		Time		Received by		Date		Time	
E-mail address: <u>Kimie.Schrupp@Arcadis.com</u>		Date		Time		Received by		Date		Time	
Data Package Options (circle if required)		Date		Time		Received by		Date		Time	
Type I (EPA Level 3 Equivalent/non-CLP)	Type VI (Raw Data Only)	Date		Time		Received by		Date		Time	
Type III (Reduced non-CLP)	NJ DKQP TX TRRP-13	Date		Time		Received by		Date		Time	
NYSDEC Category A or B	MA MCP CT RCP	Date		Time		Received by		Date		Time	
EDD Required? <u>Yes</u> No				Relinquished by Commercial Carrier:							
If yes, format:				UPS _____ FedEx <u>X</u> Other _____							
Site-Specific QC (MS/MSD/Dup)? Yes No				Temperature upon receipt <u>1.0-2.8 °C</u>							
(if yes, indicate QC sample and submit triplicate sample volume.)											

1981996

**Katherine Klinefelter**

---

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project  
**Attachments:** BAAP COC 4.pdf; BAAP COC 5.pdf; BAAP COC 8.pdf; BAAP COC 1.pdf; BAAP COC 2.pdf; BAAP COC 3.pdf

EXTERNAL EMAIL\*

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Kowalski, Joe <Joseph.Kowalski@arcadis.com>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanclabsEnv](http://www.EurofinsUS.com/LanclabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project



1981996

EXTERNAL EMAIL\*

Hi Kathy,

So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!

Thanks

Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

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# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

Acct # **13129**

Group # **1981996**

Sample # **9779614-29**

COC # **561233**

Client Information				Matrix				Analysis Requested				For Lab Use Only		
Name: <b>ADAMS</b> Address: <b>1000 Locust St, 2nd Fl</b> City/State: <b>PHILADELPHIA PA</b> Contact: <b>PAUL J. ADAMS</b> Phone: <b>215-597-1234</b> Fax: <b>215-597-1234</b> Email: <b>pa@adams.com</b> Order #: Date of order: <b>10/15/07</b>				Matrix: Transfer <input type="checkbox"/> Potable <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Sediment <input type="checkbox"/> Other: <b>Water</b> NPDES <input type="checkbox"/> Other: <b>Water</b>				Preservation and Filtration Codes: (Columns for codes)				PSC: SCRT: Preservation Codes: H-HCl, To: Thio sulfate N-NH <sub>4</sub> , Beta: OH S-H <sub>2</sub> SO <sub>4</sub> , Phi: PO <sub>4</sub> F-Field Filtered, O-Other		
Sample Identification		Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Remarks
ID	Date	Time	Matrix											
ADAM-507-50-50	10/15/07	10:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	11:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	12:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	13:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	14:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	15:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	16:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	17:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	18:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	19:00	X		X				3	X	X	X		
ADAM-507-50-50	10/15/07	20:00	X		X				3	X	X	X		

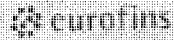
Turnaround Time (TAT) Requested: <b>Standard</b> Date results are needed: <b>10/22/07</b> Sample address: <b>1000 Locust St, Philadelphia PA</b>	Prepared by: <b>[Signature]</b> Reviewed by: <b>[Signature]</b> Analyzed by: <b>[Signature]</b> Relinquished by: <b>[Signature]</b> Date: <b>10/15/07</b>	Relinquished by Commercial Carrier: UPS <input type="checkbox"/> FedEx <input checked="" type="checkbox"/> Other <input type="checkbox"/> Temperature upon receipt: <b>7C</b>
--	---	---

Lancaster Laboratories Environmental  
The white copy should accompany samples to Eurofins LA

Keep this timer for your records.

813346307578 813346307578

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

Account # **13129** Group # **1981996** Sample # **9779614-29**

COC # **561234**

Client Information				Matrix				Analysis Requested				For Lab Use Only	
Client Name: <b>PA Dept of Environmental Protection</b> Project Name: <b>PA DEP - 9779614</b> Site #: Date: <b>10/2/05</b>				Tissue <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Sediment <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Water <input type="checkbox"/> Other:				Preservation and Filtration Codes				FSC SC#	
Sample Identification Date Collected: <b>10/2/05</b> Time Collected: <b>10:30</b>				Grab <input type="checkbox"/> Composite <input type="checkbox"/>				Total # of Containers: <b>3</b>				Preservation Codes H=HCl, T=Thiourea N=NaOH, B=NaOH S=H <sub>2</sub> SO <sub>4</sub> , P=H <sub>2</sub> PO <sub>4</sub> F=Field Filtered, O=Other	
Sample ID: <b>PA DEP - 9779614 - 3-05-50</b> Date: <b>10/2/05</b> Time: <b>10:30</b>				Soil <input checked="" type="checkbox"/> Sediment <input type="checkbox"/> Water <input type="checkbox"/>				Analysis Requested: <b>Asbestos</b>				Remarks: <b>Asbestos</b>	
Sample ID: <b>PA DEP - 9779614 - 3-55-50</b> Date: <b>10/2/05</b> Time: <b>10:30</b>				Soil <input checked="" type="checkbox"/> Sediment <input type="checkbox"/> Water <input type="checkbox"/>				Analysis Requested: <b>Asbestos</b>				Remarks: <b>Asbestos</b>	
Sample ID: <b>PA DEP - 9779614 - 3-05-50</b> Date: <b>10/2/05</b> Time: <b>10:30</b>				Soil <input checked="" type="checkbox"/> Sediment <input type="checkbox"/> Water <input type="checkbox"/>				Analysis Requested: <b>Asbestos</b>				Remarks: <b>Asbestos</b>	

Turnaround Time (TAT) Requested (circle if needed) <b>Standard</b> (Push TAT to expedite laboratory approval and surcharge)	Date results are needed: <b>10/2/05</b>	E-mail address: <b>PA DEP - 9779614@pa.gov</b>	Data Package Options (circle if required) Type I (EPA Level 3 Equivalent non-CLP) Type II (Reduced non-CLP) Type III (Raw Data Only) Type VI (Raw Data Only) NJ DKOP TX TRRP-13 MA MCP GT RCP	EDO Required? Yes No Site Specific QC (MSMS/Dup)? Yes No (Push indicate QC ranges and actual testware sample volume)	Relinquished by Commercial Carrier UPS FedEx Other	Temperature upon receipt: _____ °C
---	---	--	---	--	---	------------------------------------

Eurofins Lancaster Laboratories Environmental LLC - 2425 New Holland Pike, Lancaster, PA 17601 - 717-656-2300  
 The white copy should accompany samples to Eurofins Lancaster Laboratories Environmental. The yellow copy should be returned by the client.



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/30/2018 10:15</u>
Number of Packages:	<u>2</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Zane Hollinger (10251) at 14:26 on 08/30/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-01	2.8	DT	Wet	Y	Bagged	N
2	DT131	1.0	DT	Wet	Y	Bagged	N

# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: September 18, 2018 18:51

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1982466  
SDG: PF014  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

(717) 556-7256

To view our laboratory's current scopes of accreditation please go to <http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/>. Historical copies may be requested through your project manager.



### SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-FFTA-SN-3-50-SO Grab Soil	08/30/2018 07:40	9781878
BAAP-FFTA-SN-3-65-SO Grab Soil	08/30/2018 08:15	9781879
BAAP-FFTA-SN-3-WT80-SO Grab Soil	08/30/2018 09:15	9781880
BAAP-EB-083018-3 Grab Water	08/30/2018 12:15	9781881

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1982466

**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: 9781880**

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid

**Sample #s: 9781878**

The recovery for labeled compounds used as extraction standards d3-NMeFOSAA and d5-NEtFOSAA is outside of QC acceptance limits as noted on the QC Summary. The recovery for labeled compounds used as extraction standards d3-NMeFOSAA and d5-NEtFOSAA is also outside of QC acceptance limits in the matrix spike sample, indicating a matrix effect.

**Batch #: 18247033 (Sample number(s): 9781878-9781880 UNSPK: 9781878)**

The recovery(ies) for the following analyte(s) in the MS exceeded the acceptance window indicating a positive bias: 6:2 fluorotelomersulfonate

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) 9781878, MS

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781878  
ELLE Group #: 1982466  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 07:40  
SDG#: PF014-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.0	0.62	2.0	2.1	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.0	0.52	2.0	2.1	1
14478	NEtFOSAA	2991-50-6	< 2.1	0.52	2.1	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.1	0.52	2.1	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.62	0.21	0.62	0.83	1
14478	Perfluorobutanoic acid	375-22-4	< 0.70	0.21	0.70	0.83	1
14478	Perfluorodecanoic acid	335-76-2	< 0.70	0.31	0.70	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.70	0.21	0.70	0.83	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.70	0.21	0.70	0.83	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.66	0.21	0.66	0.83	1
14478	Perfluorohexanoic acid	307-24-4	< 0.70	0.21	0.70	0.83	1
14478	Perfluorononanoic acid	375-95-1	< 0.70	0.21	0.70	0.83	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.67	0.21	0.67	0.83	1
14478	Perfluorooctanoic acid	335-67-1	< 0.70	0.21	0.70	0.83	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.70	0.21	0.70	0.83	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.70	0.21	0.70	0.83	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.70	0.21	0.70	0.83	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.70	0.21	0.70	0.83	1

The recovery for labeled compounds used as extraction standards d3-NMeFOSAA and d5-NEtFOSAA is outside of QC acceptance limits as noted on the QC Summary. The recovery for labeled compounds used as extraction standards d3-NMeFOSAA and d5-NEtFOSAA is also outside of QC acceptance limits in the matrix spike sample, indicating a matrix effect.

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	%	%	%	%	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	8.1	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/06/2018 04:05	Marissa C Drexinger	1

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

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781878  
ELLE Group #: 1982466  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 07:40  
SDG#: PF014-01

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/04/2018 17:00	Anthony C Polaski	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18248820002A	09/05/2018 15:04	Larry E Bevins	1

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

**Sample Description:** BAAP-FFTA-SN-3-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781879  
**ELLE Group #:** 1982466  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 08:15  
**SDG#:** PF014-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.59	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.49	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.49	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.49	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.59	0.20	0.59	0.79	1
14478	Perfluorobutanoic acid	375-22-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorodecanoic acid	335-76-2	< 0.67	0.30	0.67	0.99	1
14478	Perfluorododecanoic acid	307-55-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.67	0.20	0.67	0.79	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.63	0.20	0.63	0.79	1
14478	Perfluorohexanoic acid	307-24-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorononanoic acid	375-95-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.64	0.20	0.64	0.79	1
14478	Perfluorooctanoic acid	335-67-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.67	0.20	0.67	0.79	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	2.6	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/06/2018 04:14	Marissa C Drexinger	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/04/2018 17:00	Anthony C Polaski	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781880  
**ELLE Group #:** 1982466  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 09:15  
**SDG#:** PF014-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.61	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.51	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.51	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.61	0.20	0.61	0.81	1
14478	Perfluorobutanoic acid	375-22-4	< 0.69	0.20	0.69	0.81	1
14478	Perfluorodecanoic acid	335-76-2	< 0.69	0.30	0.69	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.69	0.20	0.69	0.81	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.69	0.20	0.69	0.81	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.65	0.20	0.65	0.81	1
14478	Perfluorohexanoic acid	307-24-4	< 0.69	0.20	0.69	0.81	1
14478	Perfluorononanoic acid	375-95-1	< 0.69	0.20	0.69	0.81	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.66	0.20	0.66	0.81	1
14478	Perfluorooctanoic acid	335-67-1	1.3	0.20	0.69	0.81	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.69	0.20	0.69	0.81	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.69	0.20	0.69	0.81	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.69	0.20	0.69	0.81	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.69	0.20	0.69	0.81	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	2.1	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/07/2018 17:28	Marissa C Drexinger	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/04/2018 17:00	Anthony C Polaski	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-EB-083018-3 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781881  
**ELLE Group #:** 1982466  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 12:15  
**SDG#:** PF014-04EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.92	1.8	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.92	1.8	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.92	2.2	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.92	2.2	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.4	5.5	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.37	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.37	1.0	1.8	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.37	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.4	5.5	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.55	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.55	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.8	1

### Sample Comments

WI Cert #998035060. Note: Reported MDL(aka LOD) & LOQ are adjusted for dilution.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18250017	09/10/2018 21:18	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18250017	09/07/2018 16:00	Anthony C Polaski	1

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:51

Group Number: 1982466

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/g	ng/g	ng/g	ng/g
Batch number: 18247033	Sample number(s): 9781878-9781880			
6:2 fluorotelomersulfonate	< 1.9	0.60	1.9	2.0
8:2 fluorotelomersulfonate	< 1.9	0.50	1.9	2.0
NETFOSAA	< 2.0	0.50	2.0	3.0
NMeFOSAA	< 2.0	0.50	2.0	3.0
Perfluorobutanesulfonate	< 0.60	0.20	0.60	0.80
Perfluorobutanoic acid	< 0.68	0.20	0.68	0.80
Perfluorodecanoic acid	< 0.68	0.30	0.68	1.0
Perfluorododecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroheptanoic acid	< 0.68	0.20	0.68	0.80
Perfluorohexanesulfonate	< 0.64	0.20	0.64	0.80
Perfluorohexanoic acid	< 0.68	0.20	0.68	0.80
Perfluorononanoic acid	< 0.68	0.20	0.68	0.80
Perfluoro-octanesulfonate	< 0.65	0.20	0.65	0.80
Perfluorooctanoic acid	< 0.68	0.20	0.68	0.80
Perfluoropentanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotetradecanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotridecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroundecanoic acid	< 0.68	0.20	0.68	0.80
	ng/l	ng/l	ng/l	ng/l
Batch number: 18250017	Sample number(s): 9781881			
6:2 fluorotelomersulfonate	N.D.	1.0	2.0	3.0
8:2 fluorotelomersulfonate	N.D.	1.0	2.0	3.0
NETFOSAA	N.D.	1.0	2.4	3.0
NMeFOSAA	N.D.	1.0	2.4	3.0
Perfluorobutanesulfonate	N.D.	0.30	1.1	2.0
Perfluorobutanoic acid	N.D.	2.0	4.8	6.0
Perfluorodecanoic acid	N.D.	0.50	1.2	2.0
Perfluorododecanoic acid	N.D.	0.50	1.2	2.0
Perfluoroheptanoic acid	N.D.	0.40	1.2	2.0
Perfluorohexanesulfonate	N.D.	0.40	1.1	2.0
Perfluorohexanoic acid	N.D.	0.50	1.2	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
Perfluoropentanoic acid	N.D.	2.0	4.8	6.0
Perfluorotetradecanoic acid	N.D.	0.60	1.2	2.0
Perfluorotridecanoic acid	N.D.	0.60	1.2	2.0
Perfluoroundecanoic acid	N.D.	0.50	1.2	2.0

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:51

Group Number: 1982466

### Method Blank (continued)

Analysis Name	Result ng/l	DL** ng/l	LOD ng/l	LOQ ng/l
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### LCS/LCSD

Analysis Name	LCS Spike Added ng/g	LCS Conc ng/g	LCSD Spike Added ng/g	LCSD Conc ng/g	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18247033									
Sample number(s): 9781878-9781880									
6:2 fluorotelomersulfonate	3.79	4.68	3.79	4.41	123	116	70-130	6	30
8:2 fluorotelomersulfonate	3.83	4.27	3.83	4.42	111	115	70-130	3	30
NEtFOSAA	1.36	1.22	1.36	1.53	90	113	70-130	23	30
NMeFOSAA	1.36	1.59	1.36	1.39	117	102	70-130	13	30
Perfluorobutanesulfonate	1.20	1.23	1.20	1.24	102	103	70-130	1	30
Perfluorobutanoic acid	1.36	1.45	1.36	1.41	107	104	70-130	3	30
Perfluorodecanoic acid	1.36	1.47	1.36	1.51	108	111	70-130	3	30
Perfluorododecanoic acid	1.36	1.36	1.36	1.43	100	105	70-130	6	30
Perfluoroheptanoic acid	1.36	1.37	1.36	1.31	101	96	70-130	5	30
Perfluorohexanesulfonate	1.29	1.44	1.29	1.27	112	99	70-130	12	30
Perfluorohexanoic acid	1.36	1.37	1.36	1.31	101	96	70-130	5	30
Perfluorononanoic acid	1.36	1.28	1.36	1.36	94	100	70-130	6	30
Perfluoro-octanesulfonate	1.30	1.35	1.30	1.21	104	93	70-130	11	30
Perfluorooctanoic acid	1.36	1.36	1.36	1.41	100	104	70-130	4	30
Perfluoropentanoic acid	1.36	1.51	1.36	1.37	111	100	70-130	10	30
Perfluorotetradecanoic acid	1.36	1.50	1.36	1.41	110	104	70-130	6	30
Perfluorotridecanoic acid	1.36	1.47	1.36	1.54	108	113	70-130	5	30
Perfluoroundecanoic acid	1.36	1.15	1.36	1.36	84	100	70-130	17	30
	ng/l	ng/l	ng/l	ng/l					
Batch number: 18250017									
Sample number(s): 9781881									
6:2 fluorotelomersulfonate	15.17	16.07	15.17	16.99	106	112	70-130	6	30
8:2 fluorotelomersulfonate	15.33	15.35	15.33	16.06	100	105	70-130	5	30
NEtFOSAA	5.44	5.39	5.44	5.11	99	94	60-131	5	30
NMeFOSAA	5.44	5.99	5.44	5.88	110	108	67-124	2	30
Perfluorobutanesulfonate	4.81	4.68	4.81	4.87	97	101	72-127	4	30
Perfluorobutanoic acid	5.44	5.63	5.44	5.96	103	110	70-130	6	30
Perfluorodecanoic acid	5.44	5.34	5.44	5.64	98	104	67-141	5	30
Perfluorododecanoic acid	5.44	5.80	5.44	6.16	107	113	72-137	6	30
Perfluoroheptanoic acid	5.44	5.62	5.44	5.55	103	102	75-139	1	30
Perfluorohexanesulfonate	5.14	4.85	5.14	5.10	94	99	71-130	5	30
Perfluorohexanoic acid	5.44	5.64	5.44	5.68	104	104	77-132	1	30
Perfluorononanoic acid	5.44	5.55	5.44	5.22	102	96	73-144	6	30
Perfluoro-octanesulfonate	5.20	5.23	5.20	5.52	101	106	67-134	5	30
Perfluorooctanoic acid	5.44	5.58	5.44	5.86	102	108	76-136	5	30

\*- 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.



## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:51

Group Number: 1982466

### LCS/LCSD (continued)

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
Perfluoropentanoic acid	5.44	6.02	5.44	5.58	111	103	70-130	8	30
Perfluorotetradecanoic acid	5.44	5.13	5.44	5.00	94	92	70-142	3	30
Perfluorotridecanoic acid	5.44	4.82	5.44	4.60	89	85	57-137	5	30
Perfluoroundecanoic acid	5.44	5.38	5.44	5.69	99	105	83-132	6	30
	%	%	%	%					
Batch number: 18247820006B	Sample number(s): 9781879-9781880								
Moisture	89.5	89.43			100		99-101		
Batch number: 18248820002A	Sample number(s): 9781878								
Moisture	89.5	89.42			100		99-101		

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/g	MS Spike Added ng/g	MS Conc ng/g	MSD Spike Added ng/g	MSD Conc ng/g	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18247033	Sample number(s): 9781878-9781880 UNSPK: 9781878									
6:2 fluorotelomersulfonate	< 1.8	3.58	4.78			134*		70-130		
8:2 fluorotelomersulfonate	< 1.8	3.62	3.88			107		70-130		
NEtFOSAA	< 1.9	1.28	1.64			128		70-130		
NMeFOSAA	< 1.9	1.28	1.42			110		70-130		
Perfluorobutanesulfonate	< 0.57	1.13	1.15			101		70-130		
Perfluorobutanoic acid	< 0.65	1.28	1.41			110		70-130		
Perfluorodecanoic acid	< 0.65	1.28	1.50			117		70-130		
Perfluorododecanoic acid	< 0.65	1.28	1.35			105		70-130		
Perfluoroheptanoic acid	< 0.65	1.28	1.35			105		70-130		
Perfluorohexanesulfonate	< 0.61	1.21	1.34			110		70-130		
Perfluorohexanoic acid	< 0.65	1.28	1.33			104		70-130		
Perfluorononanoic acid	< 0.65	1.28	1.32			102		70-130		
Perfluoro-octanesulfonate	< 0.62	1.23	1.27			104		70-130		
Perfluorooctanoic acid	< 0.65	1.28	1.44			112		70-130		
Perfluoropentanoic acid	< 0.65	1.28	1.59			124		70-130		
Perfluorotetradecanoic acid	< 0.65	1.28	1.24			96		70-130		
Perfluorotridecanoic acid	< 0.65	1.28	1.36			106		70-130		
Perfluoroundecanoic acid	< 0.65	1.28	1.32			103		70-130		

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:51

Group Number: 1982466

### 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: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18247033

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9781878	71	0.57	68	0.57	67	0.57	76	0.38	80	0.57	79	0.57
9781879	72	0.58	69	0.58	67	0.58	75	0.38	77	0.58	77	0.58
9781880	76	0.59	76	0.59	75	0.59	73	0.40	79	0.59	79	0.59
Blank	69	1.2	67	1.2	64	1.2	67	0.80	66	1.2	69	1.2
LCS	71	1.2	69	1.2	70	1.2	75	0.80	74	1.2	74	1.2
LCSD	74	1.2	71	1.2	67	1.2	76	0.80	76	1.2	78	1.2
MS	71	0.57	67	0.57	68	0.57	70	0.38	76	0.57	74	0.57

Limits: 50-150 50-150 50-150 50-150 50-150 50-150

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9781878	67	0.86	73	0.57	72	0.86	69	0.38	73	0.57	71	0.86
9781879	64	0.87	70	0.58	69	0.87	72	0.38	81	0.58	77	0.87
9781880	70	0.89	76	0.59	76	0.89	76	0.40	80	0.59	74	0.89
Blank	63	1.8	67	1.2	63	1.8	61	0.80	72	1.2	63	1.8
LCS	72	1.8	71	1.2	73	1.8	75	0.80	67	1.2	69	1.8
LCSD	79	1.8	74	1.2	70	1.8	71	0.80	77	1.2	74	1.8
MS	64	0.85	70	0.57	73	0.85	72	0.38	74	0.57	70	0.85

Limits: 50-150 50-150 50-150 50-150 50-150 50-150

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9781878	40*	0.86	64	0.57	44*	0.86	76	0.57	68	0.57
9781879	59	0.87	79	0.58	58	0.87	71	0.58	67	0.58
9781880	55	0.89	78	0.59	55	0.89	80	0.59	70	0.59
Blank	64	1.8	61	1.2	70	1.8	71	1.2	64	1.2
LCS	60	1.8	68	1.2	63	1.8	69	1.2	64	1.2
LCSD	69	1.8	75	1.2	76	1.8	72	1.2	75	1.2
MS	35*	0.85	74	0.57	42*	0.85	74	0.57	79	0.57

Limits: 50-150 50-150 50-150 50-150 50-150

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18250017

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:51

Group Number: 1982466

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18250017

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9781881	78	9.2	74	2.8	73	9.2	76	1.8	76	9.2	76	1.8
Blank	84	10	79	3.0	82	10	88	2.0	87	10	85	2.0
LCS	86	10	81	3.0	86	10	85	2.0	88	10	87	2.0
LCSD	92	10	90	3.0	91	10	95	2.0	98	10	98	2.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9781881	85	9.2	78	1.8	74	9.2	79	1.8	77	1.8	81	5.5
Blank	87	10	86	2.0	82	10	91	2.0	84	2.0	90	6.0
LCS	97	10	89	2.0	82	10	84	2.0	84	2.0	86	6.0
LCSD	108	10	97	2.0	90	10	97	2.0	95	2.0	98	6.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9781881	74	7.4	79	3.7	75	7.4	79	4.6	54	4.6
Blank	87	8.0	86	4.0	87	8.0	87	5.0	63	5.0
LCS	86	8.0	87	4.0	77	8.0	83	5.0	59	5.0
LCSD	91	8.0	89	4.0	88	8.0	94	5.0	64	5.0
Limits:	50-150		50-150		50-150		50-150		50-150	

\*- Outside of specification

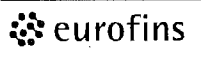
\*\* - This limit was used in the evaluation of the final result for the blank

(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.

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

Acct. # 13129 Group # 1982466 Sample # 9787828-81

COC # 561235

Client Information				Matrix				Analysis Requested				For Lab Use Only			
Client: <u>Arcadis</u>		Acct. #:		<input type="checkbox"/> Soil	<input type="checkbox"/> Sediment	<input type="checkbox"/> Tissue	<input type="checkbox"/> Potable	<input type="checkbox"/> Ground	<input type="checkbox"/> Surface	Preservation and Filtration Codes				FSC: _____	pg 1/1
Project Name#: <u>BAAP/02118216-1000.7AD00</u>		PWSID #:								Other: <u>PEA DT Lab Supplied</u>				Total # of Containers	
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:		Water				PFAS Group				Preservation Codes			
Sampler: <u>Bruce Evans/Tess Nugent</u>		Quote #:		NPDES				TOC/PH/Moisture				H=HCl      T=Thiosulfate			
State where samples were collected: <u>Wisconsin</u>		For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Grab				Moisture				N=HNO <sub>3</sub> B=NaOH			
Sample Identification		Collected		Composite				Grain Size				S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub>			
		Date	Time									F=Field Filtered      O=Other			
<u>BAAP-FFTA-SN-3-50-SO</u>		<u>8/30/18</u>	<u>0740</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>RUSH</u>
<u>BAAP-FFTA-SN-3-65-SO</u>		<u>8/30/18</u>	<u>0815</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-3-WT80-SO</u>		<u>8/30/18</u>	<u>0915</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-3-5.0-SO</u>		<u>8/29/18</u>	<u>1505</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-3-20-SO</u>		<u>8/29/18</u>	<u>1530</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-3-35-SO</u>		<u>8/29/18</u>	<u>1600</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-EB-083018-3</u>		<u>8/30/18</u>	<u>12:15</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

<b>Turnaround Time (TAT) Requested</b> (please circle) Standard <u>Rush</u> (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAYS</u>  E-mail address: <u>kimmie.schrupp@arcadis.com</u>	Relinquished by <u>[Signature]</u>	Date <u>8/30/18</u>	Time <u>17:00</u>	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by <u>[Signature]</u>	Date <u>8/31/18</u>	Time <u>10:20</u>

<b>Data Package Options</b> (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP	EDD Required? <input checked="" type="checkbox"/> Yes      No If yes, format: _____ Site-Specific QC (MS/MSD/Dup)? <input type="checkbox"/> Yes <input type="checkbox"/> No (If yes, indicate QC sample and submit triplicate sample volume.)	Relinquished by Commercial Carrier: UPS _____ FedEx <input checked="" type="checkbox"/> Other _____  Temperature upon receipt <u>1.2</u> °C
---	--	--

1982466

**Katherine Klinefelter**

---

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project  
**Attachments:** BAAP COC 4.pdf; BAAP COC 5.pdf; BAAP COC 8.pdf; BAAP COC 1.pdf; BAAP COC 2.pdf; BAAP COC 3.pdf

EXTERNAL EMAIL\*

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanLabsEnv](http://www.EurofinsUS.com/LanLabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

1982466

EXTERNAL EMAIL\*

Hi Kathy,

So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!

Thanks

Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

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T. +1 720 344 3712 | M. + 1 303 916 1193

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Be green, leave it on the screen.

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# Environmental Analysis Request/Chain of Custody

eurofins

Laboratory Laboratories  
Environmental

13124

198246

9781878-81

COC # 561235

For Lab Use Only

19/11

Client Information				Matrix				Analysis Requested								
Name				Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>				Preservation and Filtration Codes								
Address				Plastics <input type="checkbox"/> Unplastic <input type="checkbox"/> Surfactants <input type="checkbox"/>												
City				Waxes <input type="checkbox"/> NPDES <input type="checkbox"/> Other <input type="checkbox"/>												
State				Total # of Containers				Preservation Codes H-1000 F-Thiourea N-1000 B-NaOH S-1000 P-1000 F-1000 P-1000 B-Other								
Zip																
Phone								Remarks								
Fax																
E-mail								Remarks [Handwritten signature]								
Website																
Do you have a copy of the manifest? Yes <input type="checkbox"/> No <input type="checkbox"/>																
Sample Identification		Collected		Grab	Composite	Soil	Sediment	Tissue	Plastics	Unplastic	Surfactants	Waxes	NPDES	Other	Total # of Containers	
		Date	Time													
1		11/19/11	10:00	X												
2		11/19/11	10:00	X												
3		11/19/11	10:00	X												
4		11/19/11	10:00	X												
5		11/19/11	10:00	X												
6		11/19/11	10:00	X												
7		11/19/11	10:00	X												
8		11/19/11	10:00	X												
9		11/19/11	10:00	X												
10		11/19/11	10:00	X												
11		11/19/11	10:00	X												
12		11/19/11	10:00	X												
13		11/19/11	10:00	X												
14		11/19/11	10:00	X												
15		11/19/11	10:00	X												
16		11/19/11	10:00	X												
17		11/19/11	10:00	X												
18		11/19/11	10:00	X												
19		11/19/11	10:00	X												
20		11/19/11	10:00	X												

Turnaround Time (TAT) Requested: 10 days

Lab	Time	Received by	Date	Time
Lab	Time	Received by	Date	Time
Lab	Time	Received by	Date	Time
Lab	Time	Received by	Date	Time
Lab	Time	Received by	Date	Time

Data Package Options:

- Type of Data:  Raw Data  Summary Data
- Summary Data:  Summary Data  Summary Data
- Summary Data:  Summary Data  Summary Data
- Summary Data:  Summary Data  Summary Data

EPA Record? Yes  No

Temperature (if required) \_\_\_\_\_ °C

Environmental Laboratories, Environmental, 11/19/11

Keep this form for your records.

813348307590

813348307590



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/31/2018 10:20</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Conrad Burkholder (12671) at 11:47 on 08/31/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

<u>Cooler #</u>	<u>Thermometer ID</u>	<u>Corrected Temp</u>	<u>Therm. Type</u>	<u>Ice Type</u>	<u>Ice Present?</u>	<u>Ice Container</u>	<u>Elevated Temp?</u>
1	DT42-02	1.2	DT	Wet	Y	Bagged	N



# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: September 28, 2018 08:14

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1982467  
SDG: PF015  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

(717) 556-7256

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### SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-FFTA-SN-3-50-SO Grab Soil	08/30/2018 07:40	9781882
BAAP-FFTA-SN-3-65-SO Grab Soil	08/30/2018 08:15	9781883
BAAP-FFTA-SN-3-WT80-SO Grab Soil	08/30/2018 09:15	9781884
BAAP-FFTA-SN-3-5.0-SO Grab Soil	08/29/2018 15:05	9781885
BAAP-FFTA-SN-3-20-SO Grab Soil	08/29/2018 15:30	9781886
BAAP-FFTA-SN-3-35-SO Grab Soil	08/29/2018 16:00	9781887

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1982467

### 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:

#### **SW-846 9060A modified, Wet Chemistry**

Batch #: 18250667634A (Sample number(s): 9781882-9781884 UNSPK: 9781882 BKG: 9781882)

The duplicate RPD for the following analyte(s) exceeded the acceptance window: TOC Solids/Sludges  
Combustion

#### **SW-846 9045D Nov 2004, Wet Chemistry**

Sample #s: 9781884

The pH was measured in water at 19.9 C.

Sample #s: 9781882

The pH was measured in water at 20 C.

Sample #s: 9781883

The pH was measured in water at 20.2 C.

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781882  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 07:40  
SDG#: PF015-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>			<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	4,100	125	375	375	1
<b>Wet Chemistry</b>			<b>ASTM D422</b>	<b>%</b>	<b>%</b>	<b>%</b>	
11604	% Gravel	n.a.	7.4	0.50	1.0	1.0	1
11604	% Sand	n.a.	80.9	0.50	1.0	1.0	1
11604	% Silt	n.a.	10.4	0.50	1.0	1.0	1
11604	% Clay	n.a.	1.4	0.50	1.0	1.0	1
<b>Wet Chemistry</b>			<b>ASTM D422-63 (reapproved 2007)</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	97.7	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	92.6	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	90.8	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	89.5	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	88.7	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	85.9	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	62.8	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	23.2	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	11.8	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	10.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	6.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	1.0	0.50	0.50	0.50	1
<b>Wet Chemistry</b>			<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	8.83	0.0100	0.0100	0.0100	1
	The pH was measured in water at 20 C.						
<b>Wet Chemistry</b>			<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	19.3	0.50	0.50	0.50	1
	Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

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

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781882  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submittal Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 07:40  
**SDG#:** PF015-01

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/08/2018 17:54	Drew M Gerhart	1
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:50	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781883  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 08:15  
SDG#: PF015-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>							
<b>SW-846 9060A modified</b>			<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	1,930	103	309	309	1
<b>Wet Chemistry</b>							
<b>ASTM D422</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
11604	% Gravel	n.a.	11.2	0.50	1.0	1.0	1
11604	% Sand	n.a.	87.5	0.50	1.0	1.0	1
11604	% Silt	n.a.	0.81 J	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.50 J	0.50	1.0	1.0	1
<b>Wet Chemistry</b>							
<b>ASTM D422-63 (reapproved 2007)</b>			<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	98.6	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	88.8	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	88.0	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	87.1	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	86.3	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	82.0	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	47.8	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	5.2	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	1.3	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	0.50	0.50	0.50	0.50	1
<b>Wet Chemistry</b>							
<b>SW-846 9045D Nov 2004</b>			<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.32	0.0100	0.0100	0.0100	1
The pH was measured in water at 20.2 C.							
<b>Wet Chemistry</b>							
<b>SM 2540 G-2011 %Moisture Calc</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.1	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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



**Sample Description:** BAAP-FFTA-SN-3-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781883  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submittal Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 08:15  
**SDG#:** PF015-02

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/08/2018 18:33	Drew M Gerhart	1
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781884  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 09:15  
SDG#: PF015-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>							
<b>SW-846 9060A modified</b>			<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	5,200	103	310	310	1
<b>Wet Chemistry</b>							
<b>ASTM D422</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
11604	% Gravel	n.a.	5.1	0.50	1.0	1.0	1
11604	% Sand	n.a.	87.1	0.50	1.0	1.0	1
11604	% Silt	n.a.	5.8	0.50	1.0	1.0	1
11604	% Clay	n.a.	2.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>							
<b>ASTM D422-63 (reapproved 2007)</b>			<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	95.0	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	92.3	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	89.7	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	86.3	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	72.0	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	29.0	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	12.2	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	7.8	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	7.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	4.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1
<b>Wet Chemistry</b>							
<b>SW-846 9045D Nov 2004</b>			<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.32	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							
<b>Wet Chemistry</b>							
<b>SM 2540 G-2011 %Moisture Calc</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-3-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781884  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 09:15  
SDG#: PF015-03

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/08/2018 18:46	Drew M Gerhart	1
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710310A	09/05/2018 12:30	Luz M Groff	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403B	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781885  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/29/2018 15:05  
SDG#: PF015-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	< 1.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	13.3	0.50	1.0	1.0	1
11604	% Silt	n.a.	59.6	0.50	1.0	1.0	1
11604	% Clay	n.a.	27.0	0.50	1.0	1.0	1

<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	99.9	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	99.9	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	99.8	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	99.8	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	99.1	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	94.7	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	88.4	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	86.6	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	83.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	73.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	45.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	27.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	21.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	20.0	0.50	0.50	0.50	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%	
00111	Moisture	n.a.	13.8	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781886  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/29/2018 15:30  
SDG#: PF015-05

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	47.3	0.50	1.0	1.0	1
11604	% Sand	n.a.	47.4	0.50	1.0	1.0	1
11604	% Silt	n.a.	4.8	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.50 J	0.50	1.0	1.0	1

<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	73.7	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	52.7	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	47.4	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	43.2	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	39.1	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	30.3	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	16.2	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	7.8	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	5.3	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	4.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	< 0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%	
00111	Moisture	n.a.	3.8	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781887  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/29/2018 16:00  
SDG#: PF015-06

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	30.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	66.4	0.50	1.0	1.0	1
11604	% Silt	n.a.	3.1	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.50 J	0.50	1.0	1.0	1

<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	91.1	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	70.0	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	65.6	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	61.8	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	54.7	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	46.4	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	24.7	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	5.7	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	3.6	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	3.5	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	2.5	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	< 0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%	
00111	Moisture	n.a.	4.3	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/28/2018 08:14

Group Number: 1982467

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 mg/kg	DL** mg/kg	LOD mg/kg	LOQ mg/kg
Batch number: 18250667634A TOC Solids/Sludges Combustion	Sample number(s): 9781882-9781884 < 300	100	300	300

### LCS/LCSD

Analysis Name	LCS Spike Added mg/kg	LCS Conc mg/kg	LCSD Spike Added mg/kg	LCSD Conc mg/kg	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18250667634A TOC Solids/Sludges Combustion	Sample number(s): 9781882-9781884 3890	3682.2			95		47-143		
	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>					
Batch number: 18250039403B pH	Sample number(s): 9781884 7.00	6.99			100		95-105		
Batch number: 18253039401A pH	Sample number(s): 9781882-9781883 7.00	6.95			99		95-105		
	%	%	%	%					
Batch number: 18247820006B Moisture	Sample number(s): 9781882-9781887 89.5	89.43			100		99-101		

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/kg	MS Spike Added mg/kg	MS Conc mg/kg	MSD Spike Added mg/kg	MSD Conc mg/kg	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18250667634A TOC Solids/Sludges Combustion	Sample number(s): 9781882-9781884 UNSPK: 9781882 3309.41	6360	7564.59			67		47-143		

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/28/2018 08:14

Group Number: 1982467

### Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc mg/kg	DUP Conc mg/kg	DUP RPD	DUP RPD Max
Batch number: 18250667634A TOC Solids/Sludges Combustion	Sample number(s): 9781882-9781884 BKG: 9781882 3309.41	Sample number(s): 9781884 BKG: 9781882 2592.82	24*	7
Batch number: 18250039403B pH	Std. Units Sample number(s): 9781884 BKG: 9781884 9.32	Std. Units Sample number(s): 9781884 BKG: 9781884 9.33	0	3
Batch number: 18247820006B Moisture	% Sample number(s): 9781882-9781887 BKG: 9781883 2.15	% Sample number(s): 9781887 BKG: 9781883 2.19	2 (1)	5

\*- 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.



# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1982467 Sample # 9781882-87

**COC # 561235**

Client Information				Matrix				Analysis Requested										For Lab Use Only			
Client: <u>Arcadis</u>		Acct. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/>		Preservation and Filtration Codes										FSC:	pg 1/1
Project Name#: <u>BAAP/02118216-1000.7AD00</u>		PWSID #:		Other: <u>PEA DT Lab Supplied</u>		Total # of Containers												SCR#:			
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:																Preservation Codes			
Sampler: <u>Bruce Evans/Tess Nugent</u>		Quote #:																H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other			
State where samples were collected: <u>Wisconsin</u>		For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																Remarks			
Sample Identification		Collected		Grab		Composite												<u>RUSH</u>			
		Date      Time																			
<u>BAAP-FFTA-SN-3-50-SO</u>		<u>8/30/18 0740</u>		<u>X</u>		<u>X</u>		<u>PFAS Group</u>													
<u>BAAP-FFTA-SN-3-65-SO</u>		<u>8/30/18 0815</u>		<u>X</u>		<u>X</u>		<u>TOC/pH/Moisture</u>													
<u>BAAP-FFTA-SN-3-WT80-SO</u>		<u>8/30/18 0915</u>		<u>X</u>		<u>X</u>		<u>Moisture</u>													
<u>BAAP-FFTA-SN-3-5.0-SO</u>		<u>8/29/18 1505</u>		<u>X</u>		<u>X</u>		<u>Grain Size</u>													
<u>BAAP-FFTA-SN-3-20-SO</u>		<u>8/29/18 1530</u>		<u>X</u>		<u>X</u>															
<u>BAAP-FFTA-SN-3-35-SO</u>		<u>8/29/18 1600</u>		<u>X</u>		<u>X</u>															
<u>BAAP-EB-083018-3</u>		<u>8/30/18 12:15</u>		<u>X</u>				<u>X</u>													

Turnaround Time (TAT) Requested (please circle) Standard <u>Rush</u> (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAYS</u>  E-mail address: <u>kimmie.schrupp@arcadis.com</u>	Relinquished by <u>[Signature]</u>	Date <u>8/30/18</u>	Time <u>17:00</u>	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by <u>[Signature]</u>	Date <u>8/31/18</u>	Time <u>10:20</u>

Type I (EPA Level 3 Equivalent/non-CLP)	Type VI (Raw Data Only)	EDD Required? <u>Yes</u> No		Relinquished by Commercial Carrier: UPS _____ FedEx <u>X</u> Other _____	
Type III (Reduced non-CLP)	NJ DKQP TX TRRP-13	If yes, format: _____		Temperature upon receipt <u>1.2</u> °C	
NYSDEC Category A or B	MA MCP CT RCP	Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)			



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/31/2018 10:20</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Conrad Burkholder (12671) at 11:47 on 08/31/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.2	DT	Wet	Y	Bagged	N

# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

**WARRANTY AND LIMITS OF LIABILITY** - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: September 18, 2018 18:55

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1982474  
SDG: PF016  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

(717) 556-7256

To view our laboratory's current scopes of accreditation please go to <http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/>. Historical copies may be requested through your project manager.



### SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-PBGP-PBN-8205C Grab Groundwater	08/30/2018 10:05	9781926
BAAP-PBGP-PBN-8205A Grab Groundwater	08/30/2018 10:40	9781927
BAAP-PBGP-PBM-8203 Grab Groundwater	08/30/2018 14:10	9781928
BAAP-PBGP-PBM-8203MS Grab Groundwater	08/30/2018 14:10	9781929
BAAP-PBGP-PBM-8203MSD Grab Groundwater	08/30/2018 14:10	9781930
BAAP-FB-GW-083018 Grab Groundwater	08/30/2018 10:10	9781931
BAAP-FD-GW-083018 Grab Groundwater	08/30/2018	9781932

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1982474

**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 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: 9781929**

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate, NtFOSAA, NMeFOSAA

**Sample #s: 9781927**

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid, Perfluorobutanesulfonate, Perfluoropentanoic acid, 6:2 fluorotelomersulfonate

**Sample #s: 9781932**

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

**Sample #s: 9781928**

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

**Sample #s: 9781926**

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid, Perfluorononanoic acid, Perfluorodecanoic acid, Perfluoroundecanoic acid,  
Perfluorohexanoic acid, Perfluorobutanesulfonate, Perfluorohexanesulfonate, Perfluoro-octanesulfonate,  
Perfluoropentanoic acid

**Sample #s: 9781930**

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

Batch #: 18245007 (Sample number(s): 9781926-9781932 UNSPK: 9781928)

The recovery(ies) for the following analyte(s) in the MS and/or MSD were below the acceptance window:  
Perfluoropentanoic acid



**Sample Description:** BAAP-PBGP-PBN-8205C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781926  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 10:05  
**SDG#:** PF016-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.0	0.99	2.0	3.0	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.0	0.99	2.0	3.0	1
14434	NEtFOSAA	2991-50-6	< 2.4	0.99	2.4	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.4	0.99	2.4	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	0.39 J	0.30	1.1	2.0	1
14434	Perfluorobutanoic acid	375-22-4	6.8	2.0	4.8	6.0	1
14434	Perfluorodecanoic acid	335-76-2	< 1.2	0.50	1.2	2.0	1
14434	Perfluorododecanoic acid	307-55-1	< 1.2	0.50	1.2	2.0	1
14434	Perfluoroheptanoic acid	375-85-9	0.97 J	0.40	1.2	2.0	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.1	0.40	1.1	2.0	1
14434	Perfluorohexanoic acid	307-24-4	1.2 J	0.50	1.2	2.0	1
14434	Perfluorononanoic acid	375-95-1	0.55 J	0.40	1.2	2.0	1
14434	Perfluoro-octanesulfonate	1763-23-1	2.2	0.50	1.2	2.0	1
14434	Perfluorooctanoic acid	335-67-1	2.8	0.50	1.2	2.0	1
14434	Perfluoropentanoic acid	2706-90-3	2.1 J	2.0	4.8	6.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.2	0.60	1.2	2.0	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.2	0.60	1.2	2.0	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.2	0.50	1.2	2.0	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:17	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-8205A Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781927  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 10:40  
**SDG#:** PF016-02

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.96	0.26	0.96	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.2	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.96	0.35	0.96	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	0.59 J	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.2	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:26	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBM-8203 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: WW 9781928  
ELLE Group #: 1982474  
Matrix: Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 14:10  
SDG#: PF016-03BKG

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.87	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.87	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	N.D.	0.87	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.87	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.95	1.7	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.7	4.2	5.2	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.35	0.95	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.60 J	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.79 J	0.43	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	2.7 J	1.7	4.2	5.2	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.52	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.52	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.43	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:35	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBM-8203MS Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781929  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 14:10  
**SDG#:** PF016-03MS

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	14	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	15	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	4.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	4.4	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	4.1	0.26	0.97	1.8	1
14434	Perfluorobutanoic acid	375-22-4	5.7	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	5.2	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	5.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	4.8	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	4.5	0.35	0.97	1.8	1
14434	Perfluorohexanoic acid	307-24-4	4.7	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	4.7	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	4.9	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	5.1	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	5.0 J	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	5.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	5.2	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	4.4	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 03:11	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBM-8203MSD Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: WW 9781930  
ELLE Group #: 1982474  
Matrix: Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 14:10  
SDG#: PF016-03MSD

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	13	0.84	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	13	0.84	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	3.9	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	4.1	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	3.9	0.25	0.92	1.7	1
14434	Perfluorobutanoic acid	375-22-4	5.5	1.7	4.0	5.0	1
14434	Perfluorodecanoic acid	335-76-2	4.6	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	4.7	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	4.1	0.33	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	3.8	0.33	0.92	1.7	1
14434	Perfluorohexanoic acid	307-24-4	4.1	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	4.0	0.33	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	4.7	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	4.8	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	4.7 J	1.7	4.0	5.0	1
14434	Perfluorotetradecanoic acid	376-06-7	4.6	0.50	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	4.7	0.50	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	4.6	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 03:20	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-FB-GW-083018 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781931  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 10:10  
**SDG#:** PF016-04FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.98	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:44	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-FD-GW-083018 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781932  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018  
**SDG#:** PF016-05FD

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.90	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.90	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.2	0.90	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.2	0.90	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.99	0.27	0.99	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.99	0.36	0.99	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.5 J	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	0.89 J	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:53	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:55

Group Number: 1982474

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 ng/l	DL** ng/l	LOD ng/l	LOQ ng/l
Batch number: 18245007	Sample number(s): 9781926-9781932			
6:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
8:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
NEtFOSAA	< 2.4	1.0	2.4	3.0
NMeFOSAA	< 2.4	1.0	2.4	3.0
Perfluorobutanesulfonate	< 1.1	0.30	1.1	2.0
Perfluorobutanoic acid	< 4.8	2.0	4.8	6.0
Perfluorodecanoic acid	< 1.2	0.50	1.2	2.0
Perfluorododecanoic acid	< 1.2	0.50	1.2	2.0
Perfluoroheptanoic acid	< 1.2	0.40	1.2	2.0
Perfluorohexanesulfonate	< 1.1	0.40	1.1	2.0
Perfluorohexanoic acid	< 1.2	0.50	1.2	2.0
Perfluorononanoic acid	< 1.2	0.40	1.2	2.0
Perfluoro-octanesulfonate	< 1.2	0.50	1.2	2.0
Perfluorooctanoic acid	< 1.2	0.50	1.2	2.0
Perfluoropentanoic acid	< 4.8	2.0	4.8	6.0
Perfluorotetradecanoic acid	< 1.2	0.60	1.2	2.0
Perfluorotridecanoic acid	< 1.2	0.60	1.2	2.0
Perfluoroundecanoic acid	< 1.2	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: 18245007	Sample number(s): 9781926-9781932								
6:2 fluorotelomersulfonate	15.17	13.91			92		70-130		
8:2 fluorotelomersulfonate	15.33	15.61			102		70-130		
NEtFOSAA	5.44	4.51			83		60-131		
NMeFOSAA	5.44	5.10			94		67-124		
Perfluorobutanesulfonate	4.81	4.43			92		72-127		
Perfluorobutanoic acid	5.44	4.94			91		70-130		
Perfluorodecanoic acid	5.44	5.45			100		67-141		
Perfluorododecanoic acid	5.44	5.01			92		72-137		
Perfluoroheptanoic acid	5.44	4.74			87		75-139		
Perfluorohexanesulfonate	5.14	4.73			92		71-130		
Perfluorohexanoic acid	5.44	4.78			88		77-132		

\*- 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.



## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:55

Group Number: 1982474

### LCS/LCSD (continued)

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
Perfluorononanoic acid	5.44	4.85			89		73-144		
Perfluoro-octanesulfonate	5.20	5.07			98		67-134		
Perfluorooctanoic acid	5.44	5.13			94		76-136		
Perfluoropentanoic acid	5.44	5.54			102		70-130		
Perfluorotetradecanoic acid	5.44	5.19			95		70-142		
Perfluorotridecanoic acid	5.44	5.06			93		57-137		
Perfluoroundecanoic acid	5.44	4.67			86		83-132		

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/l	MS Spike Added ng/l	MS Conc ng/l	MSD Spike Added ng/l	MSD Conc ng/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18245007										
Sample number(s): 9781926-9781932 UNSPK: 9781928										
6:2 fluorotelomersulfonate	< 1.7	13.39	14.13	12.7	13.13	106	103	70-130	7	30
8:2 fluorotelomersulfonate	< 1.7	13.53	14.63	12.83	13.19	108	103	70-130	10	30
NEtFOSAA	< 2.1	4.80	4.07	4.55	3.89	85	85	60-131	5	30
NMeFOSAA	< 2.1	4.80	4.40	4.55	4.13	92	91	67-124	6	30
Perfluorobutanesulfonate	< 0.95	4.25	4.14	4.03	3.92	97	97	72-127	5	30
Perfluorobutanoic acid	< 4.2	4.80	5.75	4.55	5.52	120	121	70-130	4	30
Perfluorodecanoic acid	< 1.0	4.80	5.21	4.55	4.64	109	102	67-141	12	30
Perfluorododecanoic acid	< 1.0	4.80	5.12	4.55	4.74	107	104	72-137	8	30
Perfluoroheptanoic acid	< 1.0	4.80	4.79	4.55	4.15	100	91	75-139	14	30
Perfluorohexanesulfonate	< 0.95	4.54	4.51	4.31	3.77	99	88	71-130	18	30
Perfluorohexanoic acid	< 1.0	4.80	4.73	4.55	4.07	98	89	77-132	15	30
Perfluorononanoic acid	< 1.0	4.80	4.72	4.55	4.00	98	88	73-144	17	30
Perfluoro-octanesulfonate	0.596	4.59	4.90	4.35	4.67	94	94	67-134	5	30
Perfluorooctanoic acid	0.789	4.80	5.14	4.55	4.81	91	88	76-136	7	30
Perfluoropentanoic acid	2.65	4.80	4.99	4.55	4.73	49*	46*	70-130	5	30
Perfluorotetradecanoic acid	< 1.0	4.80	5.07	4.55	4.64	106	102	70-142	9	30
Perfluorotridecanoic acid	< 1.0	4.80	5.17	4.55	4.65	108	102	57-137	11	30
Perfluoroundecanoic acid	< 1.0	4.80	4.41	4.55	4.57	92	100	83-132	4	30

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:55

Group Number: 1982474

### 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: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18245007

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9781926	82	9.9	72	3.0	72	9.9	80	2.0	78	9.9	79	2.0
9781927	82	8.8	73	2.6	70	8.8	87	1.8	86	8.8	87	1.8
9781928	78	8.7	70	2.6	73	8.7	83	1.7	85	8.7	86	1.7
9781929	81	8.8	77	2.6	76	8.8	79	1.8	78	8.8	78	1.8
9781930	81	8.4	73	2.5	73	8.4	85	1.7	83	8.4	85	1.7
9781931	82	8.9	80	2.7	77	8.9	89	1.8	84	8.9	89	1.8
9781932	78	9.0	75	2.7	69	9.0	78	1.8	77	9.0	81	1.8
Blank	77	10	77	3.0	74	10	84	2.0	89	10	88	2.0
LCS	76	10	69	3.0	71	10	74	2.0	74	10	76	2.0
MS	81	8.8	77	2.6	76	8.8	79	1.8	78	8.8	78	1.8
MSD	81	8.4	73	2.5	73	8.4	85	1.7	83	8.4	85	1.7
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	
	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9781926	91	9.9	72	2.0	86	9.9	104	2.0	85	2.0	77	6.0
9781927	99	8.8	87	1.8	87	8.8	104	1.8	86	1.8	85	5.3
9781928	92	8.7	78	1.7	81	8.7	87	1.7	76	1.7	79	5.2
9781929	86	8.8	76	1.8	81	8.8	79	1.8	79	1.8	93	5.3
9781930	84	8.4	76	1.7	78	8.4	86	1.7	78	1.7	81	5.0
9781931	87	8.9	85	1.8	80	8.9	82	1.8	88	1.8	94	5.3
9781932	85	9.0	76	1.8	76	9.0	78	1.8	80	1.8	91	5.4
Blank	85	10	85	2.0	78	10	77	2.0	80	2.0	84	6.0
LCS	78	10	74	2.0	72	10	75	2.0	80	2.0	76	6.0
MS	86	8.8	76	1.8	81	8.8	79	1.8	79	1.8	93	5.3
MSD	84	8.4	76	1.7	78	8.4	86	1.7	78	1.7	81	5.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	
	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA			
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)		
9781926	82	7.9	86	4.0	87	7.9	88	5.0	78	5.0		
9781927	90	7.0	81	3.5	91	7.0	82	4.4	76	4.4		
9781928	80	6.9	76	3.5	83	6.9	77	4.3	72	4.3		
9781929	88	7.1	87	3.5	76	7.1	79	4.4	71	4.4		
9781930	77	6.7	70	3.3	72	6.7	68	4.2	62	4.2		

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/18/2018 18:55

Group Number: 1982474

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18245007

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9781931	100	7.1	87	3.6	83	7.1	89	4.4	80	4.4
9781932	74	7.2	79	3.6	74	7.2	71	4.5	64	4.5
Blank	77	8.0	83	4.0	86	8.0	78	5.0	79	5.0
LCS	77	8.0	75	4.0	70	8.0	76	5.0	72	5.0
MS	88	7.1	87	3.5	76	7.1	79	4.4	71	4.4
MSD	77	6.7	70	3.3	72	6.7	68	4.2	62	4.2
Limits:	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.

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1982474 Sample # 9781926-32

**COC # 561241**

Client Information				Matrix				Analysis Requested												For Lab Use Only			
Client: <u>ARCADIS</u>		Acct. #:		<input type="checkbox"/> Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input checked="" type="checkbox"/> Potable <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Water <input type="checkbox"/> NPDES <input type="checkbox"/> Other:		Preservation and Filtration Codes												FSC: _____					
Project Name/ID: <u>BADGER / 08118216.1000</u>		PWSID #:				Total # of Containers: <u>7</u> <u>7</u> PMS - EPA METHOD 537												SCR#: _____					
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:																Preservation Codes					
Sampler: <u>DREIN KEHOE / KENDRA KEON</u>		Quote #:																H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other					
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Sample Identification		Collected		Grab		Composite		Remarks: <u>RUSH</u>  <u>SHAKER TEST = NO BUBBLES</u> <u>RUN MS/MSD</u>											
Date		Time																					
<u>BAAP-PBCP-PBN-8205C</u>		<u>8:30:18</u>		<u>1005</u>		<u>X</u>				<u>X</u>													
<u>BAAP-PBCP-PBN-8205A</u>		<u>8:30:18</u>		<u>1040</u>		<u>X</u>				<u>X</u>													
<u>BAAP-PBCP-PBM-8203</u>		<u>8:30:18</u>		<u>1410</u>		<u>X</u>				<u>X</u>													
<u>BAAP-FB-GW-083018</u>		<u>8:30:18</u>		<u>1010</u>		<u>X</u>				<u>X</u>													
<u>BAAP-FD-GW-083018</u>		<u>8:30:18</u>		<u>—</u>		<u>X</u>				<u>X</u>													

Turnaround Time (TAT) Requested (please circle) Standard _____ <u>Rush</u> _____ (Rush TAT is subject to laboratory approval and surcharge.)		Relinquished by <u>[Signature]</u>	Date <u>8/30/18</u>	Time <u>1500</u>	Received by _____	Date _____	Time _____
Date results are needed: <u>5 DAY TAT</u>		Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
E-mail address: <u>kimmie.schrupp@arcadis.com</u>		Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP		Relinquished by _____	Date _____	Time _____	Received by <u>[Signature]</u>	Date <u>8/31/18</u>	Time <u>10:20</u>
EDD Required? <u>Yes</u> No		If yes, format: _____		Relinquished by Commercial Carrier: UPS _____ FedEx <u>✓</u> Other _____		Temperature upon receipt <u>0.7</u> °C	
Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)							

1982474

**Katherine Klinefelter**

---

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project  
**Attachments:** BAAP COC 4.pdf; BAAP COC 5.pdf; BAAP COC 8.pdf; BAAP COC 1.pdf; BAAP COC 2.pdf; BAAP COC 3.pdf

EXTERNAL EMAIL\*

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanclabsEnv](http://www.EurofinsUS.com/LanclabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

1982474

EXTERNAL EMAIL\*

Hi Kathy,  
So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!  
Thanks  
Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

**Arcadis** | Arcadis U.S., Inc.  
630 Plaza Drive Highlands Ranch CO | 80129 | USA  
T. +1 720 344 3712 | M. + 1 303 916 1193

Connect with us! [www.arcadis.com](http://www.arcadis.com) | [LinkedIn](#) | [Twitter](#) | [Facebook](#)



Be green, leave it on the screen.

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Client Information				Matrix				Analysis Requested								For Lab Use Only																																																																																																																														
Client: <u>ARCADIS</u>		Acct. #:		<input type="checkbox"/> Tissue		<input checked="" type="checkbox"/> Ground		<input type="checkbox"/> Surface		Preservation and Filtration Codes								FSC: _____																																																																																																																												
Project Name#: <u>BADGER / 0818216.1000</u>		PWSID #:		<input type="checkbox"/> Sediment		<input type="checkbox"/> Potable		<input type="checkbox"/> NPDES		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="2">Preservation Codes</td> </tr> <tr> <td>H=HCl</td> <td>T=Thiosulfate</td> </tr> <tr> <td>N=HNO<sub>3</sub></td> <td>B=NaOH</td> </tr> <tr> <td>S=H<sub>2</sub>SO<sub>4</sub></td> <td>P=H<sub>3</sub>PO<sub>4</sub></td> </tr> <tr> <td>F=Field Filtered</td> <td>O=Other</td> </tr> <tr> <td colspan="2">Remarks</td> </tr> <tr> <td colspan="2" style="text-align: center; vertical-align: middle;"><u>RUSH</u></td> </tr> </table>								Preservation Codes		H=HCl	T=Thiosulfate	N=HNO <sub>3</sub>	B=NaOH	S=H <sub>2</sub> SO <sub>4</sub>	P=H <sub>3</sub> PO <sub>4</sub>	F=Field Filtered	O=Other	Remarks		<u>RUSH</u>		SCR#: _____																																																																																																														
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Sampler: <u>DREN KENOE / KENDRA KEON</u>		State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Grab		Composite		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>Sample Identification</th> <th>Date</th> <th>Time</th> <th>Grab</th> <th>Composite</th> <th>Soil</th> <th>Water</th> <th>Other</th> <th>Total # of Containers</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> <th>Analysis Requested</th> </tr> <tr> <td><u>BAAP-PBCP-PBN-8205C</u></td> <td><u>8-30-18</u></td> <td><u>1005</u></td> <td><u>X</u></td> <td></td> <td></td> <td><u>X</u></td> <td></td> <td><u>2</u></td> <td><u>X</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><u>BAAP-PBCP-PBN-8205A</u></td> <td><u>8-30-18</u></td> <td><u>1040</u></td> <td><u>X</u></td> <td></td> <td></td> <td><u>X</u></td> <td></td> <td><u>2</u></td> <td><u>X</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><u>BAAP-PBCP-PBM-8203</u></td> <td><u>8-30-18</u></td> <td><u>1410</u></td> <td><u>X</u></td> <td></td> <td></td> <td><u>X</u></td> <td></td> <td><u>6</u></td> <td><u>X</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><u>BAAP-FB-GW-083018</u></td> <td><u>8-30-18</u></td> <td><u>1010</u></td> <td><u>X</u></td> <td></td> <td></td> <td><u>X</u></td> <td></td> <td><u>2</u></td> <td><u>X</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><u>BAAP-FD-GW-083018</u></td> <td><u>8-30-18</u></td> <td><u>—</u></td> <td><u>X</u></td> <td></td> <td></td> <td><u>X</u></td> <td></td> <td><u>2</u></td> <td><u>X</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>								Sample Identification	Date	Time	Grab	Composite	Soil	Water	Other	Total # of Containers	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	<u>BAAP-PBCP-PBN-8205C</u>	<u>8-30-18</u>	<u>1005</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>												<u>BAAP-PBCP-PBN-8205A</u>	<u>8-30-18</u>	<u>1040</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>												<u>BAAP-PBCP-PBM-8203</u>	<u>8-30-18</u>	<u>1410</u>	<u>X</u>			<u>X</u>		<u>6</u>	<u>X</u>												<u>BAAP-FB-GW-083018</u>	<u>8-30-18</u>	<u>1010</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>												<u>BAAP-FD-GW-083018</u>	<u>8-30-18</u>	<u>—</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>											
Sample Identification	Date	Time	Grab	Composite	Soil	Water	Other	Total # of Containers	Analysis Requested									Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested																																																																																																																			
<u>BAAP-PBCP-PBN-8205C</u>	<u>8-30-18</u>	<u>1005</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>																																																																																																																																					
<u>BAAP-PBCP-PBN-8205A</u>	<u>8-30-18</u>	<u>1040</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>																																																																																																																																					
<u>BAAP-PBCP-PBM-8203</u>	<u>8-30-18</u>	<u>1410</u>	<u>X</u>			<u>X</u>		<u>6</u>	<u>X</u>																																																																																																																																					
<u>BAAP-FB-GW-083018</u>	<u>8-30-18</u>	<u>1010</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>																																																																																																																																					
<u>BAAP-FD-GW-083018</u>	<u>8-30-18</u>	<u>—</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>																																																																																																																																					
Turnaround Time (TAT) Requested (please circle) Standard <input type="checkbox"/> <u>Rush</u> <input checked="" type="checkbox"/> (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAY TAT</u>  E-mail address: <u>kimmie.schrupp@arcadis.com</u>				Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____ Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____ Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____ Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____ Relinquished by _____ Date _____ Time _____ Received by _____ Date _____ Time _____				EDD Required? <u>Yes</u> No If yes, format: _____ Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)								Relinquished by Commercial Carrier: UPS _____ FedEx _____ Other _____  Temperature upon receipt _____ °C																																																																																																																														
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP																																																																																																																																														



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/31/2018 10:20</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Conrad Burkholder (12 671) at 11:58 on 08/31/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

<u>Cooler #</u>	<u>Thermometer ID</u>	<u>Corrected Temp</u>	<u>Therm. Type</u>	<u>Ice Type</u>	<u>Ice Present?</u>	<u>Ice Container</u>	<u>Elevated Temp?</u>
1	DT42-02	0.7	DT	Wet	Y	Bagged	N



# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

**WARRANTY AND LIMITS OF LIABILITY** - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: September 28, 2018 15:08

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1982520  
SDG: PF017  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

(717) 556-7256

To view our laboratory's current scopes of accreditation please go to <http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/>. Historical copies may be requested through your project manager.



## SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-FFTA-SN-1-5.0-SO Grab Soil	08/28/2018 10:20	9782112
BAAP-FFTA-SN-1-20-SO Grab Soil	08/28/2018 13:25	9782113
BAAP-FFTA-SN-1-35-SO Grab Soil	08/28/2018 13:40	9782114
BAAP-FFTA-SN-1-50-SO Grab Soil	08/28/2018 14:35	9782115
BAAP-FFTA-SN-1-65-SO Grab Soil	08/28/2018 15:15	9782116
BAAP-FFTA-SN-1-80-SO Grab Soil	08/29/2018 08:20	9782117
BAAP-FFTA-SN-1-WT84-SO Grab Soil	08/29/2018 08:50	9782118
BAAP-FFTA-SN-2-5.0-SO Grab Soil	08/29/2018 10:20	9782119
BAAP-FFTA-SN-2-20-SO Grab Soil	08/29/2018 11:00	9782120
BAAP-FFTA-SN-2-35-SO Grab Soil	08/29/2018 11:25	9782121
BAAP-FFTA-SN-2-50-SO Grab Soil	08/29/2018 12:20	9782122
BAAP-FFTA-SN-2-65-SO Grab Soil	08/29/2018 12:45	9782123
BAAP-FFTA-SN-2-WT80-SO Grab Soil	08/29/2018 13:50	9782124

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1982520

**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:**

No additional comments are necessary.

**Sample Description:** BAAP-FFTA-SN-1-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782112  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/28/2018 10:20  
**SDG#:** PF017-01

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	0.87 J	0.50	1.0	1.0	1
11604	% Sand	n.a.	23.2	0.50	1.0	1.0	1
11604	% Silt	n.a.	52.0	0.50	1.0	1.0	1
11604	% Clay	n.a.	24.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	99.1	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	98.7	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	97.0	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	96.5	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	95.3	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	87.4	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	79.0	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	76.0	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	73.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	65.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	44.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	24.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	21.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	19.5	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-1-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782113  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/28/2018 13:25  
**SDG#:** PF017-02

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
11604	% Gravel	n.a.	21.2	0.50	1.0	1.0	1
11604	% Sand	n.a.	57.1	0.50	1.0	1.0	1
11604	% Silt	n.a.	18.8	0.50	1.0	1.0	1
11604	% Clay	n.a.	3.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	96.0	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	78.8	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	72.7	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	67.6	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	63.4	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	54.3	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	33.9	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	26.0	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	21.8	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	19.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	12.5	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	5.5	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-1-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782114  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/28/2018 13:40  
**SDG#:** PF017-03

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	18.3	0.50	1.0	1.0	1
11604	% Sand	n.a.	77.4	0.50	1.0	1.0	1
11604	% Silt	n.a.	2.8	0.50	1.0	1.0	1
11604	% Clay	n.a.	1.5	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	94.5	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	81.7	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	79.3	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	77.6	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	75.4	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	69.9	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	37.4	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	8.5	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	4.3	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	2.5	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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



**Sample Description:** BAAP-FFTA-SN-1-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9782115  
ELLE Group #: 1982520  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/28/2018 14:35  
SDG#: PF017-04

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	10.3	0.50	1.0	1.0	1
11604	% Sand	n.a.	85.9	0.50	1.0	1.0	1
11604	% Silt	n.a.	3.3	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.50 J	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	89.7	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	87.3	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	85.1	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	79.3	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	68.0	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	34.7	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	6.6	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	3.8	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-1-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782116  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/28/2018 15:15  
**SDG#:** PF017-05

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	0.82 J	0.50	1.0	1.0	1
11604	% Sand	n.a.	95.2	0.50	1.0	1.0	1
11604	% Silt	n.a.	0.97 J	0.50	1.0	1.0	1
11604	% Clay	n.a.	3.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	99.2	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	99.0	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	98.9	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	98.5	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	95.0	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	56.6	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	9.4	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	4.0	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	3.5	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-1-80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9782117  
ELLE Group #: 1982520  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/29/2018 08:20  
SDG#: PF017-06

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	< 1.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	91.3	0.50	1.0	1.0	1
11604	% Silt	n.a.	5.7	0.50	1.0	1.0	1
11604	% Clay	n.a.	3.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	100	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	100	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	99.9	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	98.4	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	72.8	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	25.0	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	12.3	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	8.7	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	8.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	5.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	3.0	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-1-WT84-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782118  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/29/2018 08:50  
**SDG#:** PF017-07

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	< 1.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	94.5	0.50	1.0	1.0	1
11604	% Silt	n.a.	4.5	0.50	1.0	1.0	1
11604	% Clay	n.a.	1.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	100	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	100	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	99.9	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	98.6	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	81.1	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	30.1	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	10	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	5.5	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	5.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	1.0	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-2-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782119  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/29/2018 10:20  
**SDG#:** PF017-08

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>							
<b>ASTM D422</b>							
11604	% Gravel	n.a.	< 1.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	15.8	0.50	1.0	1.0	1
11604	% Silt	n.a.	56.0	0.50	1.0	1.0	1
11604	% Clay	n.a.	28.1	0.50	1.0	1.0	1
<b>Wet Chemistry</b>							
<b>ASTM D422-63 (reapproved 2007)</b>							
			<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	99.9	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	97.1	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	89.8	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	89.7	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	89.1	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	87.1	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	84.8	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	84.1	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	80.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	72.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	44.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	25.5	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	22.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	19.0	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-2-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9782120  
ELLE Group #: 1982520  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/29/2018 11:00  
SDG#: PF017-09

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	28.5	0.50	1.0	1.0	1
11604	% Sand	n.a.	60.0	0.50	1.0	1.0	1
11604	% Silt	n.a.	9.5	0.50	1.0	1.0	1
11604	% Clay	n.a.	2.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	97.0	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	71.5	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	66.1	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	61.7	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	58.4	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	51.2	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	28.5	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	15.5	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	11.5	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	10.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	7.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-2-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782121  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/29/2018 11:25  
**SDG#:** PF017-10

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	33.8	0.50	1.0	1.0	1
11604	% Sand	n.a.	64.3	0.50	1.0	1.0	1
11604	% Silt	n.a.	< 1.0	0.50	1.0	1.0	1
11604	% Clay	n.a.	1.5	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	80.5	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	66.2	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	62.4	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	59.3	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	52.8	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	39.7	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	12.9	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	3.3	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	1.9	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.5	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-2-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9782122  
ELLE Group #: 1982520  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/29/2018 12:20  
SDG#: PF017-11

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	12.9	0.50	1.0	1.0	1
11604	% Sand	n.a.	83.6	0.50	1.0	1.0	1
11604	% Silt	n.a.	1.5	0.50	1.0	1.0	1
11604	% Clay	n.a.	2.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	97.3	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	87.1	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	84.0	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	80.0	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	75.9	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	66.0	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	42.5	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	7.6	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	3.5	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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



**Sample Description:** BAAP-FFTA-SN-2-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9782123  
ELLE Group #: 1982520  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/29/2018 12:45  
SDG#: PF017-12

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	10.9	0.50	1.0	1.0	1
11604	% Sand	n.a.	80.3	0.50	1.0	1.0	1
11604	% Silt	n.a.	7.8	0.50	1.0	1.0	1
11604	% Clay	n.a.	1.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	93.5	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	89.1	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	87.4	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	86.5	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	85.9	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	80.8	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	41.2	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	13.6	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	8.8	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	8.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	7.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	4.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	0.50	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

**Sample Description:** BAAP-FFTA-SN-2-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9782124  
**ELLE Group #:** 1982520  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/29/2018 13:50  
**SDG#:** PF017-13

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Detection Limit*	As Received Limit of Detection	As Received Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	< 1.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	90.3	0.50	1.0	1.0	1
11604	% Silt	n.a.	8.5	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.82 J	0.50	1.0	1.0	1
<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	99.7	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	99.0	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	98.2	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	96.1	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	95.5	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	50.0	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	12.1	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	9.3	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	7.5	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	3.5	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	1.0	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18249710301A	09/06/2018 16:00	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18249710301A	09/06/2018 16:00	Luz M Groff	1

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

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1982520 Sample # 9782112-24

COC # 561232

Client Information				Matrix				Analysis Requested												For Lab Use Only <u>19/12</u>											
Client: <u>ARCADIS</u>				Acct. #:				Preservation and Filtration Codes												FSC: _____											
Project Name/#: <u>BAAP/02118216.1000.RAD00</u>				PWSID #:																SCR#: _____											
Project Manager: <u>Kimble Schrupp</u>				P.O. #:																Preservation Codes											
Sampler: <u>Bruce Evans/Tess Nugent</u>				Quote #:																H=HCl T=Thiosulfate											
State where samples were collected: <u>WI</u>				For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																N=HNO <sub>3</sub> B=NaOH											
																				S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub>											
																				F=Field Filtered O=Other											
Sample Identification			Collected		Grab	Composite	Soil <input checked="" type="checkbox"/>	Sediment <input type="checkbox"/>	Tissue <input type="checkbox"/>	Potable <input type="checkbox"/>	Ground <input type="checkbox"/>	Surface <input type="checkbox"/>	Water <input type="checkbox"/>	NPDES <input type="checkbox"/>	Other: _____	Total # of Containers	<u>Gram Size</u>													Remarks	
			Date	Time																											
<u>BAAP-FFTA-SN-1-50-50</u>			<u>8/28/18</u>	<u>10:20</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-1-20-50</u>			<u>8/28/18</u>	<u>13:25</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-1-35-50</u>			<u>8/28/18</u>	<u>13:40</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-1-50-50</u>			<u>8/28/18</u>	<u>14:35</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-1-65-50</u>			<u>8/28/18</u>	<u>15:15</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>													<u>As/MSD-E</u>	
<u>BAAP-FFTA-SN-1-80-50</u>			<u>8/29/18</u>	<u>08:20</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-1-40784-50</u>			<u>8/29/18</u>	<u>08:50</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														
<del><u>BAAP-FFTA-FB-50182818</u></del>			<del><u>8/29/18</u></del>	<del><u>---</u></del>	<del><u>X</u></del>		<del><u>X</u></del>									<del><u>1</u></del>	<del><u>X</u></del>														
<u>BAAP-FFTA-SN-2-5.0-50</u>			<u>8/29/18</u>	<u>10:20</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-2-20-50</u>			<u>8/29/18</u>	<u>11:00</u>	<u>X</u>		<u>X</u>									<u>1</u>	<u>X</u>														

Turnaround Time (TAT) Requested (please circle) Standard <input checked="" type="checkbox"/> Rush <input type="checkbox"/> (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: _____  E-mail address: <u>Kimble.Schrupp@ARCADIS.COM</u>	Relinquished by <u>[Signature]</u>	Date <u>8/20/18</u>	Time <u>17:00</u>	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____

Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP) <input type="checkbox"/> Type VI (Raw Data Only) <input type="checkbox"/> Type III (Reduced non-CLP) <input type="checkbox"/> NJ DKQP <input type="checkbox"/> TX TRRP-13 <input type="checkbox"/> NYSDEC Category A or B <input type="checkbox"/> MA MCP <input type="checkbox"/> CT RCP <input type="checkbox"/>	EDD Required? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, format: _____ Site-Specific QC (MS/MSD/Dup)? Yes <input type="checkbox"/> No <input type="checkbox"/> (If yes, indicate QC sample and submit triplicate sample volume.)	Relinquished by Commercial Carrier: UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> Other _____  Temperature upon receipt <u>5.4 °C</u>
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# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 198250 Sample # 9782112-24

COC # 561236

Pg 2/2

Client Information				Matrix				Analysis Requested										For Lab Use Only							
Client: <u>ARCADIS</u>		Acct. #:		<input type="checkbox"/> Tissue		<input type="checkbox"/> Ground		<input type="checkbox"/> Surface		Preservation and Filtration Codes										FSC: _____					
Project Name/#: <u>BAAP</u>		PWSID #:		<input type="checkbox"/> Sediment		<input type="checkbox"/> Potable		<input type="checkbox"/> NPDES												SCR#: _____					
Project Manager:		P.O. #:		<input type="checkbox"/> Soil		<input type="checkbox"/> Water		Other: _____												<b>Preservation Codes</b> H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other					
Sampler:		Quote #:		<input checked="" type="checkbox"/> Composite																<b>Remarks</b> #					
State where samples were collected:		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Grab		Total # of Containers																			
Sample Identification			Collected		Grab	Composite	Soil	Water	Other:	Total # of Containers	GRAIN SIZE														
Date	Time																								
<u>BAAP-FFTA-SN-2-35-50</u>	<u>8/29/18</u>	<u>11:25</u>	<u>X</u>		<u>X</u>					<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-2-50-50</u>	<u>8/29/18</u>	<u>12:20</u>	<u>X</u>		<u>X</u>					<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-2-65-50</u>	<u>8/29/18</u>	<u>12:45</u>	<u>X</u>		<u>X</u>					<u>1</u>	<u>X</u>														
<u>BAAP-FFTA-SN-2-WT80-50</u>	<u>8/29/18</u>	<u>13:50</u>	<u>X</u>		<u>X</u>					<u>1</u>	<u>X</u>														

<b>Turnaround Time (TAT) Requested</b> (please circle) <u>Standard</u> Rush (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: _____  E-mail address: <u>KMarie.Schrupp@Arcadis.com</u>	Relinquished by <u>[Signature]</u>	Date <u>8/29/18</u>	Time <u>17:00</u>	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____
	Relinquished by _____	Date _____	Time _____	Received by _____	Date _____	Time _____

<b>Data Package Options</b> (circle if required)			EDD Required? Yes No		Relinquished by Commercial Carrier:	
Type I (EPA Level 3 Equivalent/non-CLP)	Type VI (Raw Data Only)		If yes, format: _____	UPS _____	FedEx <u>X</u>	Other _____
Type III (Reduced non-CLP)	NJ DKQP      TX TRRP-13		Site-Specific QC (MS/MSD/Dup)? Yes No	Temperature upon receipt <u>5.4</u> °C		
NYSDEC Category A or B	MA MCP      CT RCP		(If yes, indicate QC sample and submit triplicate sample volume.)			

1982520

**Katherine Klinefelter**

---

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Wednesday, September 05, 2018 4:12 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: 1982520 - BAAP - Sample ID clarification. ---> Please advise.

EXTERNAL EMAIL\*

Yes all BAAP.

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Wednesday, September 5, 2018 2:10 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** 1982520 - BAAP - Sample ID clarification. ---> Please advise.

Hello,

Please see the attached COCs. Should all of the sample IDs on COC page 1 of 2 begin with BAAP rather than BAAAP? The samples IDs on COC page 2 of 2 begin with BAAP.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanCLabsEnv](http://www.EurofinsUS.com/LanCLabsEnv)

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Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/31/2018 10:20</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Carolyn Cyms (964) at 15:33 on 08/31/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

<u>Cooler #</u>	<u>Thermometer ID</u>	<u>Corrected Temp</u>	<u>Therm. Type</u>	<u>Ice Type</u>	<u>Ice Present?</u>	<u>Ice Container</u>	<u>Elevated Temp?</u>
1	32170023	5.4	IR	Wet	Y	Bagged	N

# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.





## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

ARCADIS  
Suite 100  
630 Plaza Drive  
Highlands Ranch CO 80129

Report Date: September 25, 2018 13:21

### Project: Badger Army Ammunition Plant (BAAP)

Site: Badger Army Ammunition Plant (BAAP), WI

Account #: 13129  
Group Number: 1984962  
SDG: PF019  
PO Number: D18-218 PFAS PA/SI  
State of Sample Origin: WI

Electronic Copy To ARCADIS  
Electronic Copy To ARCADIS

Attn: Joe Kowalski  
Attn: Kimmie Schrupp

Respectfully Submitted,



Katherine A. Klinefelter  
Principal Specialist

(717) 556-7256

To view our laboratory's current scopes of accreditation please go to <http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/>. Historical copies may be requested through your project manager.



## SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
BAAP-PBGP-PBM-8201 Grab Groundwater	09/05/2018 16:05	9793089
BAAP-POND-1-SE Grab Sediment	09/06/2018 11:00	9793090
BAAP-POND-1-SEMS Grab Sediment	09/06/2018 11:00	9793091
BAAP-POND-1-SEMSD Grab Sediment	09/06/2018 11:00	9793092
BAAP-FB-SE-090618 Grab Water	09/06/2018 11:05	9793093
BAAP-POND-2-SE Grab Sediment	09/06/2018 11:10	9793094
BAAP-FD-SE-090618 Grab Sediment	09/06/2018	9793095
BAAP-POND-3-SE Grab Sediment	09/06/2018 11:15	9793096
BAAP-POND-1-SW Grab Surface Water	09/06/2018 11:30	9793097
BAAP-POND-1-SWMS Grab Surface Water	09/06/2018 11:30	9793098
BAAP-POND-1-SWMSD Grab Surface Water	09/06/2018 11:30	9793099
BAAP-FB-SW-090618 Grab Water	09/06/2018 11:40	9793100
BAAP-POND-2-SW Grab Surface Water	09/06/2018 11:50	9793101
BAAP-FD-SW-090618 Grab Surface Water	09/06/2018	9793102
BAAP-PBGP-PBN-1302A Grab Groundwater	08/31/2018 09:25	9793103
BAAP-PBGP-PBN-1302B Grab Groundwater	08/31/2018 11:35	9793104
BAAP-PBGP-PBN-1302D Grab Groundwater	08/31/2018 12:25	9793105
BAAP-EB-GW-083118-4 Grab Water	08/31/2018 09:40	9793106
BAAP-PBGP-PBN-9301B Grab Groundwater	09/04/2018 14:00	9793107
BAAP-PBGP-PBN-9301C Grab Groundwater	09/04/2018 15:00	9793108
BAAP-PBGP-PBN-1302C Grab Groundwater	09/04/2018 17:55	9793109
BAAP-PBGP-PBN-9303D Grab Groundwater	09/05/2018 13:20	9793110
BAAP-PBGP-PBN-9303C Grab Groundwater	09/05/2018 13:30	9793111
BAAP-PBGP-PBN-9303B Grab Groundwater	09/05/2018 13:40	9793112
BAAP-POND-3-SW Grab Surface Water	09/06/2018 12:00	9793113

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Project Name: Badger Army Ammunition Plant (BAAP)  
ELLE Group #: 1984962

**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 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: 9793111

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

Sample #s: 9793090, 9793091, 9793092, 9793112

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate

Sample #s: 9793095

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate, NETFOSAA

Sample #s: 9793094, 9793096

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate, NMeFOSAA

Sample #s: 9793107

The following analytes were manually integrated due to incorrect integrations:  
Perfluorooctanoic acid

Sample #s: 9793089, 9793109

The following analytes were manually integrated due to incorrect integrations:

Perfluorooctanoic acid, Perfluoro-octanesulfonate

Sample #s: 9793108

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

Sample #s: 9793103, 9793113

Reporting limits were raised due to interference from the sample matrix.

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate

Sample #s: 9793099

Reporting limits were raised due to interference from the sample matrix.

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate, NtFOSAA

Sample #s: 9793098

Reporting limits were raised due to interference from the sample matrix.

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate, NMeFOSAA

Sample #s: 9793110

Reporting limits were raised due to interference from the sample matrix.

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

Sample #s: 9793102

Reporting limits were raised due to interference from the sample matrix.

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

Sample #s: 9793101, 9793105

Reporting limits were raised due to interference from the sample matrix.

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

Sample #s: 9793097

Reporting limits were raised due to interference from the sample matrix.

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

Sample #s: 9793104

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted outside holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

The following analytes were manually integrated due to incorrect integrations:  
Perfluoro-octanesulfonate

Batch #: 18255010 (Sample number(s): 9793089, 9793093, 9793097-9793101, 9793103-9793106, 9793108-9793113 UNSPK: 9793097)

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) 9793104

**Sample Description:** BAAP-PBGP-PBM-8201 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793089  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 16:05  
**SDG#:** PF019-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.83	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.83	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.83	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.83	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.91	0.25	0.91	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.0	1.7	4.0	5.0	1
14434	Perfluorodecanoic acid	335-76-2	< 0.99	0.41	0.99	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 0.99	0.41	0.99	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 0.99	0.33	0.99	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.91	0.33	0.91	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 0.99	0.41	0.99	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 0.99	0.33	0.99	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 0.99	0.41	0.99	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.54 J	0.41	0.99	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.0	1.7	4.0	5.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 0.99	0.50	0.99	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 0.99	0.50	0.99	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 0.99	0.41	0.99	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 11:32	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-1-SE Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793090  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:00  
**SDG#:** PF019-02BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 3.5	1.1	3.5	3.7	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 3.5	0.93	3.5	3.7	1
14478	NEtFOSAA	2991-50-6	< 3.7	0.93	3.7	5.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 3.7	0.93	3.7	5.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.1	0.37	1.1	1.5	1
14478	Perfluorobutanoic acid	375-22-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorodecanoic acid	335-76-2	< 1.3	0.56	1.3	1.9	1
14478	Perfluorododecanoic acid	307-55-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.3	0.37	1.3	1.5	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.2	0.37	1.2	1.5	1
14478	Perfluorohexanoic acid	307-24-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorononanoic acid	375-95-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.2	0.37	1.2	1.5	1
14478	Perfluorooctanoic acid	335-67-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.3	0.37	1.3	1.5	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	49.5	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 16:55	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-POND-1-SEMS Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793091  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:00  
**SDG#:** PF019-02MS

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	8.8	1.1	3.5	3.7	1
14478	8:2 fluorotelomersulfonate	39108-34-4	8.6	0.92	3.5	3.7	1
14478	NEtFOSAA	2991-50-6	2.7 J	0.92	3.7	5.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	2.5 J	0.92	3.7	5.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	2.4	0.37	1.1	1.5	1
14478	Perfluorobutanoic acid	375-22-4	3.0	0.37	1.2	1.5	1
14478	Perfluorodecanoic acid	335-76-2	3.0	0.55	1.2	1.8	1
14478	Perfluorododecanoic acid	307-55-1	3.0	0.37	1.2	1.5	1
14478	Perfluoroheptanoic acid	375-85-9	3.0	0.37	1.2	1.5	1
14478	Perfluorohexanesulfonate	355-46-4	2.5	0.37	1.2	1.5	1
14478	Perfluorohexanoic acid	307-24-4	3.1	0.37	1.2	1.5	1
14478	Perfluorononanoic acid	375-95-1	2.8	0.37	1.2	1.5	1
14478	Perfluoro-octanesulfonate	1763-23-1	2.7	0.37	1.2	1.5	1
14478	Perfluorooctanoic acid	335-67-1	2.9	0.37	1.2	1.5	1
14478	Perfluoropentanoic acid	2706-90-3	2.9	0.37	1.2	1.5	1
14478	Perfluorotetradecanoic acid	376-06-7	2.8	0.37	1.2	1.5	1
14478	Perfluorotridecanoic acid	72629-94-8	2.7	0.37	1.2	1.5	1
14478	Perfluoroundecanoic acid	2058-94-8	3.1	0.37	1.2	1.5	1
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00118	Moisture	n.a.	49.5	0.50	0.50	0.50	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 17:13	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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



**Sample Description:** BAAP-POND-1-SEMSD Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793092  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:00  
**SDG#:** PF019-02MSD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	7.8	1.1	3.5	3.7	1
14478	8:2 fluorotelomersulfonate	39108-34-4	7.2	0.93	3.5	3.7	1
14478	NEtFOSAA	2991-50-6	2.9 J	0.93	3.7	5.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	2.8 J	0.93	3.7	5.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	2.3	0.37	1.1	1.5	1
14478	Perfluorobutanoic acid	375-22-4	3.0	0.37	1.3	1.5	1
14478	Perfluorodecanoic acid	335-76-2	3.0	0.56	1.3	1.9	1
14478	Perfluorododecanoic acid	307-55-1	2.7	0.37	1.3	1.5	1
14478	Perfluoroheptanoic acid	375-85-9	2.9	0.37	1.3	1.5	1
14478	Perfluorohexanesulfonate	355-46-4	2.6	0.37	1.2	1.5	1
14478	Perfluorohexanoic acid	307-24-4	3.2	0.37	1.3	1.5	1
14478	Perfluorononanoic acid	375-95-1	2.8	0.37	1.3	1.5	1
14478	Perfluoro-octanesulfonate	1763-23-1	3.1	0.37	1.2	1.5	1
14478	Perfluorooctanoic acid	335-67-1	3.1	0.37	1.3	1.5	1
14478	Perfluoropentanoic acid	2706-90-3	3.3	0.37	1.3	1.5	1
14478	Perfluorotetradecanoic acid	376-06-7	2.7	0.37	1.3	1.5	1
14478	Perfluorotridecanoic acid	72629-94-8	2.9	0.37	1.3	1.5	1
14478	Perfluoroundecanoic acid	2058-94-8	2.4	0.37	1.3	1.5	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00118	Moisture	n.a.	49.5	0.50	0.50	0.50	1
00121	Moisture Duplicate	n.a.	51.3	0.50	0.50	0.50	1

The duplicate moisture value is provided to assess the precision of the moisture test. For comparability purposes, the initial moisture determination is the value used to perform dry weight calculations.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 17:31	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00118	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1
00121	Moisture Duplicate	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-FB-SE-090618 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793093  
**ELLE Group #:** 1984962  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:05  
**SDG#:** PF019-03FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.85	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.85	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.85	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.85	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.93	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.1	1.7	4.1	5.1	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.0	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.93	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 1.0	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.1	1.7	4.1	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 11:41	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-2-SE Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793094  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:10  
**SDG#:** PF019-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 3.5	1.1	3.5	3.7	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 3.5	0.92	3.5	3.7	1
14478	NEtFOSAA	2991-50-6	< 3.7	0.92	3.7	5.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 3.7	0.92	3.7	5.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.1	0.37	1.1	1.5	1
14478	Perfluorobutanoic acid	375-22-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorodecanoic acid	335-76-2	< 1.3	0.55	1.3	1.8	1
14478	Perfluorododecanoic acid	307-55-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.3	0.37	1.3	1.5	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.2	0.37	1.2	1.5	1
14478	Perfluorohexanoic acid	307-24-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorononanoic acid	375-95-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.2	0.37	1.2	1.5	1
14478	Perfluorooctanoic acid	335-67-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.3	0.37	1.3	1.5	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	47.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 17:49	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-FD-SE-090618 Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793095  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018  
**SDG#:** PF019-05FD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 3.8	1.2	3.8	4.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 3.8	1.0	3.8	4.0	1
14478	NEtFOSAA	2991-50-6	< 4.0	1.0	4.0	6.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 4.0	1.0	4.0	6.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.2	0.40	1.2	1.6	1
14478	Perfluorobutanoic acid	375-22-4	< 1.4	0.40	1.4	1.6	1
14478	Perfluorodecanoic acid	335-76-2	< 1.4	0.60	1.4	2.0	1
14478	Perfluorododecanoic acid	307-55-1	< 1.4	0.40	1.4	1.6	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.4	0.40	1.4	1.6	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.3	0.40	1.3	1.6	1
14478	Perfluorohexanoic acid	307-24-4	< 1.4	0.40	1.4	1.6	1
14478	Perfluorononanoic acid	375-95-1	< 1.4	0.40	1.4	1.6	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.3	0.40	1.3	1.6	1
14478	Perfluorooctanoic acid	335-67-1	< 1.4	0.40	1.4	1.6	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.4	0.40	1.4	1.6	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.4	0.40	1.4	1.6	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.4	0.40	1.4	1.6	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.4	0.40	1.4	1.6	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	53.9	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 18:07	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-POND-3-SE Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793096  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:15  
**SDG#:** PF019-06

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 4.1	1.3	4.1	4.3	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 4.1	1.1	4.1	4.3	1
14478	NEtFOSAA	2991-50-6	< 4.3	1.1	4.3	6.4	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 4.3	1.1	4.3	6.4	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.3	0.43	1.3	1.7	1
14478	Perfluorobutanoic acid	375-22-4	< 1.5	0.43	1.5	1.7	1
14478	Perfluorodecanoic acid	335-76-2	< 1.5	0.64	1.5	2.1	1
14478	Perfluorododecanoic acid	307-55-1	< 1.5	0.43	1.5	1.7	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.5	0.43	1.5	1.7	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.4	0.43	1.4	1.7	1
14478	Perfluorohexanoic acid	307-24-4	< 1.5	0.43	1.5	1.7	1
14478	Perfluorononanoic acid	375-95-1	< 1.5	0.43	1.5	1.7	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.4	0.43	1.4	1.7	1
14478	Perfluorooctanoic acid	335-67-1	< 1.5	0.43	1.5	1.7	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.5	0.43	1.5	1.7	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.43	1.5	1.7	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.43	1.5	1.7	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.43	1.5	1.7	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	56.7	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 18:25	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-POND-1-SW Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793097  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:30  
**SDG#:** PF019-07BKG

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
	<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>		<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	
14434	6:2 fluorotelomersulfonate	27619-97-2	< 9.9	4.9	9.9	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 9.9	4.9	9.9	15	1
14434	NEtFOSAA	2991-50-6	< 12	4.9	12	15	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.						
14434	NMeFOSAA	2355-31-9	< 12	4.9	12	15	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.						
14434	Perfluorobutanesulfonate	375-73-5	< 5.4	1.5	5.4	9.9	1
14434	Perfluorobutanoic acid	375-22-4	10 J	9.9	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 5.9	2.5	5.9	9.9	1
14434	Perfluorododecanoic acid	307-55-1	< 5.9	2.5	5.9	9.9	1
14434	Perfluoroheptanoic acid	375-85-9	< 5.9	2.0	5.9	9.9	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.4	2.0	5.4	9.9	1
14434	Perfluorohexanoic acid	307-24-4	< 5.9	2.5	5.9	9.9	1
14434	Perfluorononanoic acid	375-95-1	< 5.9	2.0	5.9	9.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	2.7 J	2.5	5.9	9.9	1
14434	Perfluorooctanoic acid	335-67-1	2.8 J	2.5	5.9	9.9	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	9.9	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 5.9	3.0	5.9	9.9	1
14434	Perfluorotridecanoic acid	72629-94-8	< 5.9	3.0	5.9	9.9	1
14434	Perfluoroundecanoic acid	2058-94-8	< 5.9	2.5	5.9	9.9	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 11:50	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-1-SWMS Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793098  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:30  
**SDG#:** PF019-07MS

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
	<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>		<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	
14434	6:2 fluorotelomersulfonate	27619-97-2	90	4.9	9.8	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	82	4.9	9.8	15	1
14434	NEtFOSAA	2991-50-6	23	4.9	12	15	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.						
14434	NMeFOSAA	2355-31-9	31	4.9	12	15	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.						
14434	Perfluorobutanesulfonate	375-73-5	28	1.5	5.4	9.8	1
14434	Perfluorobutanoic acid	375-22-4	43	9.8	24	30	1
14434	Perfluorodecanoic acid	335-76-2	32	2.5	5.9	9.8	1
14434	Perfluorododecanoic acid	307-55-1	29	2.5	5.9	9.8	1
14434	Perfluoroheptanoic acid	375-85-9	32	2.0	5.9	9.8	1
14434	Perfluorohexanesulfonate	355-46-4	28	2.0	5.4	9.8	1
14434	Perfluorohexanoic acid	307-24-4	33	2.5	5.9	9.8	1
14434	Perfluorononanoic acid	375-95-1	32	2.0	5.9	9.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	31	2.5	5.9	9.8	1
14434	Perfluorooctanoic acid	335-67-1	33	2.5	5.9	9.8	1
14434	Perfluoropentanoic acid	2706-90-3	34	9.8	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	30	3.0	5.9	9.8	1
14434	Perfluorotridecanoic acid	72629-94-8	30	3.0	5.9	9.8	1
14434	Perfluoroundecanoic acid	2058-94-8	30	2.5	5.9	9.8	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 11:59	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-1-SWMSD Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793099  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:30  
**SDG#:** PF019-07MSD

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
	<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>		<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	
14434	6:2 fluorotelomersulfonate	27619-97-2	88	5.0	10	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	86	5.0	10	15	1
14434	NEtFOSAA	2991-50-6	25	5.0	12	15	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.						
14434	NMeFOSAA	2355-31-9	27	5.0	12	15	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.						
14434	Perfluorobutanesulfonate	375-73-5	29	1.5	5.5	10	1
14434	Perfluorobutanoic acid	375-22-4	42	10	24	30	1
14434	Perfluorodecanoic acid	335-76-2	33	2.5	6.0	10	1
14434	Perfluorododecanoic acid	307-55-1	31	2.5	6.0	10	1
14434	Perfluoroheptanoic acid	375-85-9	34	2.0	6.0	10	1
14434	Perfluorohexanesulfonate	355-46-4	28	2.0	5.5	10	1
14434	Perfluorohexanoic acid	307-24-4	33	2.5	6.0	10	1
14434	Perfluorononanoic acid	375-95-1	32	2.0	6.0	10	1
14434	Perfluoro-octanesulfonate	1763-23-1	32	2.5	6.0	10	1
14434	Perfluorooctanoic acid	335-67-1	34	2.5	6.0	10	1
14434	Perfluoropentanoic acid	2706-90-3	35	10	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	31	3.0	6.0	10	1
14434	Perfluorotridecanoic acid	72629-94-8	28	3.0	6.0	10	1
14434	Perfluoroundecanoic acid	2058-94-8	33	2.5	6.0	10	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 12:08	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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



**Sample Description:** BAAP-FB-SW-090618 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793100  
**ELLE Group #:** 1984962  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:40  
**SDG#:** PF019-08FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.97	0.26	0.97	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.2	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.97	0.35	0.97	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.2	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 12:17	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-2-SW Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
ELLE Sample #: WW 9793101  
ELLE Group #: 1984962  
Matrix: Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 09/07/2018 10:10  
Collection Date/Time: 09/06/2018 11:50  
SDG#: PF019-09

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 10	5.0	10	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 10	5.0	10	15	1
14434	NEtFOSAA	2991-50-6	< 12	5.0	12	15	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 12	5.0	12	15	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 5.5	1.5	5.5	10	1
14434	Perfluorobutanoic acid	375-22-4	11 J	10	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 6.0	2.5	6.0	10	1
14434	Perfluorododecanoic acid	307-55-1	< 6.0	2.5	6.0	10	1
14434	Perfluoroheptanoic acid	375-85-9	< 6.0	2.0	6.0	10	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.5	2.0	5.5	10	1
14434	Perfluorohexanoic acid	307-24-4	< 6.0	2.5	6.0	10	1
14434	Perfluorononanoic acid	375-95-1	< 6.0	2.0	6.0	10	1
14434	Perfluoro-octanesulfonate	1763-23-1	2.7 J	2.5	6.0	10	1
14434	Perfluorooctanoic acid	335-67-1	2.8 J	2.5	6.0	10	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	10	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 6.0	3.0	6.0	10	1
14434	Perfluorotridecanoic acid	72629-94-8	< 6.0	3.0	6.0	10	1
14434	Perfluoroundecanoic acid	2058-94-8	< 6.0	2.5	6.0	10	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 12:26	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-FD-SW-090618 Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793102  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018  
**SDG#:** PF019-10FD

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 10	5.0	10	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 10	5.0	10	15	1
14434	NEtFOSAA	2991-50-6	< 12	5.0	12	15	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 12	5.0	12	15	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 5.5	1.5	5.5	10	1
14434	Perfluorobutanoic acid	375-22-4	10 J	10	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 6.0	2.5	6.0	10	1
14434	Perfluorododecanoic acid	307-55-1	< 6.0	2.5	6.0	10	1
14434	Perfluoroheptanoic acid	375-85-9	< 6.0	2.0	6.0	10	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.5	2.0	5.5	10	1
14434	Perfluorohexanoic acid	307-24-4	< 6.0	2.5	6.0	10	1
14434	Perfluorononanoic acid	375-95-1	< 6.0	2.0	6.0	10	1
14434	Perfluoro-octanesulfonate	1763-23-1	6.1 JB	2.5	6.0	10	1
14434	Perfluorooctanoic acid	335-67-1	3.1 J	2.5	6.0	10	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	10	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 6.0	3.0	6.0	10	1
14434	Perfluorotridecanoic acid	72629-94-8	< 6.0	3.0	6.0	10	1
14434	Perfluoroundecanoic acid	2058-94-8	< 6.0	2.5	6.0	10	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18257020	09/17/2018 22:10	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18257020	09/14/2018 16:00	Anthony C Polaski	1

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

**Sample Description:** BAAP-PBGP-PBN-1302A Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793103  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 08/31/2018 09:25  
**SDG#:** PF019-11

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.5	1.2	2.5	3.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.5	1.2	2.5	3.7	1
14434	NEtFOSAA	2991-50-6	< 3.0	1.2	3.0	3.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 3.0	1.2	3.0	3.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 1.4	0.37	1.4	2.5	1
14434	Perfluorobutanoic acid	375-22-4	< 6.0	2.5	6.0	7.5	1
14434	Perfluorodecanoic acid	335-76-2	< 1.5	0.62	1.5	2.5	1
14434	Perfluorododecanoic acid	307-55-1	< 1.5	0.62	1.5	2.5	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.5	0.50	1.5	2.5	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.4	0.50	1.4	2.5	1
14434	Perfluorohexanoic acid	307-24-4	< 1.5	0.62	1.5	2.5	1
14434	Perfluorononanoic acid	375-95-1	< 1.5	0.50	1.5	2.5	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.1 J	0.62	1.5	2.5	1
14434	Perfluorooctanoic acid	335-67-1	1.0 J	0.62	1.5	2.5	1
14434	Perfluoropentanoic acid	2706-90-3	< 6.0	2.5	6.0	7.5	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.75	1.5	2.5	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.75	1.5	2.5	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.62	1.5	2.5	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 12:53	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-1302B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: WW 9793104  
ELLE Group #: 1984962  
Matrix: Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 09/07/2018 10:10  
Collection Date/Time: 08/31/2018 11:35  
SDG#: PF019-12

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.85	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.85	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.85	2.0	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.85	2.0	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.94	0.26	0.94	1.7	1
14434	Perfluorobutanoic acid	375-22-4	11	1.7	4.1	5.1	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	0.61 J	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.94	0.34	0.94	1.7	1
14434	Perfluorohexanoic acid	307-24-4	1.4 J	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	3.4	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	1.2 J	0.43	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	5.2	1.7	4.1	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.43	1.0	1.7	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted outside holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:02	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-1302D Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793105  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 08/31/2018 12:25  
**SDG#:** PF019-13

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.5	1.2	2.5	3.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.5	1.2	2.5	3.7	1
14434	NEtFOSAA	2991-50-6	< 3.0	1.2	3.0	3.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 3.0	1.2	3.0	3.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 1.4	0.37	1.4	2.5	1
14434	Perfluorobutanoic acid	375-22-4	8.5	2.5	6.0	7.5	1
14434	Perfluorodecanoic acid	335-76-2	0.66 J	0.62	1.5	2.5	1
14434	Perfluorododecanoic acid	307-55-1	< 1.5	0.62	1.5	2.5	1
14434	Perfluoroheptanoic acid	375-85-9	1.4 J	0.50	1.5	2.5	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.4	0.50	1.4	2.5	1
14434	Perfluorohexanoic acid	307-24-4	1.7 J	0.62	1.5	2.5	1
14434	Perfluorononanoic acid	375-95-1	0.66 J	0.50	1.5	2.5	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.4 J	0.62	1.5	2.5	1
14434	Perfluorooctanoic acid	335-67-1	0.81 J	0.62	1.5	2.5	1
14434	Perfluoropentanoic acid	2706-90-3	7.7	2.5	6.0	7.5	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.75	1.5	2.5	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.75	1.5	2.5	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.62	1.5	2.5	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:11	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-EB-GW-083118-4 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793106  
**ELLE Group #:** 1984962  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 08/31/2018 09:40  
**SDG#:** PF019-14EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.86	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.86	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.86	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.86	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.95	0.26	0.95	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.1	1.7	4.1	5.2	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.0	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.95	0.35	0.95	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 1.0	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.35	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.1	1.7	4.1	5.2	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.52	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.52	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.43	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:20	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9301B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793107  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/04/2018 14:00  
**SDG#:** PF019-15

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.84	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.84	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.93	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.0	1.7	4.0	5.0	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.0	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.93	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 1.0	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.0	1.7	4.0	5.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.50	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.50	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18257020	09/17/2018 22:28	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18257020	09/14/2018 16:00	Anthony C Polaski	1

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



**Sample Description:** BAAP-PBGP-PBN-9301C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793108  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/04/2018 15:00  
**SDG#:** PF019-16

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	1.7 J	0.84	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.84	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	4.3	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.93	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	5.6	1.7	4.0	5.0	1
14434	Perfluorodecanoic acid	335-76-2	0.46 J	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	0.63 J	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.93	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	1.0 J	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	0.39 J	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.6 J	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	2.0	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	1.9 J	1.7	4.0	5.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.50	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.50	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:38	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-1302C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793109  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/04/2018 17:55  
**SDG#:** PF019-17

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	1.6 J	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.98	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	3.0 J	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	0.44 J	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	0.63 J	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	3.5	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:47	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9303D Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793110  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 13:20  
**SDG#:** PF019-18

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.5	1.2	2.5	3.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.5	1.2	2.5	3.7	1
14434	NEtFOSAA	2991-50-6	< 3.0	1.2	3.0	3.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 3.0	1.2	3.0	3.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	0.98 J	0.37	1.4	2.5	1
14434	Perfluorobutanoic acid	375-22-4	30	2.5	6.0	7.5	1
14434	Perfluorodecanoic acid	335-76-2	< 1.5	0.62	1.5	2.5	1
14434	Perfluorododecanoic acid	307-55-1	< 1.5	0.62	1.5	2.5	1
14434	Perfluoroheptanoic acid	375-85-9	2.9	0.50	1.5	2.5	1
14434	Perfluorohexanesulfonate	355-46-4	1.7 J	0.50	1.4	2.5	1
14434	Perfluorohexanoic acid	307-24-4	5.6	0.62	1.5	2.5	1
14434	Perfluorononanoic acid	375-95-1	< 1.5	0.50	1.5	2.5	1
14434	Perfluoro-octanesulfonate	1763-23-1	14	0.62	1.5	2.5	1
14434	Perfluorooctanoic acid	335-67-1	5.5	0.62	1.5	2.5	1
14434	Perfluoropentanoic acid	2706-90-3	24	2.5	6.0	7.5	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.75	1.5	2.5	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.75	1.5	2.5	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.62	1.5	2.5	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:56	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9303C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793111  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 13:30  
**SDG#:** PF019-19

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	0.28 J	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	7.1	1.8	4.3	5.3	1
14434	Perfluorodecanoic acid	335-76-2	1.1 J	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	1.2 J	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	1.6 J	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	1.1 J	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	7.8	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	3.8	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	2.6 J	1.8	4.3	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	0.56 J	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 14:05	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9303B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793112  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 13:40  
**SDG#:** PF019-20

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.96	0.26	0.96	1.8	1
14434	Perfluorobutanoic acid	375-22-4	6.6	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	0.61 J	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.96	0.35	0.96	1.8	1
14434	Perfluorohexanoic acid	307-24-4	0.69 J	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.73 J	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	1.2 J	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	2.1 J	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 14:14	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-3-SW Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793113  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 12:00  
**SDG#:** PF019-21

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 9.9	4.9	9.9	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 9.9	4.9	9.9	15	1
14434	NEtFOSAA	2991-50-6	< 12	4.9	12	15	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 12	4.9	12	15	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 5.4	1.5	5.4	9.9	1
14434	Perfluorobutanoic acid	375-22-4	11 J	9.9	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 5.9	2.5	5.9	9.9	1
14434	Perfluorododecanoic acid	307-55-1	< 5.9	2.5	5.9	9.9	1
14434	Perfluoroheptanoic acid	375-85-9	< 5.9	2.0	5.9	9.9	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.4	2.0	5.4	9.9	1
14434	Perfluorohexanoic acid	307-24-4	< 5.9	2.5	5.9	9.9	1
14434	Perfluorononanoic acid	375-95-1	< 5.9	2.0	5.9	9.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	3.7 J	2.5	5.9	9.9	1
14434	Perfluorooctanoic acid	335-67-1	3.5 J	2.5	5.9	9.9	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	9.9	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 5.9	3.0	5.9	9.9	1
14434	Perfluorotridecanoic acid	72629-94-8	< 5.9	3.0	5.9	9.9	1
14434	Perfluoroundecanoic acid	2058-94-8	< 5.9	2.5	5.9	9.9	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 14:32	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

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/g	ng/g	ng/g	ng/g
Batch number: 18255011	Sample number(s): 9793090-9793092,9793094-9793096			
6:2 fluorotelomersulfonate	< 1.9	0.60	1.9	2.0
8:2 fluorotelomersulfonate	< 1.9	0.50	1.9	2.0
NETFOSAA	< 2.0	0.50	2.0	3.0
NMeFOSAA	< 2.0	0.50	2.0	3.0
Perfluorobutanesulfonate	< 0.60	0.20	0.60	0.80
Perfluorobutanoic acid	< 0.68	0.20	0.68	0.80
Perfluorodecanoic acid	< 0.68	0.30	0.68	1.0
Perfluorododecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroheptanoic acid	< 0.68	0.20	0.68	0.80
Perfluorohexanesulfonate	< 0.64	0.20	0.64	0.80
Perfluorohexanoic acid	< 0.68	0.20	0.68	0.80
Perfluorononanoic acid	< 0.68	0.20	0.68	0.80
Perfluoro-octanesulfonate	< 0.65	0.20	0.65	0.80
Perfluorooctanoic acid	< 0.68	0.20	0.68	0.80
Perfluoropentanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotetradecanoic acid	< 0.68	0.20	0.68	0.80
Perfluorotridecanoic acid	< 0.68	0.20	0.68	0.80
Perfluoroundecanoic acid	< 0.68	0.20	0.68	0.80
	ng/l	ng/l	ng/l	ng/l
Batch number: 18255010	Sample number(s): 9793089,9793093,9793097-9793101,9793103-9793106,9793108-9793113			
6:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
8:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
NETFOSAA	< 2.4	1.0	2.4	3.0
NMeFOSAA	< 2.4	1.0	2.4	3.0
Perfluorobutanesulfonate	< 1.1	0.30	1.1	2.0
Perfluorobutanoic acid	< 4.8	2.0	4.8	6.0
Perfluorodecanoic acid	< 1.2	0.50	1.2	2.0
Perfluorododecanoic acid	< 1.2	0.50	1.2	2.0
Perfluoroheptanoic acid	< 1.2	0.40	1.2	2.0
Perfluorohexanesulfonate	< 1.1	0.40	1.1	2.0
Perfluorohexanoic acid	< 1.2	0.50	1.2	2.0
Perfluorononanoic acid	< 1.2	0.40	1.2	2.0
Perfluoro-octanesulfonate	< 1.2	0.50	1.2	2.0
Perfluorooctanoic acid	< 1.2	0.50	1.2	2.0
Perfluoropentanoic acid	< 4.8	2.0	4.8	6.0
Perfluorotetradecanoic acid	< 1.2	0.60	1.2	2.0
Perfluorotridecanoic acid	< 1.2	0.60	1.2	2.0
Perfluoroundecanoic acid	< 1.2	0.50	1.2	2.0

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### Method Blank (continued)

Analysis Name	Result ng/l	DL** ng/l	LOD ng/l	LOQ ng/l
Batch number: 18257020	Sample number(s): 9793102,9793107			
6:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
8:2 fluorotelomersulfonate	< 2.0	1.0	2.0	3.0
NEtFOSAA	< 2.4	1.0	2.4	3.0
NMeFOSAA	< 2.4	1.0	2.4	3.0
Perfluorobutanesulfonate	< 1.1	0.30	1.1	2.0
Perfluorobutanoic acid	< 4.8	2.0	4.8	6.0
Perfluorodecanoic acid	< 1.2	0.50	1.2	2.0
Perfluorododecanoic acid	< 1.2	0.50	1.2	2.0
Perfluoroheptanoic acid	< 1.2	0.40	1.2	2.0
Perfluorohexanesulfonate	< 1.1	0.40	1.1	2.0
Perfluorohexanoic acid	< 1.2	0.50	1.2	2.0
Perfluorononanoic acid	< 1.2	0.40	1.2	2.0
Perfluoro-octanesulfonate	0.92 J	0.50	1.2	2.0
Perfluorooctanoic acid	< 1.2	0.50	1.2	2.0
Perfluoropentanoic acid	< 4.8	2.0	4.8	6.0
Perfluorotetradecanoic acid	< 1.2	0.60	1.2	2.0
Perfluorotridecanoic acid	< 1.2	0.60	1.2	2.0
Perfluoroundecanoic acid	< 1.2	0.50	1.2	2.0

### LCS/LCSD

Analysis Name	LCS Spike Added ng/g	LCS Conc ng/g	LCSD Spike Added ng/g	LCSD Conc ng/g	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18255011	Sample number(s): 9793090-9793092,9793094-9793096								
6:2 fluorotelomersulfonate	3.79	4.75			125		70-130		
8:2 fluorotelomersulfonate	3.83	4.41			115		70-130		
NEtFOSAA	1.36	1.35			99		70-130		
NMeFOSAA	1.36	1.52			111		70-130		
Perfluorobutanesulfonate	1.20	1.27			105		70-130		
Perfluorobutanoic acid	1.36	1.63			120		70-130		
Perfluorodecanoic acid	1.36	1.49			110		70-130		
Perfluorododecanoic acid	1.36	1.54			113		70-130		
Perfluoroheptanoic acid	1.36	1.60			118		70-130		
Perfluorohexanesulfonate	1.29	1.40			108		70-130		
Perfluorohexanoic acid	1.36	1.59			117		70-130		
Perfluorononanoic acid	1.36	1.50			110		70-130		
Perfluoro-octanesulfonate	1.30	1.41			108		70-130		
Perfluorooctanoic acid	1.36	1.69			124		70-130		
Perfluoropentanoic acid	1.36	1.59			117		70-130		

\*- 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.



## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### LCS/LCSD (continued)

Analysis Name	LCS Spike Added ng/g	LCS Conc ng/g	LCSD Spike Added ng/g	LCSD Conc ng/g	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Perfluorotetradecanoic acid	1.36	1.45			107		70-130		
Perfluorotridecanoic acid	1.36	1.41			104		70-130		
Perfluoroundecanoic acid	1.36	1.49			110		70-130		
	ng/l	ng/l	ng/l	ng/l					
Batch number: 18255010	Sample number(s): 9793089,9793093,9793097-9793101,9793103-9793106,9793108-9793113								
6:2 fluorotelomersulfonate	15.17	17.45			115		70-130		
8:2 fluorotelomersulfonate	15.33	15.29			100		70-130		
NETFOSAA	5.44	5.33			98		60-131		
NMeFOSAA	5.44	4.84			89		67-124		
Perfluorobutanesulfonate	4.81	5.43			113		72-127		
Perfluorobutanoic acid	5.44	6.57			121		70-130		
Perfluorodecanoic acid	5.44	6.35			117		67-141		
Perfluorododecanoic acid	5.44	6.91			127		72-137		
Perfluoroheptanoic acid	5.44	6.57			121		75-139		
Perfluorohexanesulfonate	5.14	6.25			122		71-130		
Perfluorohexanoic acid	5.44	6.52			120		77-132		
Perfluorononanoic acid	5.44	6.28			115		73-144		
Perfluoro-octanesulfonate	5.20	5.67			109		67-134		
Perfluorooctanoic acid	5.44	6.44			118		76-136		
Perfluoropentanoic acid	5.44	6.29			116		70-130		
Perfluorotetradecanoic acid	5.44	5.41			100		70-142		
Perfluorotridecanoic acid	5.44	6.70			123		57-137		
Perfluoroundecanoic acid	5.44	6.18			114		83-132		
Batch number: 18257020	Sample number(s): 9793102,9793107								
6:2 fluorotelomersulfonate	15.17	15.49			102		70-130		
8:2 fluorotelomersulfonate	15.33	12.71			83		70-130		
NETFOSAA	5.44	5.31			98		60-131		
NMeFOSAA	5.44	4.43			82		67-124		
Perfluorobutanesulfonate	4.81	4.69			98		72-127		
Perfluorobutanoic acid	5.44	6.08			112		70-130		
Perfluorodecanoic acid	5.44	5.92			109		67-141		
Perfluorododecanoic acid	5.44	5.69			105		72-137		
Perfluoroheptanoic acid	5.44	6.03			111		75-139		
Perfluorohexanesulfonate	5.14	5.50			107		71-130		
Perfluorohexanoic acid	5.44	5.91			109		77-132		
Perfluorononanoic acid	5.44	6.10			112		73-144		
Perfluoro-octanesulfonate	5.20	5.19			100		67-134		
Perfluorooctanoic acid	5.44	5.87			108		76-136		
Perfluoropentanoic acid	5.44	6.45			119		70-130		
Perfluorotetradecanoic acid	5.44	5.44			100		70-142		
Perfluorotridecanoic acid	5.44	4.97			91		57-137		
Perfluoroundecanoic acid	5.44	4.93			91		83-132		

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### LCS/LCSD (continued)

Analysis Name	LCS Spike Added %	LCS Conc %	LCSD Spike Added %	LCSD Conc %	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 18254820010B	Sample number(s): 9793090-9793092,9793094-9793096								
Moisture	89.5	89.39			100		99-101		
Moisture	89.5	89.39			100		99-101		
Moisture Duplicate	89.5	89.39			100		99-101		

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/g	MS Spike Added ng/g	MS Conc ng/g	MSD Spike Added ng/g	MSD Conc ng/g	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 18255011	Sample number(s): 9793090-9793092,9793094-9793096 UNSPK: 9793090									
6:2 fluorotelomersulfonate	< 1.8	3.51	4.44	3.54	3.96	126	112	70-130	11	30
8:2 fluorotelomersulfonate	< 1.8	3.55	4.35	3.58	3.64	123	102	70-130	18	30
NETFOSAA	< 1.9	1.26	1.37	1.27	1.44	109	114	70-130	5	30
NMeFOSAA	< 1.9	1.26	1.29	1.27	1.41	102	111	70-130	9	30
Perfluorobutanesulfonate	< 0.57	1.11	1.20	1.12	1.18	108	105	70-130	2	30
Perfluorobutanoic acid	< 0.64	1.26	1.50	1.27	1.51	119	119	70-130	0	30
Perfluorodecanoic acid	< 0.64	1.26	1.53	1.27	1.53	121	121	70-130	0	30
Perfluorododecanoic acid	< 0.64	1.26	1.52	1.27	1.38	121	109	70-130	10	30
Perfluoroheptanoic acid	< 0.64	1.26	1.52	1.27	1.48	120	117	70-130	2	30
Perfluorohexanesulfonate	< 0.60	1.19	1.25	1.20	1.34	105	111	70-130	7	30
Perfluorohexanoic acid	< 0.64	1.26	1.58	1.27	1.62	126	127	70-130	2	30
Perfluorononanoic acid	< 0.64	1.26	1.40	1.27	1.41	111	111	70-130	1	30
Perfluoro-octanesulfonate	< 0.61	1.20	1.38	1.22	1.54	115	127	70-130	11	30
Perfluorooctanoic acid	< 0.64	1.26	1.48	1.27	1.59	117	125	70-130	7	30
Perfluoropentanoic acid	< 0.64	1.26	1.44	1.27	1.65	115	130	70-130	13	30
Perfluorotetradecanoic acid	< 0.64	1.26	1.39	1.27	1.37	110	108	70-130	2	30
Perfluorotridecanoic acid	< 0.64	1.26	1.35	1.27	1.45	107	114	70-130	8	30
Perfluoroundecanoic acid	< 0.64	1.26	1.56	1.27	1.23	124	96	70-130	24	30
	<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>	<b>ng/l</b>					
Batch number: 18255010	Sample number(s): 9793089,9793093,9793097-9793101,9793103-9793106,9793108-9793113 UNSPK: 9793097									
6:2 fluorotelomersulfonate	< 9.9	74.68	90.49	75.54	88	121	116	70-130	3	30
8:2 fluorotelomersulfonate	< 9.9	75.46	81.55	76.34	86.28	108	113	70-130	6	30
NETFOSAA	< 12	26.78	22.83	27.09	25.26	85	93	60-131	10	30
NMeFOSAA	< 12	26.78	31.34	27.09	27.35	117	101	67-124	14	30
Perfluorobutanesulfonate	< 5.4	23.69	27.6	23.96	28.52	117	119	72-127	3	30
Perfluorobutanoic acid	10.19	26.78	43.3	27.09	41.83	124	117	70-130	3	30

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### MS/MSD (continued)

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/l	MS Spike Added ng/l	MS Conc ng/l	MSD Spike Added ng/l	MSD Conc ng/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Perfluorodecanoic acid	< 5.9	26.78	32.24	27.09	32.89	120	121	67-141	2	30
Perfluorododecanoic acid	< 5.9	26.78	29.35	27.09	30.9	110	114	72-137	5	30
Perfluoroheptanoic acid	< 5.9	26.78	32.39	27.09	33.72	121	124	75-139	4	30
Perfluorohexanesulfonate	< 5.4	25.33	28.27	25.62	28.2	112	110	71-130	0	30
Perfluorohexanoic acid	< 5.9	26.78	33.13	27.09	32.67	124	121	77-132	1	30
Perfluorononanoic acid	< 5.9	26.78	32.11	27.09	32.37	120	119	73-144	1	30
Perfluoro-octanesulfonate	2.71	25.6	31.08	25.9	32.36	111	115	67-134	4	30
Perfluorooctanoic acid	2.83	26.78	33.37	27.09	34.27	114	116	76-136	3	30
Perfluoropentanoic acid	< 24	26.78	34.22	27.09	35.18	128	130	70-130	3	30
Perfluorotetradecanoic acid	< 5.9	26.78	29.57	27.09	30.78	110	114	70-142	4	30
Perfluorotridecanoic acid	< 5.9	26.78	29.51	27.09	28.03	110	103	57-137	5	30
Perfluoroundecanoic acid	< 5.9	26.78	30.09	27.09	32.91	112	121	83-132	9	30

### Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc %	DUP Conc %	DUP RPD	DUP RPD Max
Batch number: 18254820010B	Sample number(s): 9793090-9793092,9793094-9793096 BKG: 9793090			
Moisture	49.46	51.32	4	5
Moisture	49.46	51.32	4	5
Moisture Duplicate	49.46	51.32	4	5

### 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: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18255010

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9793089	86	8.3	75	2.5	81	8.3	78	1.7	85	8.3	80	1.7
9793093	84	8.5	76	2.5	78	8.5	80	1.7	82	8.5	75	1.7
9793097	88	49	81	15	86	49	90	9.9	93	49	93	9.9
9793098	91	49	87	15	89	49	85	9.8	88	49	84	9.8

\*- Outside of specification

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(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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### 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: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18255010

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9793099	92	50	90	15	87	50	91	10	95	50	93	10
9793100	93	8.8	87	2.6	87	8.8	90	1.8	93	8.8	85	1.8
9793101	85	50	81	15	83	50	80	10	82	50	80	10
9793103	97	12	82	3.7	83	12	98	2.5	98	12	97	2.5
9793104	93	8.5	81	2.6	82	8.5	88	1.7	86	8.5	83	1.7
9793105	90	12	77	3.7	78	12	91	2.5	94	12	86	2.5
9793106	91	8.6	85	2.6	82	8.6	88	1.7	93	8.6	88	1.7
9793108	80	8.4	71	2.5	73	8.4	72	1.7	69	8.4	69	1.7
9793109	94	8.9	79	2.7	84	8.9	95	1.8	97	8.9	92	1.8
9793110	90	12	77	3.7	85	12	89	2.5	95	12	91	2.5
9793111	87	8.9	73	2.7	75	8.9	81	1.8	81	8.9	83	1.8
9793112	79	8.8	74	2.6	76	8.8	76	1.8	78	8.8	83	1.8
9793113	88	49	84	15	88	49	88	9.9	90	49	84	9.9
Blank	96	10	91	3.0	90	10	98	2.0	101	10	94	2.0
LCS	87	10	80	3.0	82	10	87	2.0	89	10	84	2.0
MS	91	49	87	15	89	49	85	9.8	88	49	84	9.8
MSD	92	50	90	15	87	50	91	10	95	50	93	10

Limits: 50-150 50-150 50-150 50-150 50-150 50-150

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9793089	90	8.3	85	1.7	78	8.3	84	1.7	79	1.7	92	5.0
9793093	94	8.5	88	1.7	78	8.5	85	1.7	84	1.7	88	5.1
9793097	104	49	91	9.9	89	49	95	9.9	88	9.9	101	30
9793098	97	49	88	9.8	88	49	89	9.8	91	9.8	103	30
9793099	105	50	94	10	99	50	93	10	93	10	105	30
9793100	98	8.8	93	1.8	97	8.8	103	1.8	86	1.8	97	5.3
9793101	98	50	83	10	85	50	85	10	82	10	98	30
9793103	113	12	98	2.5	93	12	93	2.5	87	2.5	91	7.5
9793104	81	8.5	80	1.7	65	8.5	73	1.7	56	1.7	72	5.1
9793105	95	12	90	2.5	90	12	97	2.5	87	2.5	97	7.5
9793106	100	8.6	99	1.7	86	8.6	91	1.7	90	1.7	112	5.2
9793108	85	8.4	73	1.7	84	8.4	108	1.7	69	1.7	83	5.0
9793109	110	8.9	97	1.8	98	8.9	113	1.8	86	1.8	97	5.4
9793110	99	12	92	2.5	92	12	105	2.5	85	2.5	95	7.5
9793111	89	8.9	72	1.8	82	8.9	90	1.8	78	1.8	81	5.3
9793112	78	8.8	78	1.8	75	8.8	77	1.8	72	1.8	83	5.3
9793113	99	49	95	9.9	80	49	82	9.9	79	9.9	91	30

\*- Outside of specification

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(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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Water by LC/MS/MS-DoD  
Batch number: 18255010

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
Blank	106	10	102	2.0	93	10	93	2.0	91	2.0	94	6.0
LCS	99	10	88	2.0	86	10	88	2.0	84	2.0	98	6.0
MS	97	49	88	9.8	88	49	89	9.8	91	9.8	103	30
MSD	105	50	94	10	99	50	93	10	93	10	105	30
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9793089	87	6.6	78	3.3	69	6.6	82	4.1	61	4.1
9793093	103	6.8	82	3.4	91	6.8	84	4.2	80	4.2
9793097	108	39	96	20	97	39	90	25	79	25
9793098	92	39	90	20	99	39	94	25	74	25
9793099	107	40	93	20	101	40	89	25	78	25
9793100	107	7.1	86	3.5	96	7.1	94	4.4	82	4.4
9793101	101	40	96	20	101	40	86	25	77	25
9793103	98	10	91	5.0	85	10	84	6.2	72	6.2
9793104	57	6.8	50	3.4	50	6.8	54	4.3	44*	4.3
9793105	104	10	87	5.0	108	10	94	6.2	84	6.2
9793106	121	6.9	102	3.5	102	6.9	99	4.3	93	4.3
9793108	79	6.7	67	3.4	57	6.7	63	4.2	65	4.2
9793109	99	7.1	84	3.6	83	7.1	78	4.5	76	4.5
9793110	93	10	85	5.0	99	10	87	6.2	78	6.2
9793111	87	7.1	82	3.6	73	7.1	75	4.5	61	4.5
9793112	77	7.0	68	3.5	67	7.0	66	4.4	62	4.4
9793113	88	40	81	20	83	40	76	25	68	25
Blank	120	8.0	93	4.0	94	8.0	94	5.0	84	5.0
LCS	104	8.0	90	4.0	93	8.0	82	5.0	79	5.0
MS	92	39	90	20	99	39	94	25	74	25
MSD	107	40	93	20	101	40	89	25	78	25
Limits:	50-150		50-150		50-150		50-150		50-150	

Analysis Name: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18255011

	13C4-PFBA		13C5-PFPeA		13C3-PFBs		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9793090	86	0.57	81	0.57	85	0.57	87	0.38	88	0.57	85	0.57

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Soil by LC/MS/MS-DoD  
Batch number: 18255011

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9793091	80	0.56	79	0.56	78	0.56	72	0.37	79	0.56	77	0.56
9793092	77	0.56	72	0.56	75	0.56	71	0.37	76	0.56	78	0.56
9793094	88	0.58	81	0.58	84	0.58	84	0.39	87	0.58	85	0.58
9793095	82	0.56	77	0.56	79	0.56	80	0.37	83	0.56	83	0.56
9793096	80	0.56	75	0.56	75	0.56	75	0.37	78	0.56	77	0.56
Blank	82	1.2	77	1.2	80	1.2	81	0.80	77	1.2	74	1.2
LCS	85	1.2	82	1.2	82	1.2	84	0.80	90	1.2	86	1.2
MS	80	0.56	79	0.56	78	0.56	72	0.37	79	0.56	77	0.56
MSD	77	0.56	72	0.56	75	0.56	71	0.37	76	0.56	78	0.56
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9793090	99	0.85	89	0.57	83	0.85	94	0.38	86	0.57	84	0.85
9793091	87	0.83	79	0.56	82	0.83	89	0.37	73	0.56	76	0.83
9793092	90	0.84	79	0.56	73	0.84	86	0.37	73	0.56	90	0.84
9793094	102	0.87	88	0.58	90	0.87	97	0.39	88	0.58	98	0.87
9793095	93	0.83	81	0.56	86	0.83	94	0.37	77	0.56	78	0.83
9793096	97	0.83	83	0.56	77	0.83	82	0.37	74	0.56	84	0.83
Blank	92	1.8	86	1.2	77	1.8	85	0.80	81	1.2	85	1.8
LCS	97	1.8	90	1.2	88	1.8	97	0.80	84	1.2	88	1.8
MS	87	0.83	79	0.56	82	0.83	89	0.37	73	0.56	76	0.83
MSD	90	0.84	79	0.56	73	0.84	86	0.37	73	0.56	90	0.84
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
9793090	85	0.85	92	0.57	79	0.85	88	0.57	83	0.57
9793091	78	0.83	78	0.56	79	0.83	78	0.56	79	0.56
9793092	70	0.84	81	0.56	75	0.84	79	0.56	78	0.56
9793094	86	0.87	95	0.58	82	0.87	91	0.58	103	0.58
9793095	71	0.83	81	0.56	78	0.83	76	0.56	80	0.56
9793096	81	0.83	86	0.56	73	0.83	75	0.56	81	0.56
Blank	85	1.8	87	1.2	88	1.8	81	1.2	84	1.2
LCS	92	1.8	87	1.2	83	1.8	89	1.2	83	1.2
MS	78	0.83	78	0.56	79	0.83	78	0.56	79	0.56

\*- 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.

## Quality Control Summary

Client Name: ARCADIS  
Reported: 09/25/2018 13:21

Group Number: 1984962

### Labeled Isotope Quality Control (continued)

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

Analysis Name: PFAS in Soil by LC/MS/MS-DoD

Batch number: 18255011

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)	%Rec	LOD (ng/g)
MSD	70	0.84	81	0.56	75	0.84	79	0.56	78	0.56
Limits:	50-150		50-150		50-150		50-150		50-150	

Analysis Name: PFAS in Water by LC/MS/MS-DoD

Batch number: 18257020

	13C4-PFBA		13C5-PFPeA		13C3-PFBS		13C5-PFHxA		13C3-PFHxS		13C4-PFHpA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9793102	89	50	83	15	85	50	90	10	93	50	88	10
9793107	84	8.4	76	2.5	77	8.4	79	1.7	74	8.4	73	1.7
Blank	98	10	92	3.0	93	10	98	2.0	102	10	99	2.0
LCS	94	10	89	3.0	91	10	87	2.0	89	10	87	2.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	13C2-6:2-FTS		13C8-PFOA		13C8-PFOS		13C9-PFNA		13C6-PFDA		13C2-8:2-FTS	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9793102	102	50	89	10	87	50	91	10	87	10	103	30
9793107	97	8.4	80	1.7	70	8.4	78	1.7	70	1.7	88	5.0
Blank	122	10	101	2.0	95	10	102	2.0	94	2.0	98	6.0
LCS	109	10	90	2.0	90	10	95	2.0	86	2.0	111	6.0
Limits:	50-150		50-150		50-150		50-150		50-150		50-150	

	d3-NMeFOSAA		13C7-PFUnDA		d5-NEtFOSAA		13C2-PFDoDA		13C2-PFTeDA	
	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)	%Rec	LOD (ng/l)
9793102	87	40	91	20	94	40	91	25	92	25
9793107	73	6.7	68	3.4	64	6.7	62	4.2	55	4.2
Blank	100	8.0	91	4.0	85	8.0	85	5.0	83	5.0
LCS	93	8.0	96	4.0	86	8.0	89	5.0	77	5.0
Limits:	50-150		50-150		50-150		50-150		50-150	

\*- Outside of specification

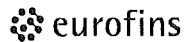
\*\* - This limit was used in the evaluation of the final result for the blank

(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.

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

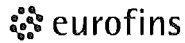
Acct. # 13129 Group # 1484962 Sample # 9793089-113

**COC # 561243**

Client Information				Matrix				Analysis Requested												For Lab Use Only																																																		
Client: <u>Arcadis</u>		Acct. #:		<input type="checkbox"/> Tissue		<input checked="" type="checkbox"/> Ground		<input checked="" type="checkbox"/> Surface		Preservation and Filtration Codes												FSC: _____																																																
Project Name/ID: <u>BADGER / 02118216.1000</u>		PWSID #:		<input checked="" type="checkbox"/> Sediment		<input type="checkbox"/> Potable		<input type="checkbox"/> NPDES		<table border="1"> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>																																																											SCR#: _____	
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:		<input type="checkbox"/> Soil		<input type="checkbox"/> Water		Other: _____		Total # of Containers <u>PFAS - EPA Method 537</u>												Preservation Codes H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other																																																
Sampler: <u>Drew Kehoe / Kevin Engle</u>		Quote #:		<input type="checkbox"/> Grab		<input type="checkbox"/> Composite																												Remarks																																				
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Sample Identification		Collected																																																																
				Date		Time																																																																
				<u>BAAP-PBGP-PBM-8201</u>		<u>9.5.18 1605</u>		<u>X</u>		<u>X</u>		<u>2</u>		<u>X</u>																																																								
				<u>BAAP-POND-1-SE</u>		<u>9.6.18 1100</u>		<u>X</u>		<u>X</u>		<u>3</u>		<u>X</u>																																																								
				<u>BAAP-FB-SE-090618</u>		<u>9.6.18 1105</u>		<u>X</u>		<u>X</u>		<u>2</u>		<u>X</u>																																																								
				<u>BAAP-POND-2-SE</u>		<u>9.6.18 1110</u>		<u>X</u>		<u>X</u>		<u>1</u>		<u>X</u>																																																								
				<u>BAAP-FD-SE-090618</u>		<u>9.6.18</u>		<u>X</u>		<u>X</u>		<u>1</u>		<u>X</u>																																																								
				<u>BAAP-POND-3-SE</u>		<u>9.6.18 1115</u>		<u>X</u>		<u>X</u>		<u>1</u>		<u>X</u>																																																								
				<u>BAAP-POND-1-SW</u>		<u>9.6.18 1130</u>		<u>X</u>		<u>X</u>		<u>6</u>		<u>X</u>																																																								
				<u>BAAP-FB-SW-090618</u>		<u>9.6.18 1140</u>		<u>X</u>		<u>X</u>		<u>2</u>		<u>X</u>																																																								
				<u>BAAP-POND-2-SW</u>		<u>9.6.18 1150</u>		<u>X</u>		<u>X</u>		<u>2</u>		<u>X</u>																																																								
				<u>BAAP-FD-SW-090618</u>		<u>9.6.18</u>		<u>X</u>		<u>X</u>		<u>2</u>		<u>X</u>																																																								
Turnaround Time (TAT) Requested (please circle) <u>Standard</u> Rush (Rush TAT is subject to laboratory approval and surcharge.)				Relinquished by <u>Drew Kehoe</u> Date <u>9.6.18</u> Time <u>1730</u>				Received by _____ Date _____ Time _____				Relinquished by _____ Date _____ Time _____				Received by _____ Date _____ Time _____																																																						
Date results are needed: _____				Relinquished by _____ Date _____ Time _____				Received by _____ Date _____ Time _____				Relinquished by _____ Date _____ Time _____				Received by _____ Date _____ Time _____																																																						
E-mail address: <u>Kimmie.Schrupp@arcadis.com</u>				Relinquished by _____ Date _____ Time _____				Received by _____ Date _____ Time _____				Relinquished by _____ Date _____ Time _____				Received by _____ Date <u>9/8/18</u> Time <u>10:00</u>																																																						
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP				EDD Required? <u>Yes</u> No If yes, format: _____				Relinquished by Commercial Carrier: UPS _____ FedEx <u>✓</u> Other _____				Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)				Temperature upon receipt <u>15</u> °C																																																						



# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1904962 Sample # 9793084-113

COC # 561242

Client Information				Matrix			Analysis Requested								For Lab Use Only	
Client: <u>ARCADIS</u>				Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>			Preservation and Filtration Codes								FSC: _____	
Project Name/ID: <u>BADGER/02118216.1000</u>				Potable <input type="checkbox"/> Ground <input checked="" type="checkbox"/> Surface <input type="checkbox"/>			PPAS - EPA METHOD 537								SCR#: _____	
Project Manager: <u>KIMMIE SCHRUPP</u>				Water <input type="checkbox"/> NPDES <input type="checkbox"/>											Preservation Codes	
Sampler: <u>DREW KEHOE / KENDRA KEON</u>				Other: _____			H=HCl T=Thiosulfate		N=HNO <sub>3</sub> B=NaOH		S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub>		F=Field Filtered O=Other			
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Sample Identification		Collected		Grab		Composite		Remarks				
				Date		Time						Shaker Test:				
BAAP-PBGP-PBN-1302A				8-31-18		09:25		X				No bubbles				
BAAP-PBGP-PBN-1302B				8-31-18		11:35		X				No bubbles				
BAAP-PBGP-PBN-1302D				8-31-18		12:25		X				No bubbles				
BAAP-EB-GW-083118-4				8-31-18		09:40		X				No bubbles				
BAAP-PBGP-PBN-9301B				9-4-18		14:00		X				No bubbles				
BAAP-PBGP-PBN-9301C				9-4-18		15:00		X				No bubbles				
BAAP-PBGP-PBN-1302C				9-4-18		17:55		X				No bubbles				
BAAP-PBGP-PBN-9303D				9-5-18		13:20		X				No bubbles				
BAAP-PBGP-PBN-9303C				9-5-18		13:30		X				No bubbles				
BAAP-PBGP-PBN-9303B				9-5-18		13:40		X				No bubbles				
Turnaround Time (TAT) Requested (please circle) <u>Standard</u> (Rush TAT is subject to laboratory approval and surcharge.)				Relinquished by: <u>Drew Kehoe</u> Date: <u>9-6-18</u> Time: <u>17:30</u>				Received by: _____ Date: _____ Time: _____								
Date results are needed: _____				Relinquished by: _____				Received by: _____								
E-mail address: <u>Kimmie.Schrupp@arcadis.com</u>				Relinquished by: _____				Received by: _____								
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only) Type III (Reduced non-CLP) NJ DKQP TX TRRP-13 NYSDEC Category A or B MA MCP CT RCP				Relinquished by: _____ Date: _____ Time: _____				Relinquished by: <u>[Signature]</u> Date: <u>9/18/18</u> Time: <u>18:00</u>								
				EDD Required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, format: _____				Relinquished by Commercial Carrier: UPS _____ FedEx _____ Other _____								
				Site-Specific QC (MS/MSD/Dup)? Yes <input type="checkbox"/> No <input type="checkbox"/> (If yes, indicate QC sample and submit triplicate sample volume.)				Temperature upon receipt <u>1.5</u> °C								

*these samples are labeled 9-2-18 and should be 9-4-18*





Client: Arcadis

**Delivery and Receipt Information**

Delivery Method: Fed Ex Arrival Timestamp: 09/07/2018 10:10  
 Number of Packages: 1 Number of Projects: 1

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	N/A
Custody Seal Present:	Yes	Sample Date/Times match COC:	N/A
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	No	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	N/A		

Unpacked by Melvin Sanchez (8943) at 17:12 on 09/07/2018

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	1.8	DT	Wet	Y	Bagged	N

**Paperwork Not Enclosed Details**

Sample ID on Label	No. of Containers	Date on Label	Comments
BAAP-POND-1-SE	3	9/06/2018 11:00	
BAAP-POND-2-SE	1	9/06/2018 11:10	
BAAP-POND-3-SE	1	9/06/2018 11:15	
BAAP-FD-SE-090618	1	9/06/2018 --	



Client: ARCADIS

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>09/08/2018 10:00</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Suegeily Mendez (14058) at 14:53 on 09/08/2018

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.5	DT	Wet	Y	Bagged	N

General Comments: RECEIVED COOLER FROM 9/7/18

# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mL</b>	milliliter(s)
<b>C</b>	degrees Celsius	<b>MPN</b>	Most Probable Number
<b>cfu</b>	colony forming units	<b>N.D.</b>	non-detect
<b>CP Units</b>	cobalt-chloroplatinate units	<b>ng</b>	nanogram(s)
<b>F</b>	degrees Fahrenheit	<b>NTU</b>	nephelometric turbidity units
<b>g</b>	gram(s)	<b>pg/L</b>	picogram/liter
<b>IU</b>	International Units	<b>RL</b>	Reporting Limit
<b>kg</b>	kilogram(s)	<b>TNTC</b>	Too Numerous To Count
<b>L</b>	liter(s)	<b>µg</b>	microgram(s)
<b>lb.</b>	pound(s)	<b>µL</b>	microliter(s)
<b>m3</b>	cubic meter(s)	<b>umhos/cm</b>	micromhos/cm
<b>meq</b>	milliequivalents	<b>MCL</b>	Maximum Contamination Limit
<b>mg</b>	milligram(s)		
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

**WARRANTY AND LIMITS OF LIABILITY** - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
P^	Concentration difference between the primary and confirmation column $> 40\%$ . The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

# DATA VALIDATION REPORTS



# Badger Army Ammunition Plant (BAAP)

## DATA REVIEW

### BAAP, Wisconsin

Perfluoroalkyl Substances (PFAS) Analysis

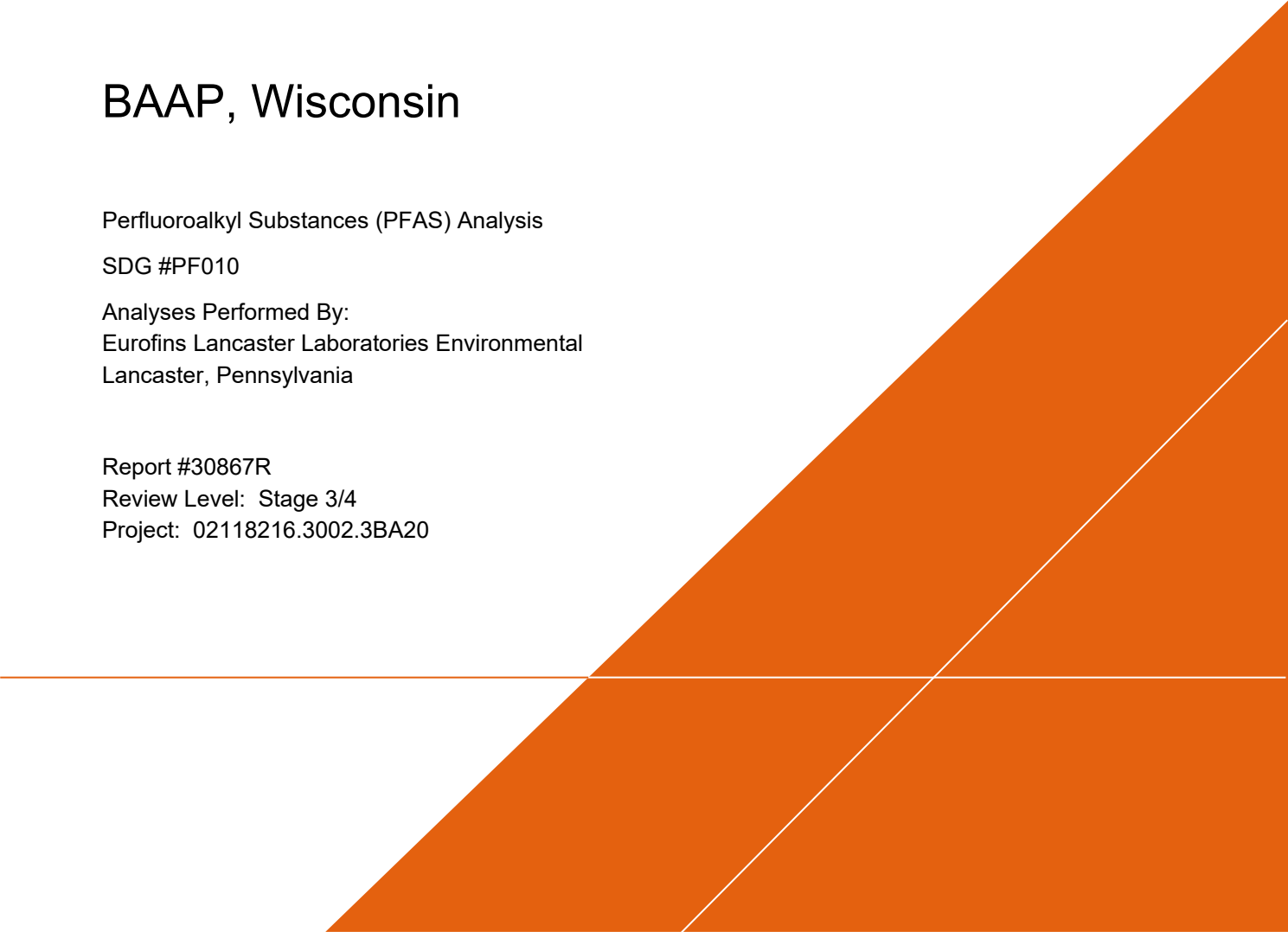
SDG #PF010

Analyses Performed By:  
Eurofins Lancaster Laboratories Environmental  
Lancaster, Pennsylvania

Report #30867R

Review Level: Stage 3/4

Project: 02118216.3002.3BA20





## DATA REVIEW REPORT

### SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # PF010 for samples collected in association with the Badger Army Ammunition Plant. The review was conducted as a Stage 3/4 evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
					PFAS	VOC	MET
BAAP-PBGP-PBN-8201A	9779469	Water	8/29/2018		X		
BAAP-PBGP-PBN-8201B	9779470	Water	8/29/2018		X		
BAAP-PBGP-PBN-8201C	9779471	Water	8/28/2018		X		
BAAP-PBGP-PBN-8205B	9779472	Water	8/29/2018		X		
BAAP-EB-GW-082918-1	9779473	Water	8/29/2018		X		
BAAP-EB-GW-082818-2	9779474	Water	8/28/2018		X		
BAAP-EB-GW-082918-3	9779475	Water	8/29/2018		X		
BAAP-EB-GW-082918-4	9779476	Water	8/29/2018		X		
BAAP-EB-GW-082918-5	9779477	Water	8/29/2018		X		

Note:

1. Stage 4 validation was performed on sample location BAAP-PBGP-PBN-8201A.

## DATA REVIEW REPORT

### ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X	X		
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:

QA - Quality Assurance

1. There were discrepancies between the chain of custody and sample identification on the bottle labels. Arcadis responded by email with direction to the lab. See the chain of custody and attached emails at the end of this report.

## DATA REVIEW REPORT

### ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with USEPA Method 537, ELLE SOPs T-PFAS-WI12031 and T-PFAS-WI14355, Department of Defense (DoD) Quality Systems Manual (QSM) 5.1, and Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, July 2018 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

## DATA REVIEW REPORT

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## DATA REVIEW REPORT

### PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified 537	Soil	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C
	Water	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, instrument, and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Instrument blanks measure carryover in the instrument from one sample to another. Method blanks measure laboratory contamination. Equipment rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were detected in the associated QA blanks; however, the associated sample results were greater than the BAL and/or were non-detect. No other qualification of the sample results was required.

#### 3. Mass Calibration

Mass calibration and system performance were acceptable.

#### 4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

##### 4.1 Initial Calibration

The percent relative standard deviation (%RSD) of the response factors (RF) must be less than 20%, or for linear calibration,  $r^2 \geq 0.99$ . Analytes must be within 70-130% of their true value for each calibration standard.

##### 4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit of 30%.

## DATA REVIEW REPORT

### 4.3 Instrument Sensitivity Check (ISC)

The ISC concentration must be at the LOQ. All target compounds associated with the ISC must exhibit a percent recovery (%R) of 70 to 130%.

### 4.4 Ion Transitions

Quantitation of analytes must use the ion transitions documented in DoD QSM 5.1 Table B-15.

All compounds associated with the above calibration checks were within the specified control limits.

## 5. Isotopically labeled Standards

### 5.1 Extracted Internal Standards (EIS)

Labeled standards must be added to all field samples and QC samples prior to extraction. For aqueous samples prepared by serial dilution instead of SPE, they must be added to samples prior to analysis. EIS recoveries must be within DoD QSM 5.1 specified limits of 50% to 150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	Recovery	
BAAP-PBGP-PBN-8201A	d5-NEtFOSAA	NEtFOSAA	< 50% but > 25%	
	13C2-PFTeDA	Perfluorotetradecanoic acid		
BAAP-PBGP-PBN-8201A RE	13C2-6:2-FTS	6:2 fluorotelomersulfonate	< 50% but > 25%	
	13C2-PFDODA	Perfluorododecanoic acid	< 25%	
	13C2-PFTEDA	Perfluorotetradecanoic acid	< 25%	
	13C6-PFDA	Perfluorodecanoic acid	< 50% but > 25%	
	13C7-PFUNDA	Perfluoroundecanoic acid	< 25%	
	13C8-PFOA	Perfluorooctanoic acid	< 50% but > 25%	
	13C8-PFOS	Perfluoro-octanesulfonate		
	13C9-PFNA	Perfluorononanoic acid		
		d5-NEtFOSAA	NEtFOSAA	< 25%
		d5-NMeFOSAA	NMeFOSAA	
	BAAP-PBGP-PBN-8201C BAAP-PBGP-PBN-8201C RE	13C2-PFTeDA	Perfluorotetradecanoic acid	< 50% but > 25%

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> 150%	Non-detect	No Action
	Detect	
< 50% but > 25%	Non-detect	
	Detect	
< 25%	Non-detect	R
	Detect	J

## DATA REVIEW REPORT

As part of the isotope dilution analysis, the EIS are used for quantitation of the sample results, therefore the calculation of sample concentrations is adjusted for EIS recoveries. The data will not be qualified unless EIS recoveries are less than 25%.

The initial results for sample location BAAP-PBGP-PBN-8201A are reported. The re-extracted results are not usable due to some EIS recoveries less than 25%.

### 5.2 Injection Internal Standards

Injection internal standards must be added to the aliquot of sample dilutions, QC samples, and standards just prior to analysis. Peak areas must be within -50% to +50% of the area measured in the ICAL midpoint standard. On days when ICAL is not performed, the peak areas must be within -50% to +50% of the peak area measured in daily initial CCV.

All internal standard responses were within control limits.

### 6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must be  $\leq 30\%$ .

A MS/MSD was not performed on a sample location associated with this SDG.

### 7. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

Sample locations associated with the LCS/LCSD exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	Compound	LCS Recovery	LCSD Recovery
BAAP-PBGP-PBN-8201A	Perfluorobutanesulfonate Perfluorododecanoic acid	>UL	>UL
	Perfluoropentanoic acid Perfluoroundecanoic acid	>UL	AC

NOTE:

AC Acceptable

The criteria used to evaluate the LCS/LCSD recoveries are presented in the following table. In the case of an LCS/LCSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R

## DATA REVIEW REPORT

Control Limit	Sample Result	Qualification
	Detect	J

The four compounds with LCS/LCSD recoveries greater than the upper control limits were not detected in the associated sample. Therefore, qualification was not required.

### 8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soils is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 2 times the LOQ, a control limit of two times the LOQ is applied for water matrices and three times the LOQ for soil matrices.

A field duplicate was not collected for a sample location associated with this SDG.

### 9. Compound Identification

PFC analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

All identified compounds met method criteria.

### 10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.



# DATA REVIEW REPORT

## DATA VALIDATION CHECKLIST FOR PFAS

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
<b>Stage 2 Validation</b>					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Field blanks	X				X
Laboratory Control Sample (LCS) %R		X	X		
Laboratory Control Sample Duplicate(LCSD) %R		X	X		
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate(MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field Duplicate (RPD)	X				X
Extracted Internal Standard %R		X	X		
Injection Internal Standard %R		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
<b>Stage 3/4 Validation</b>					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	

**DATA REVIEW REPORT**

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
D. Transcription/calculations acceptable		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

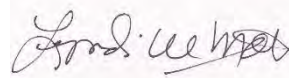
RPD Relative percent difference

%D Percent difference

## DATA REVIEW REPORT

VALIDATION PERFORMED BY: Lyndi Mott, Arcadis

SIGNATURE:



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DATE: October 11, 2018

PEER REVIEW: Dennis Capria, Arcadis

DATE: October 25, 2018

**CHAIN OF CUSTODY  
CORRECTED SAMPLE ANALYSIS DATA  
SHEETS**



# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981941 Sample # 9779469-77

COC # 561239

Client Information				Matrix				Analysis Requested								For Lab Use Only		
Client: <u>Arcadis</u>		Acct. #:		<input type="checkbox"/> Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue		<input checked="" type="checkbox"/> Ground <input type="checkbox"/> Surface		Preservation and Filtration Codes								FSC: _____		
Project Name/#: <u>Badger / 08118216.1000</u>		PWSID #:		<input type="checkbox"/> Potable <input type="checkbox"/> NPDES		<input type="checkbox"/> Water <input type="checkbox"/> Other:		Total # of Containers <b>PFAS - EPA METHOD 537</b>								SCR#: _____		
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:		Other: _____		Total # of Containers										Preservation Codes		Remarks
Sampler: <u>Drew Kehoe / Kendra Keon</u>		Quote #:		Other: _____		Total # of Containers		H=HCl T=Thiosulfate		N=HNO <sub>3</sub> B=NaOH		S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub>		F=Field Filtered O=Other				
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Grab		Composite		Other: _____		Total # of Containers		Total # of Containers		Total # of Containers		Total # of Containers		
Sample Identification		Collected		Grab	Composite	Soil	Water	Other:	Total # of Containers	PFAS - EPA METHOD 537								
		Date	Time															
<del>PBN # 8-21 BAAP-PBN-8021 1/2 B</del>																		
BAAP-PBGP-PBN-8201A		8-28-18	1240	X					2	X								SHAKER TEST = NO BUBBLES
BAAP-PBGP-PBN-8201B		<del>8-28-18</del>	<del>1340</del>	X					2	X								TIME: 1245 DATE: 8-29-18
BAAP-PBGP-PBN-8201C		<del>8-28-18</del>	<del>1340</del>	X					2	X								TIME: 1340 DATE: 8-28-18
BAAP-PBGP-PBN-8205A		8-29-18	1710	X					2	X								
BAAP-EB-GW-082918-1		8-29-18	0930	X					2	X								
BAAP-EB-GW-082818-2		8-28-18	1400	X					2	X								
BAAP-EB-GW-082918-3		8-29-18	1140	X					2	X								
BAAP-EB-GW-082918-4		8-29-18	1620	X					2	X								
BAAP-EB-GW-082918-5		8-29-18	1025	X					2	X								

Turnaround Time (TAT) Requested (please circle) Standard _____ <u>Rush</u> _____ (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAY TAT</u>  E-mail address: <u>Kimmie.Schrupp@arcadis.com</u>	Relinquished by: <u>[Signature]</u>	Date: <u>8-29-18</u>	Time: <u>1815</u>	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:

Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP) Type VI (Raw Data Only) Type III (Reduced non-CLP) NJ DKQP TX TRRP-13 NYSDEC Category A or B MA MCP CT RCP		EDD Required? <u>Yes</u> No If yes, format: _____ Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)	Relinquished by Commercial Carrier: UPS _____ FedEx <u>X</u> Other _____  Temperature upon receipt <u>0.6</u> °C
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1981941

**Katherine Klinefelter**

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Wednesday, September 05, 2018 3:09 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*

See below in Red.

Thanks!  
Kimmie

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Wednesday, September 5, 2018 12:51 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Kowalski, Joe <Joseph.Kowalski@arcadis.com>  
**Subject:** RE: Badger AAP project

Are these samples all Equipment Blanks? Yep we'll have a lot of EBs on this program.

BAAP-EB-GW-082918-1	8-29-18	0930
BAAP-EB-GW-082818-2	8-28-18	1400
BAAP-EB-GW-082918-3	8-29-18	1140
BAAP-EB-GW-082918-4	8-29-18	1620
BAAP-EB-GW-082918-5	8-29-18	1025

Should these sample IDs begin with BAAP rather than BAAAP? Yes if it's not too much trouble, other wise we can fix during validation.

**From:** Schrupp, Kimmie [mailto:Kimberley.Schrupp@arcadis.com]  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*

1981941

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanCLabsEnv](http://www.EurofinsUS.com/LanCLabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

EXTERNAL EMAIL\*

Hi Kathy,  
So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!  
Thanks  
Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981941 Sample # 9779469-77

**COC # 561239**

Client Information				Matrix				Analysis Requested										For Lab Use Only			
Client: <u>Arcadis</u>				Acct. #: <u>13129</u>				Preservation and Filtration Codes										FSC: _____			
Project Name: <u>Badger / 08118216 1000</u>				PWSID #: _____				Total # of Containers: _____ PFRS - EPA METHOD 537										SCR#: _____			
Project Manager: <u>Kimmie Schrupp</u>				P.O. #: _____														<input type="checkbox"/> Tissue <input checked="" type="checkbox"/> Ground <input type="checkbox"/> Surface		Preservation Codes H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other	
Sampler: <u>Drew Kehoe / Kendra Keon</u>				Quote #: _____														<input type="checkbox"/> Sediment <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Water <input type="checkbox"/> Other: _____		Remarks <u>*RUSH*</u>	
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Sample Identification		Collected		Grab		Composite		Soil		Water		Other:		Total # of Containers		Remarks	
				Date		Time															
<del>PBN - EB - BAAP - PBN - 8201A</del>				<del>8-28-18</del>		<del>1240</del>		<del>X</del>												SHAKER TEST - NO BUBBLES	
BAAP - PBGP - PBN - 8201A				8-28-18		1340		X										2		TIME: 1245 DATE: 8-29-18	
BAAP - PBGP - PBN - 8201B				<del>8-28-18</del>		<del>1340</del>		<del>X</del>										2		TIME: 1340 DATE: 8-28-18	
BAAP - PBGP - PBN - 8201C				8-28-18		1340		X										2			
BAAP - PBGP - PBN - 8205A				8-29-18		1710		X										2			
BAAP - EB - GW - 082918 - 1				8-29-18		0930		X										2			
BAAP - EB - GW - 082818 - 2				8-28-18		1400		X										2			
BAAP - EB - GW - 082918 - 3				8-29-18		1140		X										2			
BAAP - EB - GW - 082918 - 4				8-29-18		1620		X										2			
BAAP - EB - GW - 082918 - 5				8-29-18		1025		X										2			

Turnaround Time (TAT) Requested (please circle)		Relinquished by		Date	Time	Received by		Date	Time
<input type="radio"/> Standard <input checked="" type="radio"/> Rush		[Signature]		8-29-18	1815				
(Rush TAT is subject to laboratory approval and surcharge.)		Relinquished by		Date	Time	Received by		Date	Time
Date results are needed: <u>5 DAY TAT</u>		Relinquished by		Date	Time	Received by		Date	Time
E-mail address: <u>Kimmie.Schrupp@arcadis.com</u>		Relinquished by		Date	Time	Received by		Date	Time
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP) Type III (Reduced non-CLP) NYSDEC Category A or B		Type VI (Raw Data Only) NJ DKQP MA MCP		TX TRRP-13 CT RCP		Relinquished by Commercial Carrier: UPS _____ FedEx <input checked="" type="checkbox"/> Other _____		Temperature upon receipt _____ °C	

Eurofins Lancaster Laboratories Environmental, LLC • 2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300  
 The white copy should accompany samples to Eurofins Lancaster Laboratories Environmental. The yellow copy should be retained by the client.

7044 0717



1981941

**Katherine Klinefelter**

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**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Friday, September 14, 2018 10:56 AM  
**To:** Katherine Klinefelter  
**Subject:** FW: 1981941 - BAAP - Collection date clarification. ---> Please advise.

EXTERNAL EMAIL\*

Thanks for checking on us Kathy.

**From:** Keon, Kendra  
**Sent:** Friday, September 14, 2018 6:07 AM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Engle, Kevin <Kevin.Engle@arcadis.com>; Kehoe, Drew <Drew.Kehoe@arcadis.com>  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

The date is 8-29-18 for 8201A

The correct ID should be 8205B for the date/time listed – the COC is incorrect

I double checked the field logs/notes

**From:** Schrupp, Kimmie  
**Sent:** Thursday, September 13, 2018 6:26 PM  
**To:** Kehoe, Drew <Drew.Kehoe@arcadis.com>; Keon, Kendra <Kendra.Keon@arcadis.com>  
**Cc:** Engle, Kevin <Kevin.Engle@arcadis.com>  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Here is the COC she is referring to

**From:** Schrupp, Kimmie  
**Sent:** Thursday, September 13, 2018 5:20 PM  
**To:** Kehoe, Drew <Drew.Kehoe@arcadis.com>; Keon, Kendra <Kendra.Keon@arcadis.com>  
**Cc:** Engle, Kevin <Kevin.Engle@arcadis.com>  
**Subject:** FW: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Can you guys please confirm the questions below?

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Thursday, September 13, 2018 5:03 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Please also confirm that the correct ID is per the COC as BAAP-PBGP-PBN-8205A Grab Groundwater. Per the sample receipt doc log, the labels had BAAP-PBGP-PBN-8205B.

**From:** Katherine Klinefelter  
**Sent:** Thursday, September 13, 2018 7:00 PM

1981941

**To:** 'Schrupp, Kimmie'  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

Were you able to check the field notes to confirm?

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Thursday, September 13, 2018 6:59 PM  
**To:** Katherine Klinefelter  
**Subject:** RE: 1981941 - BAAP - Collection date clarification. ---> Please advise.

EXTERNAL EMAIL\*

It look like 8/29/18 to me.

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Thursday, September 13, 2018 4:57 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Subject:** 1981941 - BAAP - Collection date clarification. ---> Please advise.

Hello Kimmie,

The collection date for BAAP-PBGP-PBN-8201A Grab Groundwater is unclear on COC# 561239. Which is correct: 8/28/18 or 8/29/18?

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

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Client: Arcadis

**Badger/08118216.1000**

**Delivery and Receipt Information**

Delivery Method: Fed Ex Arrival Timestamp: 08/30/2018 10:15  
 Number of Packages: 1 Number of Projects: 1  
 State/Province of Origin: WI

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	No
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	Yes		
Discrepancy in Container Qty on COC:	Yes		

Unpacked by Nicole Reiff (25 684) at 12:44 on 08/30/2018

**Samples Chilled Details: Badger/08118216.1000**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT131	0.6	DT	Wet	Y	Bagged	N

**Extra Sample Details: Badger/08118216.1000**

Sample ID on Label	Number of Extra Containers	Date on Label	Comments
BAAAP-EB-GW-082818 -1	1	8/28/2018 13:10	

**Container Quantity Discrepancy Details: Badger/08118216.1000**

Sample ID on COC	Container Qty. Received	Container Qty. on COC	Comments
BAAP-EB-GW-082918- 1	1	2	

**Sample ID Discrepancy Details: Badger/08118216.1000**

Sample ID on COC	Sample ID on Label	Comments
BAAP-PBGP-PBN-8205A	BAAP-PBGP-PBN-8205B	

**Sample Description:** BAAP-PBGP-PBN-8201A Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779469  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 12:40  
**SDG#:** PF010-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	2.5	5.1	7.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	1.7	5.1	5.9	1
14434	NEtFOSAA	2991-50-6	N.D.	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.7	4.0	5.1	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	0.38 J	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.3 J	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.66 J	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	4.0	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.42	1.0	1.7	1

Extraction standard recoveries are outside QC acceptance criteria as noted on the QC Summary. The sample was reextracted and extraction standard recoveries were again outside acceptance criteria. Both sets of data are reported in the data package.

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18244002	09/05/2018 06:04	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18244002	09/01/2018 10:25	Danielle D McCully	1

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

**Sample Description:** BAAP-PBGP-PBN-8201B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779470  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 12:45  
**SDG#:** PF010-02

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.90	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.90	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	N.D.	0.90	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.90	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	0.99	1.8	1
14434	Perfluorobutanoic acid	375-22-4	1.9 J	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	0.61 J	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.36	0.99	1.8	1
14434	Perfluorohexanoic acid	307-24-4	1.4 J	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.72 J	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	1.6 J	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:28	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-PBGP-PBN-8201C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779471  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 13:40  
**SDG#:** PF010-03

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.94	1.9	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.94	1.9	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.94	2.3	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.94	2.3	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.9	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.9	4.5	5.6	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.47	1.1	1.9	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.47	1.1	1.9	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.38	1.1	1.9	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.38	1.0	1.9	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.47	1.1	1.9	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.38	1.1	1.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.47	1.1	1.9	1
14434	Perfluorooctanoic acid	335-67-1	0.78 J	0.47	1.1	1.9	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.9	4.5	5.6	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.56	1.1	1.9	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.56	1.1	1.9	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.47	1.1	1.9	1

The extraction standard recovery of 13C2-PFTeDA was below QC acceptance criteria as noted on the QC Summary. The sample was reextracted and 13C2-PFTeDA was again outside acceptance criteria.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:37	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-PBGP-PBN-8205B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779472  
**ELLE Group #:** 1981941  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 17:10  
**SDG#:** PF010-04

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.84	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.84	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	N.D.	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	1.9 J	1.7	4.1	5.1	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.42	1.0	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	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.42	1.0	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.	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.47 J	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	4.1	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:46	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-1 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779473  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 09:30  
**SDG#:** PF010-05EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.92	1.8	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.92	1.8	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.92	2.2	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.92	2.2	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.4	5.5	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.37	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.37	1.0	1.8	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.37	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.4	5.5	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.55	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.55	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 11:55	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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



**Sample Description:** BAAP-EB-GW-082818-2 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779474  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 14:00  
**SDG#:** PF010-06EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	N.D.	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	0.97	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.44	1.1	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	Perfluorohexanoic acid	307-24-4	N.D.	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.50 J	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:04	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-3 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779475  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 11:40  
**SDG#:** PF010-07EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.93	1.9	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.93	1.9	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.93	2.2	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.93	2.2	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.9	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.9	4.5	5.6	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.9	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.9	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.37	1.1	1.9	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.37	1.0	1.9	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.9	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.37	1.1	1.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.9	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.9	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.9	4.5	5.6	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.56	1.1	1.9	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.56	1.1	1.9	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.9	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:13	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-4 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779476  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 16:20  
**SDG#:** PF010-08EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.86	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.86	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	N.D.	0.86	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.86	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.95	1.7	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.7	4.2	5.2	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.35	0.95	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	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
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.7	4.2	5.2	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.52	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.52	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.43	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:31	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-GW-082918-5 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant

**ARCADIS**  
**ELLE Sample #:** WW 9779477  
**ELLE Group #:** 1981941  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:25  
**SDG#:** PF010-09EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.91	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.91	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	N.D.	0.91	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.91	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.27	1.0	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.4	5.5	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.36	1.0	1.8	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.4	5.5	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.55	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.55	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:40	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

# Badger Army Ammunition Plant (BAAP)

## DATA REVIEW

### BAAP, Wisconsin

Perfluoroalkyl Substances (PFAS), Total Organic Carbon, and Miscellaneous Analyses

SDGs #PF012, PF014, and PF015

Analyses Performed By:  
Eurofins Lancaster Laboratories Environmental  
Lancaster, Pennsylvania

Report #30868R  
Review Level: Stage 3/4  
Project: 02118216.3002.3BA20

## DATA REVIEW REPORT

### SUMMARY

This data quality assessment summarizes the review of Sample Delivery Groups (SDGs) # PF012, PF014, and PF015 for samples collected in association with the Badger Army Ammunition Plant. The review was conducted as a Stage 3/4 evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

SDG	Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
						PFAS	TOC	MISC
PF012	BAAP-FFTA-SN-2-5.0-SO	9779614	Soil	8/29/2018		X	X	X
	BAAP-FFTA-SN-2-20-SO	9779615	Soil	8/29/2018		X	X	X
	BAAP-FFTA-SN-2-35-SO	9779616	Soil	8/29/2018		X	X	X
	BAAP-FFTA-SN-2-50-SO	9779617	Soil	8/29/2018		X	X	X
	BAAP-FFTA-SN-2-65-SO	9779618	Soil	8/29/2018		X	X	X
	BAAP-FFTA-SN-2-WT80-SO	9779619	Soil	8/29/2018		X	X	X
	BAAP-EB-SO-082918-2	9779620	Water	8/29/2018		X		
	BAAP-FB-SO-082918	9779621	Water	8/29/2018		X		
	BAAP-EB-SO-082918-1	9779622	Water	8/29/2018		X		
	BAAP-FFTA-SN-3-5.0-SO	9779623	Soil	8/29/2018		X	X	X
	BAAP-FFTA-SN-3-20-SO	9779624	Soil	8/29/2018		X	X	X
	BAAP-FFTA-SN-3-35-SO	9779625	Soil	8/29/2018		X	X	X
	BAAP-FD-SO-082918	9779629	Soil	8/29/2018	BAAP-FFTA-SN-3-20-SO	X	X	X
PF014	BAAP-FFTA-SN-3-50-SO	9781878	Soil	8/30/2018		X		
	BAAP-FFTA-SN-3-65-SO	9781879	Soil	8/30/2018		X		
	BAAP-FFTA-SN-3-WT80-SO	9781880	Soil	8/30/2018		X		
	BAAP-EB-SO-083018-3	9781881	Water	8/30/2018		X		
PF015	BAAP-FFTA-SN-3-50-SO	9781882	Soil	8/30/2018			X	X
	BAAP-FFTA-SN-3-65-SO	9781883	Soil	8/30/2018			X	X
	BAAP-FFTA-SN-3-WT80-SO	9781884	Soil	8/30/2018			X	X
	BAAP-FFTA-SN-3-5.0-SO	9781885	Soil	8/29/2018				GS
	BAAP-FFTA-SN-3-20-SO	9781886	Soil	8/29/2018				GS
	BAAP-FFTA-SN-3-35-SO	9781887	Soil	8/29/2018				GS

Notes:

1. TOC is total organic carbon analysis.

## DATA REVIEW REPORT

2. Miscellaneous parameters include pH and percent moisture. GS is grain size analysis and was not validated.
3. Stage 2 validation was performed for TOC and pH analyses.
4. Stage 4 validation was performed for PFAS on sample location BAAP-FFTA-SN-2-35-SO.
5. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location BAAP-FFTA-SN-3-35-SO.

## DATA REVIEW REPORT

### ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:

QA - Quality Assurance



## DATA REVIEW REPORT

### ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with USEPA Method 537, ELLE SOPs T-PFAS-WI12031 and T-PFAS-WI14355, Department of Defense (DoD) Quality Systems Manual (QSM) 5.1, and Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, July 2018 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

## DATA REVIEW REPORT

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## DATA REVIEW REPORT

### PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified 537	Soil	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C
	Water	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, instrument, and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Instrument blanks measure carryover in the instrument from one sample to another. Method blanks measure laboratory contamination. Equipment rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

#### 3. Mass Calibration

Mass calibration and system performance were acceptable.

#### 4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

##### 4.1 Initial Calibration

The percent relative standard deviation (%RSD) of the response factors (RF) must be less than 20%, or for linear calibration,  $r^2 \geq 0.99$ . Analytes must be within 70-130% of their true value for each calibration standard.

##### 4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit of 30%.

## DATA REVIEW REPORT

### 4.3 Instrument Sensitivity Check (ISC)

The ISC concentration must be at the LOQ. All target compounds associated with the ISC must exhibit a percent recovery (%R) of 70 to 130%.

### 4.4 Ion Transitions

Quantitation of analytes must use the ion transitions documented in DoD QSM 5.1 Table B-15.

All compounds associated with the above calibration checks were within the specified control limits.

## 5. Isotopically labeled Standards

### 5.1 Extracted Internal Standards (EIS)

Labeled standards must be added to all field samples and QC samples prior to extraction. For aqueous samples prepared by serial dilution instead of SPE, they must be added to samples prior to analysis. EIS recoveries must be within DoD QSM 5.1 specified limits of 50% to 150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	Recovery
BAAP-FFTA-SN-2-5.0-SO BAAP-FFTA-SN-3-35-SO BAAP-FFTA-SN-3-35-SO RE BAAP-FFTA-SN-2-50-SO RE BAAP-FFTA-SN-2-65-SO RE BAAP-FFTA-SN-3-20-SO RE BAAP-FD-SO-082918 BAAP-FFTA-SN-3-50-SO BAAP-FFTA-SN-3-50-SO MS	d5-NEtFOSAA	NEtFOSAA	< 50% but > 25%
	d5-NMeFOSAA	NMeFOSAA	
BAAP-FFTA-SN-2-20-SO BAAP-FFTA-SN-2-20-SO RE BAAP-FFTA-SN-3-5.0-SO BAAP-FFTA-SN-3-5.0-SO RE BAAP-FFTA-SN-2-5.0-SO RE	d5-NEtFOSAA	NEtFOSAA	< 25%
	d5-NMeFOSAA	NMeFOSAA	
BAAP-FFTA-SN-2-50-SO BAAP-FFTA-SN-2-65-SO BAAP-FFTA-SN-3-20-SO	d5-NMeFOSAA	NMeFOSAA	< 50% but > 25%
BAAP-FD-SO-082918 RE	d5-NEtFOSAA	NEtFOSAA	< 25%
	d5-NMeFOSAA	NMeFOSAA	< 50% but > 25%

Note: the laboratory marked the initial extraction, performed 8/31, as "RE" in the data package. Therefore, the reported results are from the extraction performed on 9/5/2018.

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> 150%	Non-detect	No Action
	Detect	

## DATA REVIEW REPORT

Control Limit	Sample Result	Qualification
< 50% but > 25%	Non-detect	No Action
	Detect	
< 25%	Non-detect	R
	Detect	J

As part of the isotope dilution analysis, the EIS are used for quantitation of the sample results, therefore the calculation of sample concentrations is adjusted for EIS recoveries. The data will not be qualified unless EIS recoveries are less than 25%.

The NEtFOSAA and NMeFOSAA results for sample locations BAAP-FFTA-SN-2-20-SO and BAAP-FFTA-SN-3-5.0-SO, were rejected due to EIS recoveries less than 25% for the initial and the re-extracted analyses.

### 5.2 Injection Internal Standards

Injection internal standards must be added to the aliquot of sample dilutions, QC samples, and standards just prior to analysis. Peak areas must be within -50% to +50% of the area measured in the ICAL midpoint standard. On days when ICAL is not performed, the peak areas must be within -50% to +50% of the peak area measured in daily initial CCV.

All internal standard responses were within control limits.

### 6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must be  $\leq 30\%$ .

Sample locations associated with the MS/MSD exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	Compound	MS Recovery	MSD Recovery
BAAP-FFTA-SN-3-35-SO	6:2 Fluorotelomersulfonate	AC	>UL
BAAP-FFTA-SN-3-50-SO	6:2 Fluorotelomersulfonate	>UL	--

Note:

AC Acceptable

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J

## DATA REVIEW REPORT

Control Limit	Sample Result	Qualification
< 10%	Non-detect	R
	Detect	J

Sample location BAAP-FFTA-SN-3-35-SO was non-detect for the compound with MS/MSD outside control limits. Therefore, qualification was not required.

### 7. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS/LCSD analysis exhibited recoveries within the control limits.

### 8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soils is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 2 times the LOQ, a control limit of two times the LOQ is applied for water matrices and three times the LOQ for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
BAAP-FFTA-SN-3-20-SO /BAAP-FD-SO-082918	All target PFAS compounds	U	U	AC

#### Notes:

AC Acceptable

The results between the parent sample and field duplicate were acceptable.

### 9. Compound Identification

PFC analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

All identified compounds met method criteria.

### 10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

# DATA REVIEW REPORT

## DATA VALIDATION CHECKLIST FOR PFAS

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
<b>Stage 2 Validation</b>					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
C. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R		X		X	
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS) %R		X	X		
Matrix Spike Duplicate(MSD) %R		X	X		
MS/MSD Precision (RPD)		X		X	
Field Duplicate (RPD)		X		X	
Extracted Internal Standard %R		X	X		
Injection Internal Standard %R		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
<b>Stage 3/4 Validation</b>					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	

**DATA REVIEW REPORT**

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
D. Transcription/calculations acceptable		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference



## DATA REVIEW REPORT

### INORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Methods 9045D and 9060A. Data were reviewed in accordance with Department of Defense (DoD) Quality Systems Manual (QSM) 5.1, and Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, July 2018 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and that it was already subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.
  - J The reported value was obtained from a reading less than the limit of detection (LOQ), but greater than or equal to the detection limit (DL).
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The analyte was not detected above the limit of detection. However, the reported limit is approximate and may or may not represent the actual limit of detection.
  - UB Analyte considered non-detect at the listed value due to associated blank contamination.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## DATA REVIEW REPORT

### GENERAL CHEMISTRY ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
Total Organic Carbon (TOC) by SW846 9060A	Soil	28 days from collection to analysis	Cool to <6 °C.
pH by SW846 9045D	Soil	Within 24 hours of receipt at laboratory	Cool to <6 °C.

The analyses that exceeded the holding time are presented in the following table.

Sample Locations	Holding Time	Criteria
BAAP-FFTA-SN-2-5.0-SO BAAP-FFTA-SN-2-20-SO BAAP-FFTA-SN-2-35-SO BAAP-FFTA-SN-2-50-SO BAAP-FFTA-SN-2-65-SO BAAP-FFTA-SN-2-WT80-SO BAAP-FFTA-SN-3-5.0-SO BAAP-FFTA-SN-3-20-SO BAAP-FFTA-SN-3-35-SO BAAP-FD-SO-082918 BAAP-FFTA-SN-3-50-SO BAAP-FFTA-SN-3-65-SO BAAP-FFTA-SN-3-WT80-SO	7 to 11 days from receipt	Within 24 hours of receipt

Sample results associated with sample locations analyzed by analytical method SW-846 9045D were qualified, as specified in the table below. All other holding times were met.

Criteria	Qualification	
	Detected Analytes	Non-detect Analytes
Analysis completed less than two times holding time	J	UJ
Analysis completed greater than two times holding time	J	

The hold time for pH was specified in the QAPP; there is no specified hold time for pH in soil. The pH results are qualified as estimated.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is

## DATA REVIEW REPORT

compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

TOC was not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

### 3. Matrix Spike/Matrix Spike Duplicate (MS/MSD)/Laboratory Duplicate Analysis

MS/MSD and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

#### 3.1 MS/MSD Analysis

All analytes must exhibit a percent recovery within the established acceptance limits of 75% to 125%. The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the analyte's concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS analysis performed on sample location BAAP-FFTA-SN-2-65-SO for TOC exhibited a recovery within control limits.

The MS/MSD analysis performed on sample location BAAP-FFTA-SN-3-35-SO and BAAP-FFTA-SN-3-50-SO for TOC exhibited recoveries within control limits.

#### 3.2 Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices and 35% for soil matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of one time the LOQ is applied for water matrices and two times the LOQ for soil matrices.

The laboratory duplicate analysis performed on sample location BAAP-FFTA-SN-3-35-SO for pH exhibited results within control limits.

The laboratory duplicate analysis performed on sample location BAAP-FFTA-SN-2-65-SO for TOC exhibited RPD within control limits.

MS/MSD analysis for TOC on sample location BAAP-FFTA-SN-3-35-SO was performed in addition of the laboratory duplicate analysis. The MS/MSD recoveries and laboratory duplicate exhibited acceptable RPD.

All analytes associated with laboratory duplicate RPD were within the control limit, with the exception of the analytes presented in the following table.

Sample Location	Analytes	Laboratory RPD
BAAP-FFTA-SN-2-65-SO	TOC	43%

The criteria used to evaluate laboratory duplicate RPD are presented in the following table. In the case of a laboratory duplicate RPD deviation, the sample results are qualified.

Sample Concentration	Control Limit	Sample Result	Qualification
Parent sample and laboratory sample concentration >5 times LOQ	Soil > 35%	Non-detect	UJ
		Detect	J

## DATA REVIEW REPORT

### 4. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the LOQ, a control limit of three times the LOQ is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
BAAP-FFTA-SN-3-20-SO /BAAP-FD-SO-082918	TOC	12500	5410	AC

The results between the parent sample and field duplicate were acceptable.

### 5. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. TOC associated with the LCS analysis must exhibit a percent recovery between the control limits of 80% and 120%.

The LCS analysis exhibited recoveries within the control limits.

### 6. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

## DATA REVIEW REPORT

### DATA VALIDATION CHECKLIST FOR GENERAL CHEMISTRY

General Chemistry: SW846 9045D/9060A	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Miscellaneous Instrumentation					
<b>Stage 2 Validation</b>					
Holding times		X	X		
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate(MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Lab Duplicate (RPD)		X		X	
Field Duplicate (RPD)		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	

Notes:

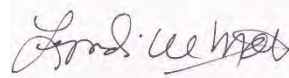
%R - percent recovery

RPD - relative percent difference

## DATA REVIEW REPORT

VALIDATION PERFORMED BY: Lyndi Mott, Arcadis

SIGNATURE:



---

DATE: October 15, 2018

PEER REVIEW: Dennis Capria, Arcadis

DATE: October 29, 2018

**CHAIN OF CUSTODY  
CORRECTED SAMPLE ANALYSIS DATA  
SHEETS**



# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981996 Sample # 9779614-29

COC # 561233

Pg 1/2

Client Information				Matrix				Analysis Requested				For Lab Use Only											
Client: <u>Acadis</u>		Acct. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Surface <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/>		Other: <u>LAB DIWATER</u>		Total # of Containers		Preservation and Filtration Codes		FSC:		SCR#:			
Project Name#: <u>BAAP/02118216.1000.7AD00</u>		PWSID #:		Soil <input checked="" type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Surface <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/>		Other: <u>LAB DIWATER</u>		Total # of Containers		Preservation and Filtration Codes		FSC:		SCR#:			
Project Manager: <u>Kimmi Schrupp</u>		P.O. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Surface <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/>		Other: <u>LAB DIWATER</u>		Total # of Containers		Preservation and Filtration Codes		FSC:		SCR#:			
Sampler: <u>Bounce Evans/Tess Nugent</u>		Quote #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Surface <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/>		Other: <u>LAB DIWATER</u>		Total # of Containers		Preservation and Filtration Codes		FSC:		SCR#:			
State where samples were collected: <u>WI</u>		For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Surface <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/>		Other: <u>LAB DIWATER</u>		Total # of Containers		Preservation and Filtration Codes		FSC:		SCR#:			
Sample Identification			Collected		Grab	Composite	Soil <input checked="" type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>	Potable <input type="checkbox"/> Ground <input type="checkbox"/>	Surface <input type="checkbox"/>	Water <input type="checkbox"/> NPDES <input type="checkbox"/>	Other: <u>LAB DIWATER</u>	Total # of Containers	PFAS Group	Toc/pH/Moisture	Moisture							Remarks	
(FFTA) BAAP-FFTA-SN-2-5.0-50			Date	Time																			
BAAP-FFTA-SN-2-5.0-50			8/29/18	10:20	X		X					3	X	X	X								
BAAP-FFTA-SN-2-20-50			8/29/18	11:00	X		X					3	X	X	X								
BAAP-FFTA-SN-2-35-50			8/29/18	11:25	X		X					3	X	X	X								
BAAP-FFTA-SN-2-50-50			8/29/18	12:20	K		X					3	X	X	X								
BAAP-FFTA-SN-2-65-50			8/29/18	12:45	K		X					3	X	X	X								
BAAP-FFTA-SN-2-180-50			8/29/18	13:50	X		X					3	X	X	X								
BAAP-EB-SO-082918-2			8/29/18	09:45	X						X	2	X										Equipment blank
BAAP-FB-SO-082918			8/29/18	10:00	X						X	2	X										Field Equipment blank
BAAP-EB-SO-082918-1			8/29/18	10:30	X						X	2	X										Equipment blank
BAAP-FFTA-SN-3-5.0-50			8/29/18	15:05	K		X					3	X	X	X								
Turnaround Time (TAT) Requested (please circle)				Relinquished by		Date	Time	Received by		Date	Time												
Standard <u>Rush</u>				<u>[Signature]</u>		8/29/18	17:00																
(Rush TAT is subject to laboratory approval and surcharge.)				Relinquished by		Date	Time	Received by		Date	Time												
Date results are needed: <u>5 DAYS</u>				Relinquished by		Date	Time	Received by		Date	Time												
E-mail address: <u>Kimmi.Schrupp@Acadis.com</u>				Relinquished by		Date	Time	Received by		Date	Time												
Data Package Options (circle if required)				Relinquished by		Date	Time	Received by		Date	Time												
Type I (EPA Level 3 Equivalent/non-CLP)		Type VI (Raw Data Only)		Relinquished by		Date	Time	Received by		Date	Time												
Type III (Reduced non-CLP)		NJ DKQP TX TRRP-13		Relinquished by		Date	Time	Received by		Date	Time												
NYSDEC Category A or B		MA MCP CT RCP		Relinquished by		Date	Time	Received by		Date	Time												
EDD Required? <u>Yes</u> No				If yes, format:				Relinquished by Commercial Carrier:				UPS <input type="checkbox"/> FedEx <input checked="" type="checkbox"/> Other <input type="checkbox"/>											
Site-Specific QC (MS/MSD/Dup)? Yes No				(If yes, indicate QC sample and submit triplicate sample volume.)				Temperature upon receipt <u>1.0-2.8</u> °C															



# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981996 Sample # 9779614-29

COC # 561234

Client Information				Matrix				Analysis Requested												For Lab Use Only			
Client: <u>Arcadis</u>		Acct. #:		<input type="checkbox"/> Tissue		<input type="checkbox"/> Ground		<input type="checkbox"/> Surface		Preservation and Filtration Codes												SCR#:	
Project Name/#: <u>BAAP</u>		PWSID #:		<input type="checkbox"/> Sediment		<input type="checkbox"/> Potable		<input type="checkbox"/> NPDES		PFAS Group TOC/PAH/moisture Moisture												Preservation Codes	
Project Manager: <u>see page 1</u>		P.O. #:		<input type="checkbox"/> Soil		<input type="checkbox"/> Water		Other:														H=HCl	
Sampler:		Quote #:		Grab		Composite		Total # of Containers														Remarks	
State where samples were collected:		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Date		Time																<u>RUSH</u>	
Sample Identification		Collected		Date		Time																	
<u>BAAP-FFTA-SN-3-20-50</u>		<u>8/29/18</u>		<u>15:30</u>		<u>X</u>		<u>X</u>															
<u>BAAP-FFTA-SN-3-35-50</u>		<u>8/29/18</u>		<u>16:00</u>		<u>X</u>		<u>X</u>															
<u>BAAP-FD-50-082918</u>		<u>8/29/18</u>		<u>-</u>		<u>X</u>		<u>X</u>														<u>MS/MSD sample</u>	

Turnaround Time (TAT) Requested (please circle)  
 Standard Rush  
 (Rush TAT is subject to laboratory approval and surcharge.)

Date results are needed: 5 DAYS

E-mail address: Kimie.Schrupp@Arcadis.com

**Data Package Options** (circle if required)

- Type I (EPA Level 3 Equivalent/non-CLP)
- Type III (Reduced non-CLP)
- NYSDEC Category A or B
- Type VI (Raw Data Only)
- NJ DKQP TX TRRP-13
- MA MCP CT RCP

Relinquished by <u>[Signature]</u>	Date <u>8/29/18</u>	Time <u>17:00</u>	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by <u>[Signature]</u>	Date <u>8/30/18</u>	Time <u>10:15</u>

EDD Required? Yes No  
 If yes, format: \_\_\_\_\_

Relinquished by Commercial Carrier:  
 UPS \_\_\_\_\_ FedEx X Other \_\_\_\_\_

Site-Specific QC (MS/MSD/Dup)? Yes No  
 (if yes, indicate QC sample and submit triplicate sample volume.)

Temperature upon receipt 1.0-2.8 °C

1981996

**Katherine Klinefelter**

---

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project  
**Attachments:** BAAP COC 4.pdf; BAAP COC 5.pdf; BAAP COC 8.pdf; BAAP COC 1.pdf; BAAP COC 2.pdf; BAAP COC 3.pdf

EXTERNAL EMAIL\*

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Kowalski, Joe <Joseph.Kowalski@arcadis.com>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanclabsEnv](http://www.EurofinsUS.com/LanclabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

1981996

EXTERNAL EMAIL\*

Hi Kathy,

So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!

Thanks

Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

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# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

Acct # **13129**

Group # **1981996** Sample #

**9779614-29**

COC # **561233**

For Lab Use Only

*pg 1/2*

Client Information				Matrix				Analysis Requested				For Lab Use Only	
Account # Project Name Project Address City/State/Zip Contact Name Phone/Fax/Email				Matrix <input type="checkbox"/> Tapwater <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Sediment <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Other				Preservation and Filtration Codes (Grid for codes)				PSC SCRT Preservation Codes H-HCl, To:Thiourea M-MnO2, Beta:OH S-H2SO4, Phi:PO4 F-Field Filtered, O-Other	
Sample Identification		Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	Remarks			
ID	Location	Date	Time							1	2		
ADAP-50-2-50-2-50-50	11/18/07	11:00	X						3	X	X		
ADAP-50-2-50-2-50-50	11/18/07	11:00	X						3	X	X		
ADAP-50-2-50-2-50-50	11/17/07	11:25	X						3	X	X		
ADAP-50-2-50-2-50-50	11/17/07	12:00	X						3	X	X		
ADAP-50-2-50-2-50-50	11/17/07	12:05	X						3	X	X		
ADAP-50-2-50-2-50-50	11/17/07	13:50	X						3	X	X		
ADAP-50-2-50-2-50-50	11/17/07	14:45	X					X	2	X		Field	
ADAP-50-2-50-2-50-50	11/17/07	16:00	X					X	2	X		Field	
ADAP-50-2-50-2-50-50	11/17/07	16:30	X					X	2	X		Field	
ADAP-50-2-50-2-50-50	11/17/07	16:05	X						3	X	X		

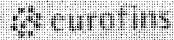
Turnaround Time (TAT) Requested Standard <input checked="" type="checkbox"/> Rush <input type="checkbox"/> Date results are needed: <b>2 DAYS</b> Sample address: <b>11111 S. Highway 100, Suite 100</b>	Requested by: _____ Approved by: _____ Performed by: _____ Analyzed by: _____	Date: _____ Time: _____ Date: _____ Time: _____ Date: _____ Time: _____ Date: _____ Time: _____	Relinquished by Commercial Carrier UPS <input type="checkbox"/> FedEx <input checked="" type="checkbox"/> Other _____ Temperature upon receipt: _____ °C
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Lancaster Laboratories Environmental  
The white copy should accompany samples to Eurofins Lab

Keep this form for your records.

813346307578 813346307578

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

Acct #

13129

Group #

1981996

Sample #

9779614-29

COC # 561234

Client Information				Matrix				Analysis Requested				For Lab Use Only		
Client Name: <u>PA DEP</u> Project Name: <u>PA DEP</u> Site #: Date: <u>1/21/05</u>				Tissue <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Water <input type="checkbox"/> Other:				Preservation and Filtration Codes				FSC SCF#		
Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>				Total # of Containers				Remarks:				Preservation Codes: H=HCl, T=Thiourea N=NaOH, B=NaOH S=H <sub>2</sub> SO <sub>4</sub> , P=H <sub>2</sub> PO <sub>4</sub> F=Field Filtered, O=Other		
Sample Identification	Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested	Analysis Requested
	Date	Time												
PA DEP - EDTA - 3-05-50	1/21/05	12:30	X		X			3						
PA DEP - EDTA - 3-05-50	1/21/05	1:00	X		X			2						
PA DEP - EDTA - 3-05-50	1/21/05	1:30	X		X			5						

Turnaround Time (TAT) Requested (circle if needed) Standard <u>Fast</u> (Push TAT's through laboratory approval and surcharge)	Date results are needed: <u>1/21/05</u>	E-mail address: <u>PA DEP</u>	Data Package Options (circle if required) Type I (EPA Level 3 Equivalent non-CLP) Type III (Reduced non-CLP) NYSDEC Category A or B Type VI (Raw Data Only) NJ DKOP TX TRRP-13 MA MCP GT RCP
EDD Required? Yes No If yes, format:	Site Specific QC (MSMS/Dup)? Yes No (yes, indicate QC range and actual test/true sample volume)	Relinquished by Commercial Carrier: UPS FedEx Other	Temperature upon receipt: _____ °C

Eurofins Lancaster Laboratories Environmental LLC - 2425 New Holland Pike, Lancaster, PA 17601 - 717-656-2300  
 The white copy should accompany samples to Eurofins Lancaster Laboratories Environmental. The yellow copy should be returned by the client.



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/30/2018 10:15</u>
Number of Packages:	<u>2</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Zane Hollinger (10251) at 14:26 on 08/30/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-01	2.8	DT	Wet	Y	Bagged	N
2	DT131	1.0	DT	Wet	Y	Bagged	N

**Sample Description:** BAAP-FFTA-SN-2-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779614  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:20  
**SDG#:** PF012-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.1	0.65	2.1	2.2	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.1	0.54	2.1	2.2	1
14478	NEtFOSAA	2991-50-6	< 2.2	0.54	2.2	3.3	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.2	0.54	2.2	3.3	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.65	0.22	0.65	0.87	1
14478	Perfluorobutanoic acid	375-22-4	< 0.74	0.22	0.74	0.87	1
14478	Perfluorodecanoic acid	335-76-2	< 0.74	0.33	0.74	1.1	1
14478	Perfluorododecanoic acid	307-55-1	< 0.74	0.22	0.74	0.87	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.74	0.22	0.74	0.87	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.70	0.22	0.70	0.87	1
14478	Perfluorohexanoic acid	307-24-4	< 0.74	0.22	0.74	0.87	1
14478	Perfluorononanoic acid	375-95-1	< 0.74	0.22	0.74	0.87	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.71	0.22	0.71	0.87	1
14478	Perfluorooctanoic acid	335-67-1	< 0.74	0.22	0.74	0.87	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.74	0.22	0.74	0.87	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.74	0.22	0.74	0.87	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.74	0.22	0.74	0.87	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.74	0.22	0.74	0.87	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	2,090	160	481	481	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	7.59 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	16.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779614  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 10:20  
SDG#: PF012-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 14:42	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 14:26	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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



**Sample Description:** BAAP-FFTA-SN-2-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779615  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 11:00  
SDG#: PF012-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	<del>NEtFOSAA</del>	<del>2991-50-6</del>	<del>&lt; 1.9</del>	<del>0.48</del>	<del>1.9</del>	<del>2.9</del>	<del>1</del> R
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	<del>NMeFOSAA</del>	<del>2355-31-9</del>	<del>&lt; 1.9</del>	<del>0.48</del>	<del>1.9</del>	<del>2.9</del>	<del>1</del> R
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.65	0.29	0.65	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.65	0.19	0.65	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.62	0.19	0.62	0.76	1
14478	Perfluorooctanoic acid	335-67-1	0.38 J	0.19	0.65	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.65	0.19	0.65	0.76	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
02079	TOC Solids/Sludges Combustion	n.a.	4,570	926	2,780	2,780

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>
00394	pH	n.a.	9.24 J	0.0100	0.0100	0.0100
The pH was measured in water at 19.8 C.						

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
00111	Moisture	n.a.	3.5	0.50	0.50	0.50
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

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

**Sample Description:** BAAP-FFTA-SN-2-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779615  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 11:00  
SDG#: PF012-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 14:51	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/10/2018 16:57	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-2-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779616  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 11:25  
**SDG#:** PF012-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.48	1.9	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.48	1.9	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.65	0.29	0.65	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.65	0.19	0.65	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.65	0.19	0.65	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.65	0.19	0.65	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.62	0.19	0.62	0.76	1
14478	Perfluorooctanoic acid	335-67-1	1.1	0.19	0.65	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.65	0.19	0.65	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.65	0.19	0.65	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.65	0.19	0.65	0.76	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	5,400	966	2,900	2,900	1
<b>SW-846 9045D Nov 2004</b>							
00394	pH	n.a.	9.22 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.8 C.							
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	3.8	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779616  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submittal Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 11:25  
**SDG#:** PF012-03

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:00	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/10/2018 17:10	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-2-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779617  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 12:20  
**SDG#:** PF012-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.62	1.9	2.1	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.1	1
14478	NEtFOSAA	2991-50-6	< 2.1	0.51	2.1	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.1	0.51	2.1	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.62	0.21	0.62	0.82	1
14478	Perfluorobutanoic acid	375-22-4	< 0.70	0.21	0.70	0.82	1
14478	Perfluorodecanoic acid	335-76-2	< 0.70	0.31	0.70	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.70	0.21	0.70	0.82	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.70	0.21	0.70	0.82	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.66	0.21	0.66	0.82	1
14478	Perfluorohexanoic acid	307-24-4	< 0.70	0.21	0.70	0.82	1
14478	Perfluorononanoic acid	375-95-1	< 0.70	0.21	0.70	0.82	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.67	0.21	0.67	0.82	1
14478	Perfluorooctanoic acid	335-67-1	< 0.70	0.21	0.70	0.82	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.70	0.21	0.70	0.82	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.70	0.21	0.70	0.82	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.70	0.21	0.70	0.82	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.70	0.21	0.70	0.82	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	3,430	103	308	308	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.24 <span style="color:red">J</span>	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.5	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779617  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 12:20  
SDG#: PF012-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:09	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:05	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-2-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779618  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 12:45  
**SDG#:** PF012-05

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.64	0.28	0.64	0.94	1
14478	Perfluorododecanoic acid	307-55-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.64	0.19	0.64	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.60	0.19	0.60	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.61	0.19	0.61	0.76	1
14478	Perfluorooctanoic acid	335-67-1	0.44 J	0.19	0.64	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.64	0.19	0.64	0.76	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	2,860 J	103	309	309	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	8.98 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.6 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.0	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-2-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779618  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 12:45  
SDG#: PF012-05

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:18	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18247667632B	09/05/2018 00:53	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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



**Sample Description:** BAAP-FFTA-SN-2-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779619  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 13:50  
**SDG#:** PF012-06

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.59	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.49	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.49	2.0	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.49	2.0	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.59	0.20	0.59	0.78	1
14478	Perfluorobutanoic acid	375-22-4	< 0.66	0.20	0.66	0.78	1
14478	Perfluorodecanoic acid	335-76-2	< 0.66	0.29	0.66	0.98	1
14478	Perfluorododecanoic acid	307-55-1	< 0.66	0.20	0.66	0.78	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.66	0.20	0.66	0.78	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.62	0.20	0.62	0.78	1
14478	Perfluorohexanoic acid	307-24-4	< 0.66	0.20	0.66	0.78	1
14478	Perfluorononanoic acid	375-95-1	< 0.66	0.20	0.66	0.78	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.63	0.20	0.63	0.78	1
14478	Perfluorooctanoic acid	335-67-1	0.67 J	0.20	0.66	0.78	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.66	0.20	0.66	0.78	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.66	0.20	0.66	0.78	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.66	0.20	0.66	0.78	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.66	0.20	0.66	0.78	1

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
02079	TOC Solids/Sludges Combustion	n.a.	937	105	314	314
		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>
00394	pH	n.a.	9.26 J	0.0100	0.0100	0.0100
The pH was measured in water at 19.7 C.						

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
00111	Moisture	n.a.	2.4	0.50	0.50	0.50
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

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

**Sample Description:** BAAP-FFTA-SN-2-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779619  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 13:50  
SDG#: PF012-06

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:37	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:18	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-EB-SO-082918-2 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779620  
**ELLE Group #:** 1981996  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 09:45  
**SDG#:** PF012-07EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.98	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:58	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-FB-SO-082918 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779621  
**ELLE Group #:** 1981996  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:00  
**SDG#:** PF012-08FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.93	1.9	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.93	1.9	2.8	1
14434	NEtFOSAA	2991-50-6	< 2.2	0.93	2.2	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.2	0.93	2.2	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 1.0	0.28	1.0	1.9	1
14434	Perfluorobutanoic acid	375-22-4	< 4.4	1.9	4.4	5.6	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.46	1.1	1.9	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.46	1.1	1.9	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.37	1.1	1.9	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.0	0.37	1.0	1.9	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.46	1.1	1.9	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.37	1.1	1.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.46	1.1	1.9	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.46	1.1	1.9	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.4	1.9	4.4	5.6	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.56	1.1	1.9	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.56	1.1	1.9	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.46	1.1	1.9	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 13:07	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-EB-SO-082918-1 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779622  
**ELLE Group #:** 1981996  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 10:30  
**SDG#:** PF012-09EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.90	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.90	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.2	0.90	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.2	0.90	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.99	0.27	0.99	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.99	0.36	0.99	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 13:16	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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

**Sample Description:** BAAP-FFTA-SN-3-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779623  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 15:05  
**SDG#:** PF012-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.2	0.69	2.2	2.3	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.2	0.58	2.2	2.3	1
14478	<del>NEtFOSAA</del>	<del>2991-50-6</del>	<del>&lt; 2.3</del>	<del>0.58</del>	<del>2.3</del>	<del>3.5</del>	<del>1</del> R
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	<del>NMeFOSAA</del>	<del>2355-31-9</del>	<del>&lt; 2.3</del>	<del>0.58</del>	<del>2.3</del>	<del>3.5</del>	<del>1</del> R
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.69	0.23	0.69	0.92	1
14478	Perfluorobutanoic acid	375-22-4	< 0.78	0.23	0.78	0.92	1
14478	Perfluorodecanoic acid	335-76-2	< 0.78	0.35	0.78	1.2	1
14478	Perfluorododecanoic acid	307-55-1	< 0.78	0.23	0.78	0.92	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.78	0.23	0.78	0.92	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.74	0.23	0.74	0.92	1
14478	Perfluorohexanoic acid	307-24-4	< 0.78	0.23	0.78	0.92	1
14478	Perfluorononanoic acid	375-95-1	< 0.78	0.23	0.78	0.92	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.75	0.23	0.75	0.92	1
14478	Perfluorooctanoic acid	335-67-1	< 0.78	0.23	0.78	0.92	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.78	0.23	0.78	0.92	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.78	0.23	0.78	0.92	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.78	0.23	0.78	0.92	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.78	0.23	0.78	0.92	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
02079	TOC Solids/Sludges Combustion	n.a.	2,150	160	479	479

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>
00394	pH	n.a.	7.88 J	0.0100	0.0100	0.0100
The pH was measured in water at 19.7 C.						

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
00111	Moisture	n.a.	14.8	0.50	0.50	0.50
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

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

**Sample Description:** BAAP-FFTA-SN-3-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779623  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 15:05  
SDG#: PF012-10

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:46	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:31	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-3-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779624  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 15:30  
**SDG#:** PF012-11

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.58	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.48	1.9	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.48	1.9	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.58	0.19	0.58	0.77	1
14478	Perfluorobutanoic acid	375-22-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorodecanoic acid	335-76-2	< 0.66	0.29	0.66	0.97	1
14478	Perfluorododecanoic acid	307-55-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.66	0.19	0.66	0.77	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.62	0.19	0.62	0.77	1
14478	Perfluorohexanoic acid	307-24-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorononanoic acid	375-95-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.63	0.19	0.63	0.77	1
14478	Perfluorooctanoic acid	335-67-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.66	0.19	0.66	0.77	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	12,500	874	2,620	2,620	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.24 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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



**Sample Description:** BAAP-FFTA-SN-3-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779624  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 15:30  
SDG#: PF012-11

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 15:55	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/10/2018 17:49	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779625  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 16:00  
**SDG#:** PF012-12BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.61	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.51	2.0	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.51	2.0	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.61	0.20	0.61	0.82	1
14478	Perfluorobutanoic acid	375-22-4	< 0.70	0.20	0.70	0.82	1
14478	Perfluorodecanoic acid	335-76-2	< 0.70	0.31	0.70	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.70	0.20	0.70	0.82	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.70	0.20	0.70	0.82	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.65	0.20	0.65	0.82	1
14478	Perfluorohexanoic acid	307-24-4	< 0.70	0.20	0.70	0.82	1
14478	Perfluorononanoic acid	375-95-1	< 0.70	0.20	0.70	0.82	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.67	0.20	0.67	0.82	1
14478	Perfluorooctanoic acid	335-67-1	< 0.70	0.20	0.70	0.82	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.70	0.20	0.70	0.82	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.70	0.20	0.70	0.82	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.70	0.20	0.70	0.82	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.70	0.20	0.70	0.82	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	3,130	105	316	316	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.36 <span style="color: red;">J</span>	0.0100	0.0100	0.0100	1
The pH was measured in water at 20.6 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	4.2	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-3-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779625  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 16:00  
SDG#: PF012-12BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 16:04	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 15:57	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

**Sample Description:** BAAP-FD-SO-082918 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779629  
**ELLE Group #:** 1981996  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018  
**SDG#:** PF012-13FD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.58	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.48	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.48	1.9	2.9	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.48	1.9	2.9	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.58	0.19	0.58	0.77	1
14478	Perfluorobutanoic acid	375-22-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorodecanoic acid	335-76-2	< 0.66	0.29	0.66	0.96	1
14478	Perfluorododecanoic acid	307-55-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.66	0.19	0.66	0.77	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.62	0.19	0.62	0.77	1
14478	Perfluorohexanoic acid	307-24-4	< 0.66	0.19	0.66	0.77	1
14478	Perfluorononanoic acid	375-95-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.63	0.19	0.63	0.77	1
14478	Perfluorooctanoic acid	335-67-1	< 0.66	0.19	0.66	0.77	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.66	0.19	0.66	0.77	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.66	0.19	0.66	0.77	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.66	0.19	0.66	0.77	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	5,410	892	2,680	2,680	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.29 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 20.2 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.9	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FD-SO-082918 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779629  
ELLE Group #: 1981996  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018  
SDG#: PF012-13FD

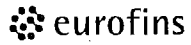
CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248031	09/06/2018 16:31	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248031	09/05/2018 17:00	Anthony C Polaski	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/10/2018 18:02	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820004A	08/31/2018 09:33	William C Schwebel	1

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

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1982466 Sample # 9787828-81

COC # 561235

Client Information				Matrix				Analysis Requested				For Lab Use Only		
Client: <u>Arcadis</u>		Acct. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>	Potable <input type="checkbox"/> Ground <input type="checkbox"/>	Water <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/>	Other: <u>PEA DT Lab Supplied</u>	Total # of Containers	Preservation and Filtration Codes				FSC: _____	pg 1/1
Project Name#: <u>BAAP/02118216-1000.7AD00</u>		PWSID #:											SCR#: _____	
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:						Preservation Codes				Remarks		
Sampler: <u>Bruce Evans/Tess Nugent</u>		Quote #:						H=HCl                      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered        O=Other						
State where samples were collected: <u>Wisconsin</u>		For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Grab	Composite					PFAS Group TOC/PH/Moisture Moisture Grain Size				<u>RUSH</u>
Sample Identification		Collected												
Date	Time	Grab	Composite	Soil	Water	Other	Total # of Containers	PFAS Group	TOC/PH/Moisture	Moisture	Grain Size			
<u>BAAP-FFTA-SN-3-50-SO</u>	<u>8/30/18 0740</u>	<u>X</u>		<u>X</u>			<u>5</u>	<u>X</u>	<u>X</u>	<u>X</u>				
<u>BAAP-FFTA-SN-3-65-SO</u>	<u>8/30/18 0815</u>	<u>X</u>		<u>X</u>				<u>X</u>	<u>X</u>	<u>X</u>				
<u>BAAP-FFTA-SN-3-WT80-SO</u>	<u>8/30/18 0915</u>	<u>X</u>		<u>X</u>				<u>X</u>	<u>X</u>	<u>X</u>				
<u>BAAP-FFTA-SN-3-5.0-SO</u>	<u>8/29/18 1505</u>	<u>X</u>		<u>X</u>						<u>X</u>				
<u>BAAP-FFTA-SN-3-20-SO</u>	<u>8/29/18 1530</u>	<u>X</u>		<u>X</u>						<u>X</u>				
<u>BAAP-FFTA-SN-3-35-SO</u>	<u>8/29/18 1600</u>	<u>X</u>		<u>X</u>						<u>X</u>				
<u>BAAP-EB-083018-3</u>	<u>8/30/18 12:15</u>	<u>X</u>				<u>X</u>	<u>2</u>	<u>X</u>						

Turnaround Time (TAT) Requested (please circle) Standard <u>Rush</u> (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAYS</u>  E-mail address: <u>kimmie.schrupp@arcadis.com</u>	Relinquished by <u>[Signature]</u>	Date <u>8/30/18</u>	Time <u>17:00</u>	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by	Date	Time
	Relinquished by	Date	Time	Received by <u>[Signature]</u>	Date <u>8/31/18</u>	Time <u>10:20</u>

Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP	EDD Required? Yes <input checked="" type="checkbox"/> No If yes, format: _____ Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)	Relinquished by Commercial Carrier: UPS      FedEx <input checked="" type="checkbox"/> Other _____  Temperature upon receipt <u>1.2</u> °C
--	---	---

1982466

**Katherine Klinefelter**

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**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project  
**Attachments:** BAAP COC 4.pdf; BAAP COC 5.pdf; BAAP COC 8.pdf; BAAP COC 1.pdf; BAAP COC 2.pdf; BAAP COC 3.pdf

EXTERNAL EMAIL\*

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanLabsEnv](http://www.EurofinsUS.com/LanLabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

1982466

EXTERNAL EMAIL\*

Hi Kathy,

So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!

Thanks

Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

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# Environmental Analysis Request/Chain of Custody

eurofins

Laboratory Laboratories  
Environmental

13124

198246

9781878-81

COC # 561235

For Lab Use Only

19/11

Client Information				Matrix				Analysis Requested									
Client Name		Address		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Plastics <input type="checkbox"/> Unfilled <input type="checkbox"/> Dioxins <input type="checkbox"/>		Preservation and Filtration Codes									
Client Reference		City		Water <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/>		Other <input type="checkbox"/>		Preservation Codes H-H-100 F-Thiourea N-N-100 B-NaOH S-S-100 P-HCl F-Filled Filtered B-Other									
Client Phone		State		Total # of Containers		Remarks											
Sample Identification		Collected		Grab	Composite	Soil	Sediment	Tissue	Plastics	Unfilled	Dioxins	Water	NPDES	Surface	Other	Total # of Containers	
		Date	Time														
Sample 1		10/15/11	10:00	X		X											
Sample 2		10/15/11	11:00	X		X											
Sample 3		10/15/11	12:00	X		X											
Sample 4		10/15/11	13:00	X		X											
Sample 5		10/15/11	14:00	X		X											
Sample 6		10/15/11	15:00	X		X											
Sample 7		10/15/11	16:00	X		X											
Sample 8		10/15/11	17:00	X		X											
Sample 9		10/15/11	18:00	X		X											
Sample 10		10/15/11	19:00	X		X											
Sample 11		10/15/11	20:00	X		X											
Sample 12		10/15/11	21:00	X		X											
Sample 13		10/15/11	22:00	X		X											
Sample 14		10/15/11	23:00	X		X											
Sample 15		10/15/11	00:00	X		X											
Sample 16		10/15/11	01:00	X		X											
Sample 17		10/15/11	02:00	X		X											
Sample 18		10/15/11	03:00	X		X											
Sample 19		10/15/11	04:00	X		X											
Sample 20		10/15/11	05:00	X		X											

Turnaround Time (TAT) Requested: 30 days

Lab	Date	Received By	Lab	Date	Received By
<i>[Signature]</i>	<i>[Date]</i>	<i>[Signature]</i>			

Data Package Options:  Full Report

ESD Required?  Yes  No  
 ESD Labeling?  Yes  No  
 Temperature Control Requested: \_\_\_\_\_ °C

Environmental Laboratories, Environmental, Inc. 11-14

Keep this form for your records.

813348307590

813348307590



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/31/2018 10:20</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Conrad Burkholder (12671) at 11:47 on 08/31/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.2	DT	Wet	Y	Bagged	N

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781878  
ELLE Group #: 1982466  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 07:40  
SDG#: PF014-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.0	0.62	2.0	2.1	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.0	0.52	2.0	2.1	1
14478	NEtFOSAA	2991-50-6	< 2.1	0.52	2.1	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.1	0.52	2.1	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.62	0.21	0.62	0.83	1
14478	Perfluorobutanoic acid	375-22-4	< 0.70	0.21	0.70	0.83	1
14478	Perfluorodecanoic acid	335-76-2	< 0.70	0.31	0.70	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.70	0.21	0.70	0.83	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.70	0.21	0.70	0.83	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.66	0.21	0.66	0.83	1
14478	Perfluorohexanoic acid	307-24-4	< 0.70	0.21	0.70	0.83	1
14478	Perfluorononanoic acid	375-95-1	< 0.70	0.21	0.70	0.83	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.67	0.21	0.67	0.83	1
14478	Perfluorooctanoic acid	335-67-1	< 0.70	0.21	0.70	0.83	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.70	0.21	0.70	0.83	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.70	0.21	0.70	0.83	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.70	0.21	0.70	0.83	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.70	0.21	0.70	0.83	1

The recovery for labeled compounds used as extraction standards d3-NMeFOSAA and d5-NEtFOSAA is outside of QC acceptance limits as noted on the QC Summary. The recovery for labeled compounds used as extraction standards d3-NMeFOSAA and d5-NEtFOSAA is also outside of QC acceptance limits in the matrix spike sample, indicating a matrix effect.

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	%	%	%	%	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	8.1	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/06/2018 04:05	Marissa C Drexinger	1

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

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781878  
ELLE Group #: 1982466  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 07:40  
SDG#: PF014-01

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/04/2018 17:00	Anthony C Polaski	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18248820002A	09/05/2018 15:04	Larry E Bevins	1

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

**Sample Description:** BAAP-FFTA-SN-3-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781879  
**ELLE Group #:** 1982466  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 08:15  
**SDG#:** PF014-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.59	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.49	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.49	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.49	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.59	0.20	0.59	0.79	1
14478	Perfluorobutanoic acid	375-22-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorodecanoic acid	335-76-2	< 0.67	0.30	0.67	0.99	1
14478	Perfluorododecanoic acid	307-55-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.67	0.20	0.67	0.79	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.63	0.20	0.63	0.79	1
14478	Perfluorohexanoic acid	307-24-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorononanoic acid	375-95-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.64	0.20	0.64	0.79	1
14478	Perfluorooctanoic acid	335-67-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.67	0.20	0.67	0.79	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	2.6	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/06/2018 04:14	Marissa C Drexinger	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/04/2018 17:00	Anthony C Polaski	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781880  
**ELLE Group #:** 1982466  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 09:15  
**SDG#:** PF014-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.61	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.51	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.51	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.61	0.20	0.61	0.81	1
14478	Perfluorobutanoic acid	375-22-4	< 0.69	0.20	0.69	0.81	1
14478	Perfluorodecanoic acid	335-76-2	< 0.69	0.30	0.69	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.69	0.20	0.69	0.81	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.69	0.20	0.69	0.81	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.65	0.20	0.65	0.81	1
14478	Perfluorohexanoic acid	307-24-4	< 0.69	0.20	0.69	0.81	1
14478	Perfluorononanoic acid	375-95-1	< 0.69	0.20	0.69	0.81	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.66	0.20	0.66	0.81	1
14478	Perfluorooctanoic acid	335-67-1	1.3	0.20	0.69	0.81	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.69	0.20	0.69	0.81	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.69	0.20	0.69	0.81	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.69	0.20	0.69	0.81	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.69	0.20	0.69	0.81	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	2.1	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/07/2018 17:28	Marissa C Drexinger	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18247033	09/04/2018 17:00	Anthony C Polaski	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-EB-083018-3 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781881  
**ELLE Group #:** 1982466  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 12:15  
**SDG#:** PF014-04EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.92	1.8	2.8	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.92	1.8	2.8	1
14434	NEtFOSAA	2991-50-6	N.D.	0.92	2.2	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.92	2.2	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.28	1.0	1.8	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.8	4.4	5.5	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.46	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.37	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.37	1.0	1.8	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.46	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.37	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	N.D.	0.46	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	N.D.	0.46	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	N.D.	1.8	4.4	5.5	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.55	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.55	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.46	1.1	1.8	1

### Sample Comments

WI Cert #998035060. Note: Reported MDL(aka LOD) & LOQ are adjusted for dilution.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18250017	09/10/2018 21:18	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18250017	09/07/2018 16:00	Anthony C Polaski	1

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

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1982467 Sample # 9781882-87

**COC # 561235**

Client Information				Matrix				Analysis Requested				For Lab Use Only					
Client: <u>Arcadis</u>		Acct. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/>		Other: <u>PEA DT Lab Supplied</u>		Total # of Containers		Preservation and Filtration Codes		FSC: _____	
Project Name#: <u>BAAP/02118216-1000.7AD00</u>		PWSID #:		Grab <input type="checkbox"/> Composite <input type="checkbox"/>		PFAS Group		TOC/pH/Moisture		Moisture		Grain Size		SCR#: _____		Preservation Codes	
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/>		Other: <u>PEA DT Lab Supplied</u>		Total # of Containers		F=Field Filtered O=Other		H=HCl T=Thiosulfate	
Sampler: <u>Bruce Evans/Tess Nugent</u>		Quote #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/>		Other: <u>PEA DT Lab Supplied</u>		Total # of Containers		F=Field Filtered O=Other		N=HNO <sub>3</sub> B=NaOH	
State where samples were collected: <u>Wisconsin</u>		For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input type="checkbox"/>		Potable <input type="checkbox"/> Ground <input type="checkbox"/>		Water <input type="checkbox"/> NPDES <input type="checkbox"/> Surface <input type="checkbox"/>		Other: <u>PEA DT Lab Supplied</u>		Total # of Containers		F=Field Filtered O=Other		S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub>	
Sample Identification			Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	PFAS Group	TOC/pH/Moisture	Moisture	Grain Size	Remarks		
Date	Time																
<u>BAAP-FFTA-SN-3-50-SO</u>	<u>8/30/18</u>	<u>0740</u>	<u>X</u>		<u>X</u>					<u>5</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>		<u>RUSH</u>	
<u>BAAP-FFTA-SN-3-65-SO</u>	<u>8/30/18</u>	<u>0815</u>	<u>X</u>		<u>X</u>					<u>5</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>BAAP-FFTA-SN-3-WT80-SO</u>	<u>8/30/18</u>	<u>0915</u>	<u>X</u>		<u>X</u>					<u>5</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>BAAP-FFTA-SN-3-5.0-SO</u>	<u>8/29/18</u>	<u>1505</u>	<u>X</u>		<u>X</u>					<u>1</u>			<u>X</u>				
<u>BAAP-FFTA-SN-3-20-SO</u>	<u>8/29/18</u>	<u>1530</u>	<u>X</u>		<u>X</u>					<u>1</u>			<u>X</u>				
<u>BAAP-FFTA-SN-3-35-SO</u>	<u>8/29/18</u>	<u>1600</u>	<u>X</u>		<u>X</u>					<u>1</u>			<u>X</u>				
<u>BAAP-EB-083018-3</u>	<u>8/30/18</u>	<u>12:15</u>	<u>X</u>					<u>X</u>	<u>2</u>	<u>X</u>							

Turnaround Time (TAT) Requested (please circle) Standard _____ <u>Rush</u> _____ (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAYS</u>  E-mail address: <u>kimmie.schrupp@arcadis.com</u>	Relinquished by: <u>[Signature]</u>	Date: <u>8/30/18</u>	Time: <u>17:00</u>	Received by: _____	Date: _____	Time: _____
	Relinquished by: _____	Date: _____	Time: _____	Received by: _____	Date: _____	Time: _____
	Relinquished by: _____	Date: _____	Time: _____	Received by: _____	Date: _____	Time: _____
	Relinquished by: _____	Date: _____	Time: _____	Received by: _____	Date: _____	Time: _____
	Relinquished by: _____	Date: _____	Time: _____	Received by: <u>[Signature]</u>	Date: <u>8/31/18</u>	Time: <u>10:20</u>

Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP	EDD Required? <u>Yes</u> No If yes, format: _____ Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)	Relinquished by Commercial Carrier: UPS _____ FedEx <u>X</u> Other _____  Temperature upon receipt <u>1.2</u> °C
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Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/31/2018 10:20</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Conrad Burkholder (12671) at 11:47 on 08/31/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.2	DT	Wet	Y	Bagged	N

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781882  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 07:40  
**SDG#:** PF015-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>							
<b>SW-846 9060A modified</b>			<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	4,100	125	375	375	1
<b>Wet Chemistry</b>							
<b>ASTM D422</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
11604	% Gravel	n.a.	7.4	0.50	1.0	1.0	1
11604	% Sand	n.a.	80.9	0.50	1.0	1.0	1
11604	% Silt	n.a.	10.4	0.50	1.0	1.0	1
11604	% Clay	n.a.	1.4	0.50	1.0	1.0	1
<b>Wet Chemistry</b>							
<b>ASTM D422-63 (reapproved 2007)</b>			<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	97.7	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	92.6	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	90.8	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	89.5	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	88.7	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	85.9	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	62.8	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	23.2	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	11.8	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	10.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	6.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	1.0	0.50	0.50	0.50	1
<b>Wet Chemistry</b>							
<b>SW-846 9045D Nov 2004</b>			<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	8.83 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 20 C.							
<b>Wet Chemistry</b>							
<b>SM 2540 G-2011 %Moisture Calc</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	19.3	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-3-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9781882  
ELLE Group #: 1982467  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 07:40  
SDG#: PF015-01

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/08/2018 17:54	Drew M Gerhart	1
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:50	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781883  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 08:15  
**SDG#:** PF015-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>							
<b>SW-846 9060A modified</b>			<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	1,930	103	309	309	1
<b>Wet Chemistry</b>							
<b>ASTM D422</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
11604	% Gravel	n.a.	11.2	0.50	1.0	1.0	1
11604	% Sand	n.a.	87.5	0.50	1.0	1.0	1
11604	% Silt	n.a.	0.81 J	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.50 J	0.50	1.0	1.0	1
<b>Wet Chemistry</b>							
<b>ASTM D422-63 (reapproved 2007)</b>			<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	98.6	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	88.8	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	88.0	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	87.1	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	86.3	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	82.0	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	47.8	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	5.2	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	1.3	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	0.50	0.50	0.50	0.50	1
<b>Wet Chemistry</b>							
<b>SW-846 9045D Nov 2004</b>			<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.32 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 20.2 C.							
<b>Wet Chemistry</b>							
<b>SM 2540 G-2011 %Moisture Calc</b>			<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.1	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-3-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781883  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submittal Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 08:15  
**SDG#:** PF015-02

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/08/2018 18:33	Drew M Gerhart	1
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00394	pH	SW-846 9045D Nov 2004	1	18253039401A	09/10/2018 18:20	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781884  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 09:15  
**SDG#:** PF015-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>			<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	5,200	103	310	310	1
<b>Wet Chemistry</b>			<b>ASTM D422</b>	<b>%</b>	<b>%</b>	<b>%</b>	
11604	% Gravel	n.a.	5.1	0.50	1.0	1.0	1
11604	% Sand	n.a.	87.1	0.50	1.0	1.0	1
11604	% Silt	n.a.	5.8	0.50	1.0	1.0	1
11604	% Clay	n.a.	2.0	0.50	1.0	1.0	1
<b>Wet Chemistry</b>			<b>ASTM D422-63 (reapproved 2007)</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	95.0	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	92.3	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	89.7	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	86.3	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	72.0	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	29.0	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	12.2	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	7.8	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	7.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	4.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1
<b>Wet Chemistry</b>			<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.32 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							
<b>Wet Chemistry</b>			<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

**Sample Description:** BAAP-FFTA-SN-3-WT80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781884  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submittal Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 09:15  
**SDG#:** PF015-03

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667634A	09/08/2018 18:46	Drew M Gerhart	1
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710310A	09/05/2018 12:30	Luz M Groff	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403B	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781885  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/29/2018 15:05  
**SDG#:** PF015-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>		<b>ASTM D422</b>	%	%	%	%	
11604	% Gravel	n.a.	< 1.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	13.3	0.50	1.0	1.0	1
11604	% Silt	n.a.	59.6	0.50	1.0	1.0	1
11604	% Clay	n.a.	27.0	0.50	1.0	1.0	1

<b>Wet Chemistry</b>		<b>ASTM D422-63 (reapproved 2007)</b>	% Passing	% Passing	% Passing	% Passing	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	100	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	99.9	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	99.9	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	99.8	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	99.8	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	99.1	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	94.7	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	88.4	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	86.6	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	83.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	73.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	45.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	27.0	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	21.0	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	20.0	0.50	0.50	0.50	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%	
00111	Moisture	n.a.	13.8	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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



**Sample Description:** BAAP-FFTA-SN-3-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781886  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/29/2018 15:30  
**SDG#:** PF015-05

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>							
<b>ASTM D422</b>							
11604	% Gravel	n.a.	47.3	0.50	1.0	1.0	1
11604	% Sand	n.a.	47.4	0.50	1.0	1.0	1
11604	% Silt	n.a.	4.8	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.50 J	0.50	1.0	1.0	1
<b>Wet Chemistry</b>							
<b>ASTM D422-63 (reapproved 2007)</b>							
			<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	73.7	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	52.7	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	47.4	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	43.2	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	39.1	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	30.3	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	16.2	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	7.8	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	5.3	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	4.0	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	3.0	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	1.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	< 0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1
<b>Wet Chemistry</b>							
<b>SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	3.8	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

**Sample Description:** BAAP-FFTA-SN-3-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9781887  
**ELLE Group #:** 1982467  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/29/2018 16:00  
**SDG#:** PF015-06

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>Wet Chemistry</b>							
<b>ASTM D422</b>							
11604	% Gravel	n.a.	30.0	0.50	1.0	1.0	1
11604	% Sand	n.a.	66.4	0.50	1.0	1.0	1
11604	% Silt	n.a.	3.1	0.50	1.0	1.0	1
11604	% Clay	n.a.	0.50 J	0.50	1.0	1.0	1
<b>Wet Chemistry</b>							
<b>ASTM D422-63 (reapproved 2007)</b>							
			<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	<b>% Passing</b>	
07103	75 mm	n.a.	100	0.50	0.50	0.50	1
07103	37.5 mm	n.a.	100	0.50	0.50	0.50	1
07103	19 mm	n.a.	91.1	0.50	0.50	0.50	1
07103	4.75 mm	n.a.	70.0	0.50	0.50	0.50	1
07103	3.35 mm	n.a.	65.6	0.50	0.50	0.50	1
07103	2.36 mm	n.a.	61.8	0.50	0.50	0.50	1
07103	1.18 mm	n.a.	54.7	0.50	0.50	0.50	1
07103	0.6 mm	n.a.	46.4	0.50	0.50	0.50	1
07103	0.3 mm	n.a.	24.7	0.50	0.50	0.50	1
07103	0.15 mm	n.a.	5.7	0.50	0.50	0.50	1
07103	0.075 mm	n.a.	3.6	0.50	0.50	0.50	1
07103	0.064 mm	n.a.	3.5	0.50	0.50	0.50	1
07103	0.05 mm	n.a.	2.5	0.50	0.50	0.50	1
07103	0.02 mm	n.a.	2.0	0.50	0.50	0.50	1
07103	0.005 mm	n.a.	0.50	0.50	0.50	0.50	1
07103	0.002 mm	n.a.	< 0.50	0.50	0.50	0.50	1
07103	0.001 mm	n.a.	< 0.50	0.50	0.50	0.50	1
<b>Wet Chemistry</b>							
<b>SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	4.3	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11604	Grain Size Classification	ASTM D422	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
07103	Grain Size to 1 um	ASTM D422-63 (reapproved 2007)	1	18248710301A	09/05/2018 12:30	Luz M Groff	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18247820006B	09/04/2018 23:43	Scott W Freisher	1

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

# Badger Army Ammunition Plant (BAAP)

## DATA REVIEW

### BAAP, Wisconsin

Perfluoroalkyl Substances (PFAS) Analysis

SDG #PF016

Analyses Performed By:  
Eurofins Lancaster Laboratories Environmental  
Lancaster, Pennsylvania

Report #30870R

Review Level: Stage 3

Project: 02118216.3002.3BA20

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## DATA REVIEW REPORT

### SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # PF016 for samples collected in association with the Badger Army Ammunition Site. The review was conducted as a Stage 3 evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
					PFAS	VOC	MET
BAAP-PBGP-PBN-8205C	9781926	Water	8/30/2018		X		
BAAP-PBGP-PBN-8205A	9781927	Water	8/30/2018		X		
BAAP-PBGP-PBM-8203	9781928	Water	8/30/2018		X		
BAAP-FB-GW-083018	9781931	Water	8/30/2018		X		
BAAP-FD-GW-083018	9781932	Water	8/30/2018	BAAP-PBGP-PBM-8203	X		

Note:

1. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location BAAP-PBGP-PBM-8203.

## DATA REVIEW REPORT

### ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:

QA - Quality Assurance

## DATA REVIEW REPORT

### ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with USEPA Method 537, ELLE SOPs T-PFAS-WI12031 and T-PFAS-WI14355, Department of Defense (DoD) Quality Systems Manual (QSM) 5.1, and Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, July 2018 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

## DATA REVIEW REPORT

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## DATA REVIEW REPORT

### PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified 537	Soil	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C
	Water	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, instrument, and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Instrument blanks measure carryover in the instrument from one sample to another. Method blanks measure laboratory contamination. Equipment rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

#### 3. Mass Calibration

Mass calibration and system performance were acceptable.

#### 4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

##### 4.1 Initial Calibration

The percent relative standard deviation (%RSD) of the response factors (RF) must be less than 20%, or for linear calibration,  $r^2 \geq 0.99$ . Analytes must be within 70-130% of their true value for each calibration standard.

##### 4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit of 30%.



## DATA REVIEW REPORT

### 4.3 Instrument Sensitivity Check (ISC)

The ISC concentration must be at the LOQ. All target compounds associated with the ISC must exhibit a percent recovery (%R) of 70 to 130%.

### 4.4 Ion Transitions

Quantitation of analytes must use the ion transitions documented in DoD QSM 5.1 Table B-15.

All compounds associated with the above calibration checks were within the specified control limits.

## 5. Isotopically labeled Standards

### 5.1 Extracted Internal Standards (EIS)

Labeled standards must be added to all field samples and QC samples prior to extraction. For aqueous samples prepared by serial dilution instead of SPE, they must be added to samples prior to analysis. EIS recoveries must be within DoD QSM 5.1 specified limits of 50% to 150%.

All EIS recoveries were within control limits.

### 5.2 Injection Internal Standards

Injection internal standards must be added to the aliquot of sample dilutions, QC samples, and standards just prior to analysis. Peak areas must be within -50% to +50% of the area measured in the ICAL midpoint standard. On days when ICAL is not performed, the peak areas must be within -50% to +50% of the peak area measured in daily initial CCV.

All internal standard responses were within control limits.

## 6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must be  $\leq 30\%$ .

Sample locations associated with the MS/MSD exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	Compound	MS Recovery	MSD Recovery
BAAP-PBGP-PBM-8203	Perfluoropentanoic acid	<LL but >10%	<LL but >10%

Note:

AC Acceptable

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J

## DATA REVIEW REPORT

Control Limit	Sample Result	Qualification
< 10%	Non-detect	R
	Detect	J

### 7. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

### 8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soils is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 2 times the LOQ, a control limit of two times the LOQ is applied for water matrices and three times the LOQ for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
BAAP-PBGP-PBM-8203/ BAAP-FD-GW-083018	Perfluoro-octanesulfonate	0.60 J	1.5 J	AC
	Perfluorooctanoic acid	0.79 J	0.89 J	
	Perfluoropentanoic acid	2.7 J	4.3 U	

#### Notes:

AC Acceptable

The results between the parent sample and field duplicate were acceptable.

### 9. Compound Identification

PFC analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

All identified compounds met method criteria.

### 10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

**DATA REVIEW REPORT**

**DATA VALIDATION CHECKLIST FOR PFAS**

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
<b>Stage 2 Validation</b>					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks					X
C. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate(MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field Duplicate (RPD)		X		X	
Extracted Internal Standard %R		X		X	
Injection Internal Standard %R		X		X	
Dilution Factor		X		X	
Moisture Content	X				X
<b>Stage 3/4 Validation</b>					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	

**DATA REVIEW REPORT**

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
D. Transcription/calculations acceptable					Not required for Stage 3
E. Reporting limits adjusted to reflect sample dilutions		X		X	

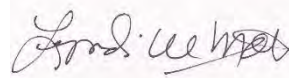
Notes:

- %RSD Relative standard deviation
- %R Percent recovery
- RPD Relative percent difference
- %D Percent difference

## DATA REVIEW REPORT

VALIDATION PERFORMED BY: Lyndi Mott, Arcadis

SIGNATURE:



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DATE: October 15, 2018

PEER REVIEW: Dennis Capria, Arcadis

DATE: October 29, 2018

**CHAIN OF CUSTODY  
CORRECTED SAMPLE ANALYSIS DATA  
SHEETS**



# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1982474 Sample # 9781926-32

**COC # 561241**

Client Information				Matrix				Analysis Requested										For Lab Use Only																																												
Client: <u>ARCADIS</u>		Acct. #:		<input type="checkbox"/> Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Tissue <input checked="" type="checkbox"/> Ground <input type="checkbox"/> Potable <input type="checkbox"/> Water <input type="checkbox"/> Surface <input type="checkbox"/> NPDES <input type="checkbox"/> Other:	Total # of Containers	Preservation and Filtration Codes										FSC: _____																																														
Project Name/ID: <u>BADGER / 08118216.1000</u>		PWSID #:				<table border="1" style="width:100%; height:100%; border-collapse: collapse;"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>																																																							SCR#: _____	
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:																																																												
Sampler: <u>DREIN KEHOE / KENDRA KEON</u>		Quote #:																																																												
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>												Preservation Codes H=HCl            T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered   O=Other																																																
Sample Identification				Collected		Grab	Composite	Total # of Containers: <u>PPAS - EPA METHOD 537</u>										Remarks																																												
				Date	Time																																																									
<u>BAAP-PBCP-PBN-8205C</u>				<u>8:30:18</u>	<u>1005</u>	X			X										<u>RUSH</u>																																											
<u>BAAP-PBCP-PBN-8205A</u>				<u>8:30:18</u>	<u>1040</u>	X			X										<u>SHAKER TEST = NO BUBBLES</u>																																											
<u>BAAP-PBCP-PBM-8203</u>				<u>8:30:18</u>	<u>1410</u>	X			X										<u>RUN MS/MSD</u>																																											
<u>BAAP-FB-GW-083018</u>				<u>8:30:18</u>	<u>1010</u>	X			X																																																					
<u>BAAP-FD-GW-083018</u>				<u>8:30:18</u>	<u>—</u>	X			X																																																					

Turnaround Time (TAT) Requested (please circle) Standard <u>Rush</u> (Rush TAT is subject to laboratory approval and surcharge.)			Relinquished by: <u>[Signature]</u> Date: <u>8/30/18</u> Time: <u>1500</u>		Received by: _____ Date: _____ Time: _____	
Date results are needed: <u>5 DAY TAT</u>			Relinquished by: _____ Date: _____ Time: _____		Received by: _____ Date: _____ Time: _____	
E-mail address: <u>kimmie.schrupp@arcadis.com</u>			Relinquished by: _____ Date: _____ Time: _____		Received by: _____ Date: _____ Time: _____	
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)    Type VI (Raw Data Only) Type III (Reduced non-CLP)    NJ DKQP    TX TRRP-13 NYSDEC Category A or B    MA MCP    CT RCP			EDD Required? <u>Yes</u> No If yes, format: _____		Relinquished by Commercial Carrier: UPS _____ FedEx <u>✓</u> Other _____	
			Site-Specific QC (MS/MSD/Dup)? Yes No (If yes, indicate QC sample and submit triplicate sample volume.)		Temperature upon receipt <u>0.7</u> °C	

1982474

**Katherine Klinefelter**

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**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project  
**Attachments:** BAAP COC 4.pdf; BAAP COC 5.pdf; BAAP COC 8.pdf; BAAP COC 1.pdf; BAAP COC 2.pdf; BAAP COC 3.pdf

EXTERNAL EMAIL\*

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanclabsEnv](http://www.EurofinsUS.com/LanclabsEnv)

---

**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project



1982474

EXTERNAL EMAIL\*

Hi Kathy,  
So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!  
Thanks  
Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

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Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1982474 Sample # 9781926-32

COC # 561241

Client Information				Matrix				Analysis Requested								For Lab Use Only	
Client: <u>ARCADIS</u>		Acct. #:		<input type="checkbox"/> Tissue	<input checked="" type="checkbox"/> Ground	<input type="checkbox"/> Surface	Total # of Containers	Preservation and Filtration Codes								FSC: _____	SCR#: _____
Project Name#: <u>BADGER / 0818216.1000</u>		PWSID #:		<input type="checkbox"/> Sediment	<input type="checkbox"/> Potable	<input type="checkbox"/> NPDES		PPAS - EPA METHOD 537									<b>Preservation Codes</b> H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered      O=Other
Project Manager: <u>KIMMIE SCHRUPP</u>		P.O. #:		<input type="checkbox"/> Soil	<input type="checkbox"/> Water	<input type="checkbox"/> Other:	Date		Time	Received by	Date	Time	Remarks				
Sampler: <u>DREN KENOE / KENDRA KEON</u>		Quote #:															
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Grab		Composite											
Sample Identification		Collected		Grab	Composite	Soil	Water	Other:	Total # of Containers	Date	Time	Received by	Date	Time			
		Date	Time														
<u>BAAP-PBCP-PBN-8205C</u>		<u>8-30-18</u>	<u>1005</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>					<u>SHAKER TEST = NO BUBBLES</u>		
<u>BAAP-PBCP-PBN-8205A</u>		<u>8-30-18</u>	<u>1040</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>					<u>RUN MS/MSD</u>		
<u>BAAP-PBCP-PBM-8203</u>		<u>8-30-18</u>	<u>1410</u>	<u>X</u>			<u>X</u>		<u>6</u>	<u>X</u>							
<u>BAAP-FB-GW-083018</u>		<u>8-30-18</u>	<u>1010</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>							
<u>BAAP-FD-GW-083018</u>		<u>8-30-18</u>	<u>-</u>	<u>X</u>			<u>X</u>		<u>2</u>	<u>X</u>							

RUSH

SHAKER TEST = NO BUBBLES

RUN MS/MSD



Turnaround Time (TAT) Requested (please circle)

Standard Rush

(Rush TAT is subject to laboratory approval and surcharge.)

Date results are needed: 5 DAY TAT

E-mail address: kimmie.schrupp@arcadis.com

Data Package Options (circle if required)

- Type I (EPA Level 3 Equivalent/non-CLP)
- Type III (Reduced non-CLP)
- NYSDEC Category A or B
- Type VI (Raw Data Only)
- NJ DKQP
- MA MCP
- TX TRRP-13
- CT RCP

Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time

EDD Required? Yes No

If yes, format: \_\_\_\_\_

Site-Specific QC (MS/MSD/Dup)? Yes No  
(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:  
UPS \_\_\_\_\_ FedEx \_\_\_\_\_ Other \_\_\_\_\_

Temperature upon receipt \_\_\_\_\_ °C



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>08/31/2018 10:20</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Conrad Burkholder (12 671) at 11:58 on 08/31/2018*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	0.7	DT	Wet	Y	Bagged	N

**Sample Description:** BAAP-PBGP-PBN-8205C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781926  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 10:05  
**SDG#:** PF016-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.0	0.99	2.0	3.0	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.0	0.99	2.0	3.0	1
14434	NEtFOSAA	2991-50-6	< 2.4	0.99	2.4	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.4	0.99	2.4	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	0.39 J	0.30	1.1	2.0	1
14434	Perfluorobutanoic acid	375-22-4	6.8	2.0	4.8	6.0	1
14434	Perfluorodecanoic acid	335-76-2	< 1.2	0.50	1.2	2.0	1
14434	Perfluorododecanoic acid	307-55-1	< 1.2	0.50	1.2	2.0	1
14434	Perfluoroheptanoic acid	375-85-9	0.97 J	0.40	1.2	2.0	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.1	0.40	1.1	2.0	1
14434	Perfluorohexanoic acid	307-24-4	1.2 J	0.50	1.2	2.0	1
14434	Perfluorononanoic acid	375-95-1	0.55 J	0.40	1.2	2.0	1
14434	Perfluoro-octanesulfonate	1763-23-1	2.2	0.50	1.2	2.0	1
14434	Perfluorooctanoic acid	335-67-1	2.8	0.50	1.2	2.0	1
14434	Perfluoropentanoic acid	2706-90-3	2.1 J	2.0	4.8	6.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.2	0.60	1.2	2.0	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.2	0.60	1.2	2.0	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.2	0.50	1.2	2.0	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:17	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-8205A Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
ELLE Sample #: WW 9781927  
ELLE Group #: 1982474  
Matrix: Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/31/2018 10:20  
Collection Date/Time: 08/30/2018 10:40  
SDG#: PF016-02

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.96	0.26	0.96	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.2	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.96	0.35	0.96	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	0.59 J	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.2	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:26	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBM-8203 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781928  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 14:10  
**SDG#:** PF016-03BKG

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	N.D.	0.87	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	N.D.	0.87	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	N.D.	0.87	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	N.D.	0.87	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	N.D.	0.26	0.95	1.7	1
14434	Perfluorobutanoic acid	375-22-4	N.D.	1.7	4.2	5.2	1
14434	Perfluorodecanoic acid	335-76-2	N.D.	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	N.D.	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	N.D.	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	N.D.	0.35	0.95	1.7	1
14434	Perfluorohexanoic acid	307-24-4	N.D.	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	N.D.	0.35	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.60 J	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.79 J	0.43	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	2.7 J	1.7	4.2	5.2	1
14434	Perfluorotetradecanoic acid	376-06-7	N.D.	0.52	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	N.D.	0.52	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	N.D.	0.43	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:35	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-FB-GW-083018 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781931  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018 10:10  
**SDG#:** PF016-04FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.98	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:44	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-FD-GW-083018 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9781932  
**ELLE Group #:** 1982474  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/31/2018 10:20  
**Collection Date/Time:** 08/30/2018  
**SDG#:** PF016-05FD

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.90	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.90	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.2	0.90	2.2	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.2	0.90	2.2	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.99	0.27	0.99	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.3	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.99	0.36	0.99	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.5 J	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	0.89 J	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/06/2018 02:53	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18245007	09/02/2018 13:40	Isaac Phillips-Cary	1

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



# Badger Army Ammunition Plant (BAAP)

## DATA REVIEW

### BAAP, Wisconsin

Perfluoroalkyl Substances (PFAS) Analysis

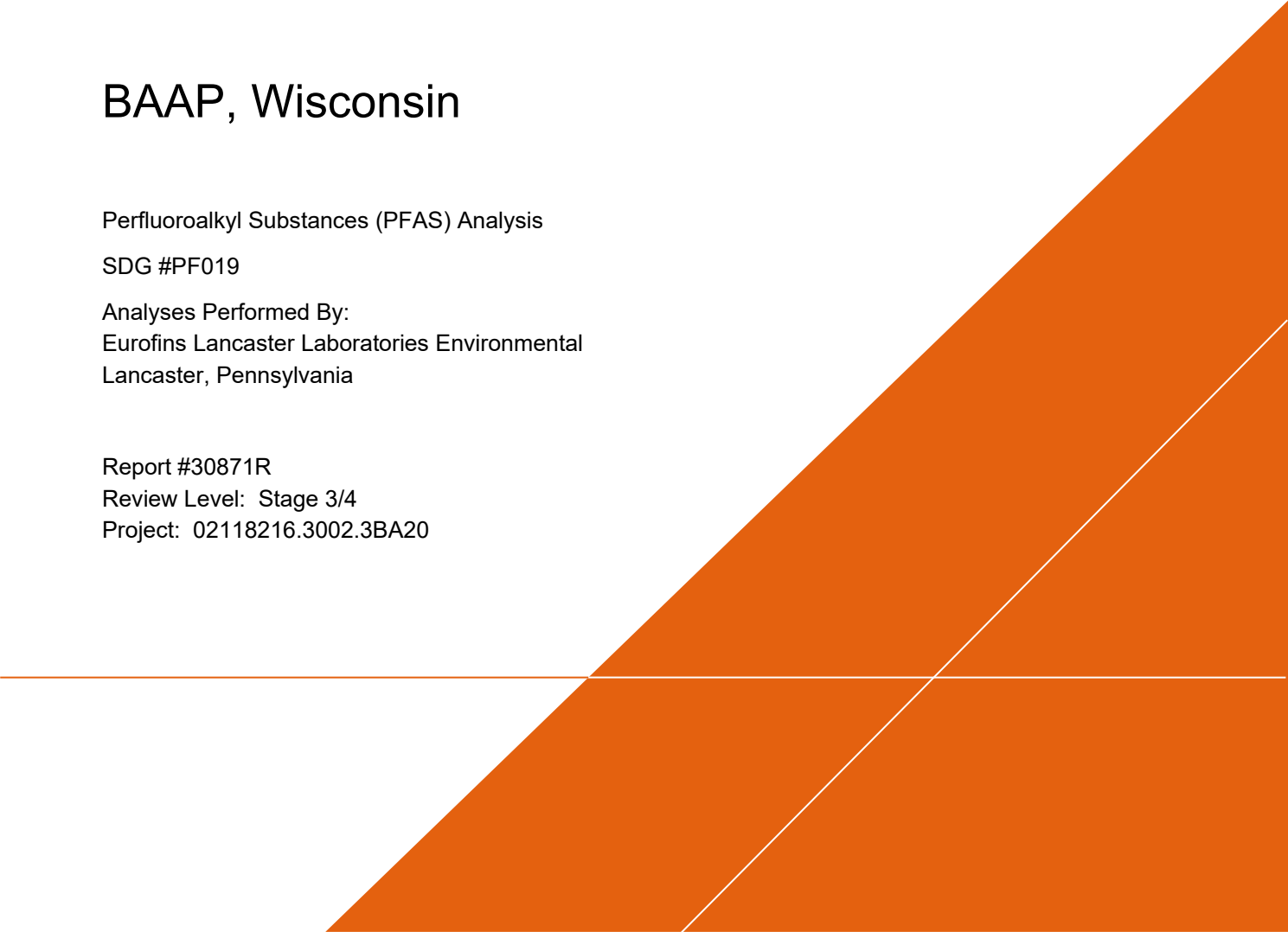
SDG #PF019

Analyses Performed By:  
Eurofins Lancaster Laboratories Environmental  
Lancaster, Pennsylvania

Report #30871R

Review Level: Stage 3/4

Project: 02118216.3002.3BA20



## DATA REVIEW REPORT

### SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # PF019 for samples collected in association with the Badger Army Ammunition Site. The review was conducted as a Stage 3/4 evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
					PFAS	VOC	MET
BAAP-PBGP-PBM-8201	9793089	Water	9/5/2018		X		
BAAP-POND-1-SE	9793090	Sediment	9/6/2018		X		
BAAP-FB-SE-090618	9793093	Water	9/6/2018		X		
BAAP-POND-2-SE	9793094	Sediment	9/6/2018		X		
BAAP-FD-SE-090618	9793095	Sediment	9/6/2018	BAAP-POND-2-SE	X		
BAAP-POND-3-SE	9793096	Sediment	9/6/2018		X		
BAAP-POND-1-SW	9793097	Water	9/6/2018		X		
BAAP-FB-SW-090618	9793100	Water	9/6/2018		X		
BAAP-POND-2-SW	9793101	Water	9/6/2018		X		
BAAP-FD-SW-090618	9793102	Water	9/6/2018	BAAP-POND-2-SW	X		
BAAP-PBGP-PBN-1302A	9793103	Water	8/31/2018		X		
BAAP-PBGP-PBN-1302B	9793104	Water	8/31/2018		X		
BAAP-PBGP-PBN-1302D	9793105	Water	8/31/2018		X		
BAAP-EB-GW-083118-4	9793106	Water	8/31/2018		X		
BAAP-PBGP-PBN-9301B	9793107	Water	9/4/2018		X		
BAAP-PBGP-PBN-9301C	9793108	Water	9/4/2018		X		
BAAP-PBGP-PBN-1302C	9793109	Water	9/4/2018		X		
BAAP-PBGP-PBN-9303D	9793110	Water	9/5/2018		X		
BAAP-PBGP-PBN-9303C	9793111	Water	9/5/2018		X		
BAAP-PBGP-PBN-9303B	9793112	Water	9/5/2018		X		
BAAP-POND-3-SW	9793113	Water	9/6/2018		X		

Note:

1. Stage 4 validation was performed on sample location BAAP-POND-1-SW.
2. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample locations BAAP-POND-1-SE and BAAP-POND-1-SW.

## DATA REVIEW REPORT

### ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:

QA - Quality Assurance

## DATA REVIEW REPORT

### ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with USEPA Method 537, ELLE SOPs T-PFAS-WI12031 and T-PFAS-WI14355, Department of Defense (DoD) Quality Systems Manual (QSM) 5.1, and Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, July 2018 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

## DATA REVIEW REPORT

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## DATA REVIEW REPORT

### PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified 537	Soil	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C
	Water	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, instrument, and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Instrument blanks measure carryover in the instrument from one sample to another. Method blanks measure laboratory contamination. Equipment rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were detected in the associated QA blanks; however, the associated sample results were greater than the BAL and/or were non-detect. Therefore, sample results greater than the BAL resulted in the removal of the laboratory qualifier (B). No other qualification of the sample results was required.

#### 3. Mass Calibration

Mass calibration and system performance were acceptable.

#### 4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

##### 4.1 Initial Calibration

The percent relative standard deviation (%RSD) of the response factors (RF) must be less than 20%, or for linear calibration,  $r^2 \geq 0.99$ . Analytes must be within 70-130% of their true value for each calibration standard.

##### 4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit of 30%.

## DATA REVIEW REPORT

### 4.3 Instrument Sensitivity Check (ISC)

The ISC concentration must be at the LOQ. All target compounds associated with the ISC must exhibit a percent recovery (%R) of 70 to 130%.

### 4.4 Ion Transitions

Quantitation of analytes must use the ion transitions documented in DoD QSM 5.1 Table B-15.

All compounds associated with the above calibration checks were within the specified control limits.

## 5. Isotopically labeled Standards

### 5.1 Extracted Internal Standards (EIS)

Labeled standards must be added to all field samples and QC samples prior to extraction. For aqueous samples prepared by serial dilution instead of SPE, they must be added to samples prior to analysis. EIS recoveries must be within DoD QSM 5.1 specified limits of 50% to 150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	Recovery
BAAP-PBGP-PBN-1302B	13C2 PFTeDA	Perfluorotetradecanoic acid	< 50% but > 25%

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> 150%	Non-detect	No Action
	Detect	
< 50% but > 25%	Non-detect	
	Detect	
< 25%	Non-detect	R
	Detect	J

As part of the isotope dilution analysis, the EIS are used for quantitation of the sample results, therefore the calculation of sample concentrations is adjusted for EIS recoveries. The data will not be qualified unless EIS recoveries are less than 25%.

### 5.2 Injection Internal Standards

Injection internal standards must be added to the aliquot of sample dilutions, QC samples, and standards just prior to analysis. Peak areas must be within -50% to +50% of the area measured in the ICAL midpoint standard. On days when ICAL is not performed, the peak areas must be within -50% to +50% of the peak area measured in daily initial CCV.

All internal standard responses were within control limits.

## 6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established

## DATA REVIEW REPORT

acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must be  $\leq 30\%$ .

The MS/MSD analysis performed on sample locations BAAP-POND-1-SE and BAAP-POND-1-SW exhibited acceptable recoveries and RPD between the MS/MSD recoveries.

### 7. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

### 8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soils is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 2 times the LOQ, a control limit of two times the LOQ is applied for water matrices and three times the LOQ for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
BAAP-POND-2-SE/ BAAP-FD-SE-090618	All target PFAS compounds	U	U	AC
BAAP-POND-2-SW/ BAAP-FD-SW-090618	Perfluorobutanoic acid	10 J	4.2 U	AC
	Perfluoro-octanesulfonate	2.7 J	1.1 U	
	Perfluorooctanoic acid	2.8 J	1.1 U	

#### Notes:

AC Acceptable

The results between the parent samples and their associated field duplicate were acceptable.

### 9. Compound Identification

PFC analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

All identified compounds met method criteria.

### 10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.



# DATA REVIEW REPORT

## DATA VALIDATION CHECKLIST FOR PFAS

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
<b>Stage 2 Validation</b>					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
C. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate(MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field Duplicate (RPD)		X		X	
Extracted Internal Standard %R		X	X		
Injection Internal Standard %R		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
<b>Stage 3/4 Validation</b>					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	

**DATA REVIEW REPORT**

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
D. Transcription/calculations acceptable		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

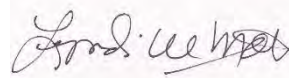
RPD Relative percent difference

%D Percent difference

## DATA REVIEW REPORT

VALIDATION PERFORMED BY: Lyndi Mott, Arcadis

SIGNATURE:



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DATE: October 15, 2018

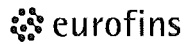
PEER REVIEW: Dennis Capria, Arcadis

DATE: October 29, 2018

**CHAIN OF CUSTODY  
CORRECTED SAMPLE ANALYSIS DATA  
SHEETS**



# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1484962 Sample # 9793089-113

**COC # 561243**

Client Information				Matrix				Analysis Requested										For Lab Use Only	
Client: <u>Arcadis</u>			Acct. #:	<input type="checkbox"/> Tissue <input checked="" type="checkbox"/> Ground <input checked="" type="checkbox"/> Surface <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Water <input type="checkbox"/> Sediment <input type="checkbox"/> Soil <input type="checkbox"/> Other:		Preservation and Filtration Codes										FSC: _____			
Project Name/ID: <u>BADGER / 02118216.1000</u>			PWSID #:			Total # of Containers: <u>PFAS - EPA Method 521</u>										SCR#: _____			
Project Manager: <u>Kimmie Schrupp</u>			P.O. #:													Preservation Codes			
Sampler: <u>Drew Kehoe / Kevin Engle</u>			Quote #:													H=HCl                      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered        O=Other			
State where samples were collected: <u>WI</u>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Grab	Composite											Remarks			
Sample Identification		Collected																	
		Date	Time																
<u>BAAP-PBGP-PBM-8201</u>		<u>9.5.18</u>	<u>1605</u>	<u>X</u>															
<u>BAAP-POND-1-SE</u>		<u>9.6.18</u>	<u>1100</u>	<u>X</u>	<u>X</u>														
<u>BAAP-FB-SE-090618</u>		<u>9.6.18</u>	<u>1105</u>	<u>X</u>		<u>X</u>													
<u>BAAP-POND-2-SE</u>		<u>9.6.18</u>	<u>1110</u>	<u>X</u>	<u>X</u>														
<u>BAAP-FD-SE-090618</u>		<u>9.6.18</u>		<u>X</u>	<u>X</u>														
<u>BAAP-POND-3-SE</u>		<u>9.6.18</u>	<u>1115</u>	<u>X</u>	<u>X</u>														
<u>BAAP-POND-1-SW</u>		<u>9.6.18</u>	<u>1130</u>	<u>X</u>			<u>X</u>												
<u>BAAP-FB-SW-090618</u>		<u>9.6.18</u>	<u>1140</u>	<u>X</u>			<u>X</u>												
<u>BAAP-POND-2-SW</u>		<u>9.6.18</u>	<u>1150</u>	<u>X</u>			<u>X</u>												
<u>BAAP-FD-SW-090618</u>		<u>9.6.18</u>		<u>X</u>			<u>X</u>												

Turnaround Time (TAT) Requested (please circle) Standard <input checked="" type="checkbox"/> Rush <input type="checkbox"/> (Rush TAT is subject to laboratory approval and surcharge.)		Relinquished by <u>Drew Kehoe</u>	Date <u>9.6.18</u>	Time <u>1730</u>	Received by	Date	Time
Date results are needed: _____		Relinquished by	Date	Time	Received by	Date	Time
E-mail address: <u>Kimmie.Schrupp@arcadis.com</u>		Relinquished by	Date	Time	Received by	Date	Time
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP		Relinquished by	Date	Time	Received by	Date	Time
EDD Required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, format: _____		Relinquished by Commercial Carrier:		UPS _____ FedEx <input checked="" type="checkbox"/> Other _____			
Site-Specific QC (MS/MSD/Dup)?    Yes    No (If yes, indicate QC sample and submit triplicate sample volume.)		Temperature upon receipt <u>15</u> °C					

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1984962 Sample # 9793084-113

**COC # 561242**

Client Information				Matrix				Analysis Requested				For Lab Use Only			
Client: <b>ARCADIS</b>		Acct. #:		<input type="checkbox"/> Tissue <input checked="" type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Water <input type="checkbox"/> Other:		Total # of Containers		Preservation and Filtration Codes				FSC: _____			
Project Name/ID: <b>BADGER/02118216.1000</b>		PWSID #:						PFAS - EPA METHOD 537				SCR#: _____			
Project Manager: <b>KIMMIE SCHRUPP</b>		P.O. #:										Preservation Codes			
Sampler: <b>DREW KEHOE/KENDRA KEON</b>		Quote #:		Soil <input type="checkbox"/> Sediment <input type="checkbox"/>		Water <input checked="" type="checkbox"/>		H=HCl                      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered        O=Other		Remarks					
State where samples were collected: <b>WI</b>		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>		Sample Identification		Collected		Grab				Composite			
Sample Identification		Collected		Grab		Composite									
Date	Time	Grab	Composite	Soil	Water	Other	Total # of Containers								
BADP-PBGP-PBN-1302A	8-31-18 09:25	X			X		2	X						No bubbles	
BADP-PBGP-PBN-1302B	8-31-18 11:35	X			X		2	X						No bubbles	
BADP-PBGP-PBN-1302D	8-31-18 12:25	X			X		2	X						No bubbles	
BADP-EB-GW-083118-4	8-31-18 09:40	X			X		2	X						No bubbles	
BAAP-PBGP-PBN-9301B	9-4-18 14:00	X			X		2	X						No bubbles - these samples are labeled	
BAAP-PBGP-PBN-9301C	9-4-18 15:00	X			X		2	X						No bubbles	
BAAP-PBGP-PBN-1302C	9-4-18 17:55	X			X		2	X						no bubbles	
BAAP-PBGP-PBN-9303D	9-5-18 13:20	X			X		2	X							
BAAP-PBGP-PBN-9303C	9-5-18 13:30	X			X		2	X							
BAAP-PBGP-PBN-9303B	9-5-18 13:40	X			X		2	X							
Turnaround Time (TAT) Requested (please circle) Standard <input checked="" type="radio"/> Rush <input type="radio"/> (Rush TAT is subject to laboratory approval and surcharge.)				Relinquished by: <b>Drew Kehoe</b>		Date: <b>9-6-18</b> Time: <b>17:30</b>		Received by:		Date:		Time:			
Date results are needed: _____				Relinquished by:		Date:		Time:		Received by:		Date:		Time:	
E-mail address: <b>Kimmie.Schrupp@arcadis.com</b>				Relinquished by:		Date:		Time:		Received by:		Date:		Time:	
Data Package Options (circle if required) Type I (EPA Level 3 Equivalent/non-CLP)      Type VI (Raw Data Only) Type III (Reduced non-CLP)      NJ DKQP      TX TRRP-13 NYSDEC Category A or B      MA MCP      CT RCP				Relinquished by:		Date:		Time:		Received by:		Date:		Time:	
				Relinquished by:		Date:		Time:		Received by:		Date:		Time:	
				Relinquished by:		Date:		Time:		Received by: <b>[Signature]</b>		Date: <b>9/18/18</b>		Time: <b>18:00</b>	
				EDD Required? <input checked="" type="radio"/> Yes <input type="radio"/> No				Relinquished by Commercial Carrier:							
				If yes, format: _____				UPS _____ FedEx _____ Other _____							
				Site-Specific QC (MS/MSD/Dup)? Yes No				Temperature upon receipt <b>1.5</b> °C							
				(If yes, indicate QC sample and submit triplicate sample volume.)											

Shaker Test:  
 No bubbles  
 No bubbles  
 No bubbles  
 No bubbles  
 No bubbles - these samples are labeled  
 No bubbles } 9-2-18 and 9-4-18  
 no bubbles

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1484962 Sample # 9793069-113

**COC # 561244**

Client Information					Matrix			Analysis Requested											For Lab Use Only												
Client:		Acct. #:			<input type="checkbox"/> Tissue			Preservation and Filtration Codes											FSC: _____												
Project Name/#:		PWSID #:			<input type="checkbox"/> Sediment			<table border="1"><tr><td colspan="11">Remarks</td></tr></table>											Remarks											SCR#: _____	
Remarks																															
Project Manager:		P.O. #:			<input type="checkbox"/> Ground														Preservation Codes												
Sampler:		Quote #:			<input type="checkbox"/> Potable														H=HCl T=Thiosulfate												
State where samples were collected:		For Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>			<input type="checkbox"/> NPDES														N=HNO <sub>3</sub> B=NaOH												
					<input type="checkbox"/> Other:			S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub>																							
Sample Identification			Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	PPHS - EPA Method 537											Remarks									
			Date	Time																											
BAAP-POND-3-SW			9-6-18	1200	X				X		2	X																			
Turnaround Time (TAT) Requested (please circle)							Relinquished by		Date		Time		Received by		Date		Time														
Standard			Rush				Drew Kehoe		9-6-18		1730																				
(Rush TAT is subject to laboratory approval and surcharge.)																															
Date results are needed: _____																															
E-mail address: <u>Kimmi.schrupp@arcadis.com</u>																															
Data Package Options (circle if required)							Relinquished by		Date		Time		Received by		Date		Time														
Type I (EPA Level 3 Equivalent/non-CLP)			Type VI (Raw Data Only)																												
Type III (Reduced non-CLP)			NJ DKQP TX TRRP-13																												
NYSDEC Category A or B			MA MCP CT RCP										Sum		9/8/18		10:00														
							EDD Required? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>						Relinquished by Commercial Carrier:																		
							If yes, format: _____						UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> Other <input type="checkbox"/>																		
							Site-Specific QC (MS/MSD/Dup)? Yes No						Temperature upon receipt		65		°C														
							(If yes, indicate QC sample and submit triplicate sample volume.)																								



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method: Fed Ex Arrival Timestamp: 09/07/2018 10:10  
 Number of Packages: 1 Number of Projects: 1

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	N/A
Custody Seal Present:	Yes	Sample Date/Times match COC:	N/A
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	No	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	N/A		

Unpacked by Melvin Sanchez (8943) at 17:12 on 09/07/2018

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	1.8	DT	Wet	Y	Bagged	N

**Paperwork Not Enclosed Details**

Sample ID on Label	No. of Containers	Date on Label	Comments
BAAP-POND-1-SE	3	9/06/2018 11:00	
BAAP-POND-2-SE	1	9/06/2018 11:10	
BAAP-POND-3-SE	1	9/06/2018 11:15	
BAAP-FD-SE-090618	1	9/06/2018 --	





Client: ARCADIS

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>09/08/2018 10:00</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WI</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Suegeily Mendez (14058) at 14:53 on 09/08/2018

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.5	DT	Wet	Y	Bagged	N

General Comments: RECEIVED COOLER FROM 9/7/18

**Sample Description:** BAAP-PBGP-PBM-8201 Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793089  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 16:05  
**SDG#:** PF019-01

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.83	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.83	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.83	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.83	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.91	0.25	0.91	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.0	1.7	4.0	5.0	1
14434	Perfluorodecanoic acid	335-76-2	< 0.99	0.41	0.99	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 0.99	0.41	0.99	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 0.99	0.33	0.99	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.91	0.33	0.91	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 0.99	0.41	0.99	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 0.99	0.33	0.99	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 0.99	0.41	0.99	1.7	1
14434	Perfluorooctanoic acid	335-67-1	0.54 J	0.41	0.99	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.0	1.7	4.0	5.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 0.99	0.50	0.99	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 0.99	0.50	0.99	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 0.99	0.41	0.99	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 11:32	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-1-SE Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793090  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:00  
**SDG#:** PF019-02BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 3.5	1.1	3.5	3.7	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 3.5	0.93	3.5	3.7	1
14478	NEtFOSAA	2991-50-6	< 3.7	0.93	3.7	5.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 3.7	0.93	3.7	5.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.1	0.37	1.1	1.5	1
14478	Perfluorobutanoic acid	375-22-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorodecanoic acid	335-76-2	< 1.3	0.56	1.3	1.9	1
14478	Perfluorododecanoic acid	307-55-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.3	0.37	1.3	1.5	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.2	0.37	1.2	1.5	1
14478	Perfluorohexanoic acid	307-24-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorononanoic acid	375-95-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.2	0.37	1.2	1.5	1
14478	Perfluorooctanoic acid	335-67-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.3	0.37	1.3	1.5	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	49.5	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 16:55	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-FB-SE-090618 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793093  
**ELLE Group #:** 1984962  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:05  
**SDG#:** PF019-03FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.85	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.85	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.85	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.85	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.93	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.1	1.7	4.1	5.1	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.0	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.93	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 1.0	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.1	1.7	4.1	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 11:41	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-2-SE Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793094  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:10  
**SDG#:** PF019-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 3.5	1.1	3.5	3.7	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 3.5	0.92	3.5	3.7	1
14478	NEtFOSAA	2991-50-6	< 3.7	0.92	3.7	5.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 3.7	0.92	3.7	5.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.1	0.37	1.1	1.5	1
14478	Perfluorobutanoic acid	375-22-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorodecanoic acid	335-76-2	< 1.3	0.55	1.3	1.8	1
14478	Perfluorododecanoic acid	307-55-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.3	0.37	1.3	1.5	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.2	0.37	1.2	1.5	1
14478	Perfluorohexanoic acid	307-24-4	< 1.3	0.37	1.3	1.5	1
14478	Perfluorononanoic acid	375-95-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.2	0.37	1.2	1.5	1
14478	Perfluorooctanoic acid	335-67-1	< 1.3	0.37	1.3	1.5	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.3	0.37	1.3	1.5	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.3	0.37	1.3	1.5	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.3	0.37	1.3	1.5	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	47.4	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 17:49	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-FD-SE-090618 Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793095  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018  
**SDG#:** PF019-05FD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 3.8	1.2	3.8	4.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 3.8	1.0	3.8	4.0	1
14478	NEtFOSAA	2991-50-6	< 4.0	1.0	4.0	6.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 4.0	1.0	4.0	6.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.2	0.40	1.2	1.6	1
14478	Perfluorobutanoic acid	375-22-4	< 1.4	0.40	1.4	1.6	1
14478	Perfluorodecanoic acid	335-76-2	< 1.4	0.60	1.4	2.0	1
14478	Perfluorododecanoic acid	307-55-1	< 1.4	0.40	1.4	1.6	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.4	0.40	1.4	1.6	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.3	0.40	1.3	1.6	1
14478	Perfluorohexanoic acid	307-24-4	< 1.4	0.40	1.4	1.6	1
14478	Perfluorononanoic acid	375-95-1	< 1.4	0.40	1.4	1.6	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.3	0.40	1.3	1.6	1
14478	Perfluorooctanoic acid	335-67-1	< 1.4	0.40	1.4	1.6	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.4	0.40	1.4	1.6	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.4	0.40	1.4	1.6	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.4	0.40	1.4	1.6	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.4	0.40	1.4	1.6	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	53.9	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 18:07	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-POND-3-SE Grab Sediment  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9793096  
**ELLE Group #:** 1984962  
**Matrix:** Sediment

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:15  
**SDG#:** PF019-06

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 4.1	1.3	4.1	4.3	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 4.1	1.1	4.1	4.3	1
14478	NEtFOSAA	2991-50-6	< 4.3	1.1	4.3	6.4	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 4.3	1.1	4.3	6.4	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 1.3	0.43	1.3	1.7	1
14478	Perfluorobutanoic acid	375-22-4	< 1.5	0.43	1.5	1.7	1
14478	Perfluorodecanoic acid	335-76-2	< 1.5	0.64	1.5	2.1	1
14478	Perfluorododecanoic acid	307-55-1	< 1.5	0.43	1.5	1.7	1
14478	Perfluoroheptanoic acid	375-85-9	< 1.5	0.43	1.5	1.7	1
14478	Perfluorohexanesulfonate	355-46-4	< 1.4	0.43	1.4	1.7	1
14478	Perfluorohexanoic acid	307-24-4	< 1.5	0.43	1.5	1.7	1
14478	Perfluorononanoic acid	375-95-1	< 1.5	0.43	1.5	1.7	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 1.4	0.43	1.4	1.7	1
14478	Perfluorooctanoic acid	335-67-1	< 1.5	0.43	1.5	1.7	1
14478	Perfluoropentanoic acid	2706-90-3	< 1.5	0.43	1.5	1.7	1
14478	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.43	1.5	1.7	1
14478	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.43	1.5	1.7	1
14478	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.43	1.5	1.7	1

<b>Wet Chemistry</b>		<b>SM 2540 G-2011</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
		<b>%Moisture Calc</b>					
00111	Moisture	n.a.	56.7	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/17/2018 18:25	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255011	09/13/2018 08:30	Isaac Phillips-Cary	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18254820010B	09/11/2018 19:45	Scott W Freisher	1

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

**Sample Description:** BAAP-POND-1-SW Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793097  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:30  
**SDG#:** PF019-07BKG

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 9.9	4.9	9.9	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 9.9	4.9	9.9	15	1
14434	NEtFOSAA	2991-50-6	< 12	4.9	12	15	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 12	4.9	12	15	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 5.4	1.5	5.4	9.9	1
14434	Perfluorobutanoic acid	375-22-4	10 J	9.9	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 5.9	2.5	5.9	9.9	1
14434	Perfluorododecanoic acid	307-55-1	< 5.9	2.5	5.9	9.9	1
14434	Perfluoroheptanoic acid	375-85-9	< 5.9	2.0	5.9	9.9	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.4	2.0	5.4	9.9	1
14434	Perfluorohexanoic acid	307-24-4	< 5.9	2.5	5.9	9.9	1
14434	Perfluorononanoic acid	375-95-1	< 5.9	2.0	5.9	9.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	2.7 J	2.5	5.9	9.9	1
14434	Perfluorooctanoic acid	335-67-1	2.8 J	2.5	5.9	9.9	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	9.9	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 5.9	3.0	5.9	9.9	1
14434	Perfluorotridecanoic acid	72629-94-8	< 5.9	3.0	5.9	9.9	1
14434	Perfluoroundecanoic acid	2058-94-8	< 5.9	2.5	5.9	9.9	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 11:50	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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



**Sample Description:** BAAP-FB-SW-090618 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793100  
**ELLE Group #:** 1984962  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:40  
**SDG#:** PF019-08FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.97	0.26	0.97	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.2	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.97	0.35	0.97	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.2	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 12:17	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-2-SW Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793101  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 11:50  
**SDG#:** PF019-09

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 10	5.0	10	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 10	5.0	10	15	1
14434	NEtFOSAA	2991-50-6	< 12	5.0	12	15	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 12	5.0	12	15	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 5.5	1.5	5.5	10	1
14434	Perfluorobutanoic acid	375-22-4	11 J	10	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 6.0	2.5	6.0	10	1
14434	Perfluorododecanoic acid	307-55-1	< 6.0	2.5	6.0	10	1
14434	Perfluoroheptanoic acid	375-85-9	< 6.0	2.0	6.0	10	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.5	2.0	5.5	10	1
14434	Perfluorohexanoic acid	307-24-4	< 6.0	2.5	6.0	10	1
14434	Perfluorononanoic acid	375-95-1	< 6.0	2.0	6.0	10	1
14434	Perfluoro-octanesulfonate	1763-23-1	2.7 J	2.5	6.0	10	1
14434	Perfluorooctanoic acid	335-67-1	2.8 J	2.5	6.0	10	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	10	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 6.0	3.0	6.0	10	1
14434	Perfluorotridecanoic acid	72629-94-8	< 6.0	3.0	6.0	10	1
14434	Perfluoroundecanoic acid	2058-94-8	< 6.0	2.5	6.0	10	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 12:26	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-FD-SW-090618 Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793102  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018  
**SDG#:** PF019-10FD

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 10	5.0	10	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 10	5.0	10	15	1
14434	NEtFOSAA	2991-50-6	< 12	5.0	12	15	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 12	5.0	12	15	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 5.5	1.5	5.5	10	1
14434	Perfluorobutanoic acid	375-22-4	10 J	10	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 6.0	2.5	6.0	10	1
14434	Perfluorododecanoic acid	307-55-1	< 6.0	2.5	6.0	10	1
14434	Perfluoroheptanoic acid	375-85-9	< 6.0	2.0	6.0	10	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.5	2.0	5.5	10	1
14434	Perfluorohexanoic acid	307-24-4	< 6.0	2.5	6.0	10	1
14434	Perfluorononanoic acid	375-95-1	< 6.0	2.0	6.0	10	1
14434	Perfluoro-octanesulfonate	1763-23-1	6.1 JB	2.5	6.0	10	1
14434	Perfluorooctanoic acid	335-67-1	3.1 J	2.5	6.0	10	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	10	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 6.0	3.0	6.0	10	1
14434	Perfluorotridecanoic acid	72629-94-8	< 6.0	3.0	6.0	10	1
14434	Perfluoroundecanoic acid	2058-94-8	< 6.0	2.5	6.0	10	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18257020	09/17/2018 22:10	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18257020	09/14/2018 16:00	Anthony C Polaski	1

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

**Sample Description:** BAAP-PBGP-PBN-1302A Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793103  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 08/31/2018 09:25  
**SDG#:** PF019-11

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.5	1.2	2.5	3.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.5	1.2	2.5	3.7	1
14434	NEtFOSAA	2991-50-6	< 3.0	1.2	3.0	3.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 3.0	1.2	3.0	3.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 1.4	0.37	1.4	2.5	1
14434	Perfluorobutanoic acid	375-22-4	< 6.0	2.5	6.0	7.5	1
14434	Perfluorodecanoic acid	335-76-2	< 1.5	0.62	1.5	2.5	1
14434	Perfluorododecanoic acid	307-55-1	< 1.5	0.62	1.5	2.5	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.5	0.50	1.5	2.5	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.4	0.50	1.4	2.5	1
14434	Perfluorohexanoic acid	307-24-4	< 1.5	0.62	1.5	2.5	1
14434	Perfluorononanoic acid	375-95-1	< 1.5	0.50	1.5	2.5	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.1 J	0.62	1.5	2.5	1
14434	Perfluorooctanoic acid	335-67-1	1.0 J	0.62	1.5	2.5	1
14434	Perfluoropentanoic acid	2706-90-3	< 6.0	2.5	6.0	7.5	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.75	1.5	2.5	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.75	1.5	2.5	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.62	1.5	2.5	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 12:53	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-1302B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793104  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 08/31/2018 11:35  
**SDG#:** PF019-12

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.85	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.85	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.85	2.0	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.85	2.0	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.94	0.26	0.94	1.7	1
14434	Perfluorobutanoic acid	375-22-4	11	1.7	4.1	5.1	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	0.61 J	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.94	0.34	0.94	1.7	1
14434	Perfluorohexanoic acid	307-24-4	1.4 J	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	3.4	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	1.2 J	0.43	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	5.2	1.7	4.1	5.1	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.51	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.51	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.43	1.0	1.7	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted outside holding time. The data is reported from the original extraction. Both sets of data are included in the data package.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:02	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-1302D Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793105  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 08/31/2018 12:25  
**SDG#:** PF019-13

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.5	1.2	2.5	3.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.5	1.2	2.5	3.7	1
14434	NEtFOSAA	2991-50-6	< 3.0	1.2	3.0	3.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 3.0	1.2	3.0	3.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 1.4	0.37	1.4	2.5	1
14434	Perfluorobutanoic acid	375-22-4	8.5	2.5	6.0	7.5	1
14434	Perfluorodecanoic acid	335-76-2	0.66 J	0.62	1.5	2.5	1
14434	Perfluorododecanoic acid	307-55-1	< 1.5	0.62	1.5	2.5	1
14434	Perfluoroheptanoic acid	375-85-9	1.4 J	0.50	1.5	2.5	1
14434	Perfluorohexanesulfonate	355-46-4	< 1.4	0.50	1.4	2.5	1
14434	Perfluorohexanoic acid	307-24-4	1.7 J	0.62	1.5	2.5	1
14434	Perfluorononanoic acid	375-95-1	0.66 J	0.50	1.5	2.5	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.4 J	0.62	1.5	2.5	1
14434	Perfluorooctanoic acid	335-67-1	0.81 J	0.62	1.5	2.5	1
14434	Perfluoropentanoic acid	2706-90-3	7.7	2.5	6.0	7.5	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.75	1.5	2.5	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.75	1.5	2.5	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.62	1.5	2.5	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:11	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-EB-GW-083118-4 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793106  
**ELLE Group #:** 1984962  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 08/31/2018 09:40  
**SDG#:** PF019-14EB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.86	1.7	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.86	1.7	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.86	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.86	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.95	0.26	0.95	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.1	1.7	4.1	5.2	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.43	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.0	0.35	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.95	0.35	0.95	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 1.0	0.43	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.35	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	< 1.0	0.43	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.1	1.7	4.1	5.2	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.52	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.52	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.43	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:20	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9301B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793107  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/04/2018 14:00  
**SDG#:** PF019-15

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.7	0.84	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.84	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	< 2.0	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.93	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	< 4.0	1.7	4.0	5.0	1
14434	Perfluorodecanoic acid	335-76-2	< 1.0	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.0	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.93	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	< 1.0	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	< 1.0	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.0	1.7	4.0	5.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.50	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.50	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18257020	09/17/2018 22:28	Joshua P Trost	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18257020	09/14/2018 16:00	Anthony C Polaski	1

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



**Sample Description:** BAAP-PBGP-PBN-9301C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793108  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/04/2018 15:00  
**SDG#:** PF019-16

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	1.7 J	0.84	1.7	2.5	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.7	0.84	1.7	2.5	1
14434	NEtFOSAA	2991-50-6	4.3	0.84	2.0	2.5	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.0	0.84	2.0	2.5	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.93	0.25	0.93	1.7	1
14434	Perfluorobutanoic acid	375-22-4	5.6	1.7	4.0	5.0	1
14434	Perfluorodecanoic acid	335-76-2	0.46 J	0.42	1.0	1.7	1
14434	Perfluorododecanoic acid	307-55-1	< 1.0	0.42	1.0	1.7	1
14434	Perfluoroheptanoic acid	375-85-9	0.63 J	0.34	1.0	1.7	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.93	0.34	0.93	1.7	1
14434	Perfluorohexanoic acid	307-24-4	1.0 J	0.42	1.0	1.7	1
14434	Perfluorononanoic acid	375-95-1	0.39 J	0.34	1.0	1.7	1
14434	Perfluoro-octanesulfonate	1763-23-1	1.6 J	0.42	1.0	1.7	1
14434	Perfluorooctanoic acid	335-67-1	2.0	0.42	1.0	1.7	1
14434	Perfluoropentanoic acid	2706-90-3	1.9 J	1.7	4.0	5.0	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.0	0.50	1.0	1.7	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.0	0.50	1.0	1.7	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.0	0.42	1.0	1.7	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:38	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-1302C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793109  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/04/2018 17:55  
**SDG#:** PF019-17

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	1.6 J	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.98	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	3.0 J	1.8	4.3	5.4	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	0.44 J	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	0.63 J	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	3.5	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.3	1.8	4.3	5.4	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.54	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.54	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:47	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9303D Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793110  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 13:20  
**SDG#:** PF019-18

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 2.5	1.2	2.5	3.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 2.5	1.2	2.5	3.7	1
14434	NEtFOSAA	2991-50-6	< 3.0	1.2	3.0	3.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 3.0	1.2	3.0	3.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	0.98 J	0.37	1.4	2.5	1
14434	Perfluorobutanoic acid	375-22-4	30	2.5	6.0	7.5	1
14434	Perfluorodecanoic acid	335-76-2	< 1.5	0.62	1.5	2.5	1
14434	Perfluorododecanoic acid	307-55-1	< 1.5	0.62	1.5	2.5	1
14434	Perfluoroheptanoic acid	375-85-9	2.9	0.50	1.5	2.5	1
14434	Perfluorohexanesulfonate	355-46-4	1.7 J	0.50	1.4	2.5	1
14434	Perfluorohexanoic acid	307-24-4	5.6	0.62	1.5	2.5	1
14434	Perfluorononanoic acid	375-95-1	< 1.5	0.50	1.5	2.5	1
14434	Perfluoro-octanesulfonate	1763-23-1	14	0.62	1.5	2.5	1
14434	Perfluorooctanoic acid	335-67-1	5.5	0.62	1.5	2.5	1
14434	Perfluoropentanoic acid	2706-90-3	24	2.5	6.0	7.5	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.5	0.75	1.5	2.5	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.5	0.75	1.5	2.5	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.5	0.62	1.5	2.5	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 13:56	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9303C Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793111  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 13:30  
**SDG#:** PF019-19

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.89	1.8	2.7	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.89	1.8	2.7	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.89	2.1	2.7	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.89	2.1	2.7	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	0.28 J	0.27	0.98	1.8	1
14434	Perfluorobutanoic acid	375-22-4	7.1	1.8	4.3	5.3	1
14434	Perfluorodecanoic acid	335-76-2	1.1 J	0.45	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.45	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	1.2 J	0.36	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.98	0.36	0.98	1.8	1
14434	Perfluorohexanoic acid	307-24-4	1.6 J	0.45	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	1.1 J	0.36	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	7.8	0.45	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	3.8	0.45	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	2.6 J	1.8	4.3	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	0.56 J	0.45	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 14:05	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-PBGP-PBN-9303B Grab Groundwater  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793112  
**ELLE Group #:** 1984962  
**Matrix:** Groundwater

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/05/2018 13:40  
**SDG#:** PF019-20

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.96	0.26	0.96	1.8	1
14434	Perfluorobutanoic acid	375-22-4	6.6	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	0.61 J	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.96	0.35	0.96	1.8	1
14434	Perfluorohexanoic acid	307-24-4	0.69 J	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	0.73 J	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	1.2 J	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	2.1 J	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 14:14	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

**Sample Description:** BAAP-POND-3-SW Grab Surface Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9793113  
**ELLE Group #:** 1984962  
**Matrix:** Surface Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 09/07/2018 10:10  
**Collection Date/Time:** 09/06/2018 12:00  
**SDG#:** PF019-21

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 9.9	4.9	9.9	15	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 9.9	4.9	9.9	15	1
14434	NEtFOSAA	2991-50-6	< 12	4.9	12	15	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 12	4.9	12	15	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 5.4	1.5	5.4	9.9	1
14434	Perfluorobutanoic acid	375-22-4	11 J	9.9	24	30	1
14434	Perfluorodecanoic acid	335-76-2	< 5.9	2.5	5.9	9.9	1
14434	Perfluorododecanoic acid	307-55-1	< 5.9	2.5	5.9	9.9	1
14434	Perfluoroheptanoic acid	375-85-9	< 5.9	2.0	5.9	9.9	1
14434	Perfluorohexanesulfonate	355-46-4	< 5.4	2.0	5.4	9.9	1
14434	Perfluorohexanoic acid	307-24-4	< 5.9	2.5	5.9	9.9	1
14434	Perfluorononanoic acid	375-95-1	< 5.9	2.0	5.9	9.9	1
14434	Perfluoro-octanesulfonate	1763-23-1	3.7 J	2.5	5.9	9.9	1
14434	Perfluorooctanoic acid	335-67-1	3.5 J	2.5	5.9	9.9	1
14434	Perfluoropentanoic acid	2706-90-3	< 24	9.9	24	30	1
14434	Perfluorotetradecanoic acid	376-06-7	< 5.9	3.0	5.9	9.9	1
14434	Perfluorotridecanoic acid	72629-94-8	< 5.9	3.0	5.9	9.9	1
14434	Perfluoroundecanoic acid	2058-94-8	< 5.9	2.5	5.9	9.9	1

Reporting limits were raised due to interference from the sample matrix.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/13/2018 14:32	Mark Makowiecki	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	1	18255010	09/12/2018 09:00	Isaac Phillips-Cary	1

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

# Badger Army Ammunition Plant (BAAP)

## DATA REVIEW

### BAAP, Wisconsin

Perfluoroalkyl Substances (PFAS), Total Organic Carbon, and Miscellaneous Analyses

SDG #PF011

Analyses Performed By:  
Eurofins Lancaster Laboratories Environmental  
Lancaster, Pennsylvania

Report #30872R  
Review Level: Stage 3/4  
Project: 02118216.3002.3BA20

## DATA REVIEW REPORT

### SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # PF011 for samples collected in association with the Badger Army Ammunition Plant. The review was conducted as a Stage 3/4 evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis		
					PFAS	TOC	MISC
BAAP-FFTA-SN-1-5.0-SO	9779602	Soil	8/28/2018		X	X	X
BAAP-FFTA-SN-1-20-SO	9779603	Soil	8/28/2018		X	X	X
BAAP-FFTA-SN-1-35-SO	9779604	Soil	8/28/2018		X	X	X
BAAP-FFTA-SN-1-50-SO	9779605	Soil	8/28/2018		X	X	X
BAAP-FFTA-SN-1-65-SO	9779606	Soil	8/28/2018		X	X	X
BAAP-FB-SO-082818	9779610	Water	8/28/2018		X		
BAAP-FD-SO-082818	9779611	Soil	8/28/2018	BAAP-FFTA-SN-1-50-SO	X	X	X
BAAP-FFTA-SN-1-80-SO	9779612	Soil	8/29/2018		X	X	X
BAAP-FFTA-SN-1-WT84-SO	9779613	Soil	8/29/2018		X	X	X

#### Notes:

1. TOC is total organic carbon analysis.
2. Miscellaneous parameters include pH and percent moisture.
3. Stage 2 validation was performed for TOC and pH analyses.
4. Stage 4 validation was performed for PFAS on sample location BAAP-FFTA-SN-1-WT84-SO.
5. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location BAAP-FFTA-SN-1-65-SO.



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### ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:

QA - Quality Assurance

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### ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Modified Method 537. Data were reviewed in accordance with USEPA Method 537, ELLE SOPs T-PFAS-WI12031 and T-PFAS-WI14355, Department of Defense (DoD) Quality Systems Manual (QSM) 5.1, and Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, July 2018 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is

## DATA REVIEW REPORT

that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

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### PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA modified 537	Soil	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C
	Water	14 days to extraction; 28 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method, instrument, and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Instrument blanks measure carryover in the instrument from one sample to another. Method blanks measure laboratory contamination. Equipment rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

#### 3. Mass Calibration

Mass calibration and system performance were acceptable.

#### 4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

##### 4.1 Initial Calibration

The percent relative standard deviation (%RSD) of the response factors (RF) must be less than 20%, or for linear calibration,  $r^2 \geq 0.99$ . Analytes must be within 70-130% of their true value for each calibration standard.

##### 4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit of 30%.

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### 4.3 Instrument Sensitivity Check (ISC)

The ISC concentration must be at the LOQ. All target compounds associated with the ISC must exhibit a percent recovery (%R) of 70 to 130%.

### 4.4 Ion Transitions

Quantitation of analytes must use the ion transitions documented in DoD QSM 5.1 Table B-15.

All compounds associated with the above calibration checks were within the specified control limits.

## 5. Isotopically labeled Standards

### 5.1 Extracted Internal Standards (EIS)

Labeled standards must be added to all field samples and QC samples prior to extraction. For aqueous samples prepared by serial dilution instead of SPE, they must be added to samples prior to analysis. EIS recoveries must be within DoD QSM 5.1 specified limits of 50% to 150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	Recovery
BAAP-FFTA-SN-1-20-SO	d5-NEtFOSAA	NEtFOSAA	< 50% but > 25%
BAAP-FFTA-SN-1-50-SO	d5-NMeFOSAA	NMeFOSAA	
BAAP-FFTA-SN-1-5.0-SO	d5-NEtFOSAA	NEtFOSAA	< 25%
	d5-NMeFOSAA	NMeFOSAA	
BAAP-FFTA-SN-1-65-SO	d5-NMeFOSAA	NMeFOSAA	< 50% but > 25%
BAAP-FFTA-SN-1-65-SO MSD			
BAAP-FFTA-SN-1-80-SO			

Note: the laboratory marked the initial extraction, performed 8/31, as "RE" in the data package. Therefore, the reported results are from the extraction performed on 9/5/2018.

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> 150%	Non-detect	No Action
	Detect	
< 50% but > 25%	Non-detect	No Action
	Detect	
< 25%	Non-detect	R
	Detect	J

As part of the isotope dilution analysis, the EIS are used for quantitation of the sample results, therefore the calculation of sample concentrations is adjusted for EIS recoveries. The data will not be qualified unless EIS recoveries are less than 25%.

### 5.2 Injection Internal Standards

Injection internal standards must be added to the aliquot of sample dilutions, QC samples, and standards just prior to analysis. Peak areas must be within -50% to +50% of the area measured in the ICAL midpoint

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standard. On days when ICAL is not performed, the peak areas must be within -50% to +50% of the peak area measured in daily initial CCV.

All internal standard responses were within control limits.

### 6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must be  $\leq 30\%$ .

Sample locations associated with the MS/MSD exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	Compound	MS Recovery	MSD Recovery
BAAP-FFTA-SN-1-65-SO	Perfluorooctanoic acid	<LL but >10%	AC

Note:

AC Acceptable

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J

### 7. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

### 8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 35% for water matrices and 50% for soils is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 2 times the LOQ, a control limit of two times the LOQ is applied for water matrices and three times the LOQ for soil matrices.

Results for duplicate samples are summarized in the following table.

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Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
BAAP-FFTA-SN-1-50-SO /BAAP-FD-SO-082818	Perfluorooctanoic acid	1.1	2.5	AC

Note:

AC Acceptable

The results between the parent sample and field duplicate were acceptable.

### 9. Compound Identification

PFC analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

All identified compounds met method criteria.

### 10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

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## DATA VALIDATION CHECKLIST FOR PFAS

PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
<b>Stage 2 Validation</b>					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
C. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X	X		
Matrix Spike Duplicate(MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field Duplicate (RPD)		X		X	
Extracted Internal Standard %R		X	X		
Injection Internal Standard %R		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
<b>Stage 3/4 Validation</b>					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	



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PFAS: 537M/DoD QSM 5.1	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>LIQUID CHROMATOGRAPHY/MASS SPECTROMETRY (LC/MS/MS)</b>					
D. Transcription/calculations acceptable		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

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### INORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Methods 9045D and 9060A. Data were reviewed in accordance with Department of Defense (DoD) Quality Systems Manual (QSM) 5.1, and Draft Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan USAEC PFAS PA/SI Active Army Installations, July 2018 (Arcadis).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and that it was already subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.
  - J The reported value was obtained from a reading less than the limit of detection (LOQ), but greater than or equal to the detection limit (DL).
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The analyte was not detected above the limit of detection. However, the reported limit is approximate and may or may not represent the actual limit of detection.
  - UB Analyte considered non-detect at the listed value due to associated blank contamination.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

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### GENERAL CHEMISTRY ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
Total Organic Carbon (TOC) by SW846 9060A	Soil	28 days from collection to analysis	Cool to <6 °C.
pH by SW846 9045D	Soil	Within 24 hours of receipt at laboratory	Cool to <6 °C.

The analyses that exceeded the holding time are presented in the following table.

Sample Locations	Holding Time	Criteria
BAAP-FFTA-SN-1-5.0-SO BAAP-FFTA-SN-1-20-SO BAAP-FFTA-SN-1-35-SO BAAP-FFTA-SN-1-50-SO BAAP-FFTA-SN-1-65-SO BAAP-FB-SO-082818 BAAP-FD-SO-082818 BAAP-FFTA-SN-1-80-SO BAAP-FFTA-SN-1-WT84-SO	10 to 11 days from receipt	Within 24 hours of receipt

Sample results associated with sample locations analyzed by analytical method SW-846 9045D were qualified, as specified in the table below. All other holding times were met.

Criteria	Qualification	
	Detected Analytes	Non-detect Analytes
Analysis completed less than two times holding time	J	UJ
Analysis completed greater than two times holding time	J	

The hold time for pH was specified in the QAPP; there is no specified hold time for pH in soil. The pH results are qualified as estimated.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the detection limit (DL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

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TOC was not detected above the DL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

### 3. Matrix Spike/Matrix Spike Duplicate (MS/MSD)/Laboratory Duplicate Analysis

MS/MSD and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

#### 3.1 MS/MSD Analysis

All analytes must exhibit a percent recovery within the established acceptance limits of 75% to 125%. The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the analyte's concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS analyses performed on sample locations BAAP-FFTA-SN-1-20-SO, BAAP-FFTA-SN-1-35-SO, and BAAP-FFTA-SN-1-80-SO for TOC exhibited recoveries within control limits.

The MS/MSD analysis performed on sample location BAAP-FFTA-SN-1-65-SO for TOC exhibited recoveries within control limits.

#### 3.2 Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices and 35% for soil matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of one time the LOQ is applied for water matrices and two times the LOQ for soil matrices.

The laboratory duplicate analysis performed on sample location BAAP-FFTA-SN-1-65-SO for pH exhibited results within control limits.

The laboratory duplicate analyses performed on sample locations BAAP-FFTA-SN-1-20-SO, BAAP-FFTA-SN-1-35-SO, and BAAP-FFTA-SN-1-80-SO for TOC exhibited RPD within control limits.

MS/MSD analysis for TOC on sample location BAAP-FFTA-SN-1-65-SO was performed in addition of the laboratory duplicate analysis. The MS/MSD recoveries and laboratory duplicate exhibited acceptable RPD.

### 4. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the LOQ, a control limit of three times the LOQ is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
BAAP-FFTA-SN-1-50-SO/ BAAP-FD-SO-082818	TOC	3730	2040	58.6%
	pH	9.39	9.44	AC

Note:

AC Acceptable

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TOC associated with samples locations BAAP-FFTA-SN-1-50-SO and BAAP-FD-SO-082818 exhibited a field duplicate RPD greater than the control limit. The associated sample results from sample locations for TOC were qualified as estimated.

### **5. Laboratory Control Sample (LCS) Analysis**

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. TOC associated with the LCS analysis must exhibit a percent recovery between the control limits of 80% and 120%.

The LCS analysis exhibited recoveries within the control limits.

### **6. System Performance and Overall Assessment**

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

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### DATA VALIDATION CHECKLIST FOR GENERAL CHEMISTRY

General Chemistry: SW846 9045D/9060A	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Miscellaneous Instrumentation					
<b>Stage 2 Validation</b>					
Holding times		X	X		
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate(MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Lab Duplicate (RPD)		X		X	
Field Duplicate (RPD)		X	X		
Dilution Factor		X		X	
Moisture Content		X		X	

Notes:

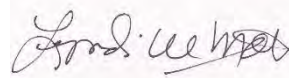
%R - percent recovery

RPD - relative percent difference

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VALIDATION PERFORMED BY: Lyndi Mott, Arcadis

SIGNATURE:

A handwritten signature in black ink, appearing to read "Lyndi Mott", is written over a light gray rectangular background. The signature is cursive and somewhat stylized.

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DATE: October 16, 2018

PEER REVIEW: Dennis Capria, Arcadis

DATE: October 29, 2018

**CHAIN OF CUSTODY  
CORRECTED SAMPLE ANALYSIS DATA  
SHEETS**





# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

For Eurofins Lancaster Laboratories Environmental use only

Acct. # 13129 Group # 1981995 Sample # 9779602-13

COC # 561230

Client Information				Matrix				Analysis Requested				For Lab Use Only			
Client: <u>ARCADIS</u>		Acct. #:		Tissue		Ground		Surface		Preservation and Filtration Codes				FSC: _____	
Project Name/ID: <u>BAAP/02118216.1000, 7AD00</u>		PWSID #:		Soil		Potable		NPDES						SCR#: _____	
Project Manager: <u>Kimmie Schrupp</u>		P.O. #:		Sediment		Water		Other: <u>PFA-DI Lab Supplies</u>						Preservation Codes	
Sampler: <u>Bruce Evans / Tees Nugent</u>		Quote #:		Composite		Water		Total # of Containers						H=HCl      T=Thiosulfate N=HNO <sub>3</sub> B=NaOH S=H <sub>2</sub> SO <sub>4</sub> P=H <sub>3</sub> PO <sub>4</sub> F=Field Filtered    O=Other	
State where samples were collected: <u>WI</u>		For Compliance: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>												Remarks	
Sample Identification		Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	PFAS Group	TOC/PA/Moisture	Moisture	SAMPLING	Remarks	
Date	Time	Grab	Composite												
<u>BAAP-FFTA-SN-1-50-50</u>	<u>8/28/18</u>	<u>10:20</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>34</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-1-20-50</u>	<u>8/28/18</u>	<u>13:25</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>34</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-1-35-50</u>	<u>8/28/18</u>	<u>13:40</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>34</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-1-50-50</u>	<u>8/28/18</u>	<u>14:35</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>34</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-1-65-50</u>	<u>8/28/18</u>	<u>15:15</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>912</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<u>MS/MSD</u>
<u>BAAP-FB-50-082818</u>	<u>8/28/18</u>	<u>10:30</u>	<input checked="" type="checkbox"/>					<u>X</u>	<u>2</u>	<input checked="" type="checkbox"/>					<u>Field Blank</u>
<del><u>BAAP-EB-50-082818</u></del>	<del><u>8/28/18</u></del>	<del><u>13:00</u></del>	<del><input checked="" type="checkbox"/></del>					<del><u>X</u></del>	<del><u>2</u></del>	<del><input checked="" type="checkbox"/></del>					<del><u>Equipment Blank</u></del>
<u>BAAP-FD-50-082818</u>	<u>8/28/18</u>	<u>-</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>329</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-1-80-50</u>	<u>8/29/18</u>	<u>08:20</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>3</u>	<u>3</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<u>BAAP-FFTA-SN-1-WT84-50</u>	<u>8/29/18</u>	<u>08:50</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<u>3</u>	<u>3</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

Turnaround Time (TAT) Requested (please circle) Standard <u>Rush</u> (Rush TAT is subject to laboratory approval and surcharge.)  Date results are needed: <u>5 DAYS</u>  E-mail address: <u>Kimmie.Schrupp@Arcadis.com</u>	Relinquished by: <u>[Signature]</u>	Date: <u>8/29/18</u>	Time: <u>17:00</u>	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by: <u>[Signature]</u>	Date: <u>8/30/18</u>	Time: <u>10:15</u>

EDD Required? <u>Yes</u> No If yes, format: _____	Relinquished by Commercial Carrier: UPS _____ FedEx <u>X</u> Other _____
Site-Specific QC (MS/MSD/Dup)? <u>Yes</u> No (If yes, indicate QC sample and submit triplicate sample volume.)	Temperature upon receipt <u>1.0-2.8</u> °C

1981995

**Katherine Klinefelter**

**From:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Sent:** Wednesday, September 05, 2018 3:09 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*

See below in Red.

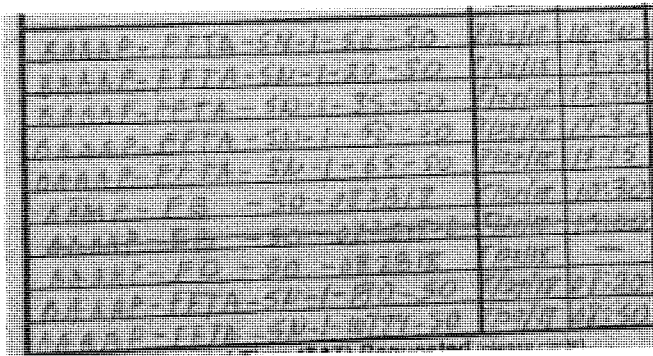
Thanks!  
Kimmie

**From:** Katherine Klinefelter <KatherineKlinefelter@eurofinsus.com>  
**Sent:** Wednesday, September 5, 2018 12:51 PM  
**To:** Schrupp, Kimmie <Kimberley.Schrupp@arcadis.com>  
**Cc:** Kowalski, Joe <Joseph.Kowalski@arcadis.com>  
**Subject:** RE: Badger AAP project

Are these samples all Equipment Blanks? Yep we'll have a lot of EBs on this program.

BAAP-EB-GW-082918-1	8-29-18	0930
BAAP-EB-GW-082818-2	8-28-18	1400
BAAP-EB-GW-082918-3	8-29-18	1140
BAAP-EB-GW-082918-4	8-29-18	1620
BAAP-EB-GW-082918-5	8-29-18	1025

Should these sample IDs begin with BAAP rather than BAAAP? Yes if it's not too much trouble, other wise we can fix during validation.



**From:** Schrupp, Kimmie [mailto:Kimberley.Schrupp@arcadis.com]  
**Sent:** Tuesday, September 04, 2018 2:50 PM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** RE: Badger AAP project

EXTERNAL EMAIL\*

1981995

Ok these are the revised COCs. Let me know if you need anything else.

thanks  
Kimmie

---

**From:** Katherine Klinefelter <[KatherineKlinefelter@eurofinsus.com](mailto:KatherineKlinefelter@eurofinsus.com)>  
**Sent:** Tuesday, September 4, 2018 12:36 PM  
**To:** Schrupp, Kimmie <[Kimberley.Schrupp@arcadis.com](mailto:Kimberley.Schrupp@arcadis.com)>  
**Cc:** Kowalski, Joe <[Joseph.Kowalski@arcadis.com](mailto:Joseph.Kowalski@arcadis.com)>  
**Subject:** RE: Badger AAP project

Hi Kimmie,

Please email COCs with TAT amended to standard. These will be appended to the original COCs to document the TAT change.

Thanks,

Kathy

Katherine Klinefelter  
Principal Project Manager, Environmental Client Services

Eurofins Lancaster Laboratories Environmental, LLC  
2425 New Holland Pike  
Lancaster, PA 17601  
USA

Direct: +1 717-556-7256  
Main: +1 717-656-2300 x1566  
Fax: +1 717-656-6766

[KatherineKlinefelter@EurofinsUS.com](mailto:KatherineKlinefelter@EurofinsUS.com)  
[www.EurofinsUS.com/LanCLabsEnv](http://www.EurofinsUS.com/LanCLabsEnv)

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**From:** Schrupp, Kimmie [<mailto:Kimberley.Schrupp@arcadis.com>]  
**Sent:** Tuesday, September 04, 2018 11:21 AM  
**To:** Katherine Klinefelter  
**Cc:** Kowalski, Joe  
**Subject:** Badger AAP project

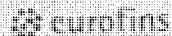
EXTERNAL EMAIL\*

Hi Kathy,  
So we just got new direction from our client and we do not need these samples rushed on the 5 day TAT. If there is any way to cancel the rush on some of the samples from last week, I would like to do that.

Please let me know!  
Thanks  
Kimmie

**Kimberley M. Schrupp** | Account Manager | [kimberley.schrupp@arcadis.com](mailto:kimberley.schrupp@arcadis.com)

# Environmental Analysis Request/Chain of Custody



Lancaster Laboratories  
Environmental

Account # 13129 Group # 1981995 Sample # 9779602-13

COC # 561230

Client Information				Matrix			Analysis Requested				For Lab Use Only		
Name: <u>APCO/IS</u> Address: <u>2000 E. Main St. / P.O. Box 7000</u> City: <u>Springer, NY</u> State: <u>NY</u> Zip: <u>11781</u> Contact: <u>Joe E. ...</u> Phone: <u>...</u> Fax: <u>...</u> Email: <u>...</u>				Tissue <input type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Sediment <input type="checkbox"/> Potable <input type="checkbox"/> MPECS <input type="checkbox"/> Water <input type="checkbox"/> Other: <u>...</u>			Preservation and Filtration Codes (Grid for codes)				FSC: <u>...</u> SCRF: <u>...</u> Preservation Codes: H-HCl, T-Thiosulfate N-HNO3, B-NaOH S-H2SO4, P-H2PO4 F-Field Filtered, O-Other		
Sample Identification	Collected		Grab	Composite	Soil	Water	Other	Total # of Containers	Analysis Requested				Remarks
	Date	Time							1	2	3	4	
<u>APCO-PTA-SU-1-51-50</u>	<u>10/11</u>	<u>10:30</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-10-50</u>	<u>10/11</u>	<u>13:20</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-35-50</u>	<u>10/11</u>	<u>15:10</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-50-50</u>	<u>10/11</u>	<u>11:35</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-65-50</u>	<u>10/11</u>	<u>16:15</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-80-50</u>	<u>10/11</u>	<u>17:30</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-90-50</u>	<u>10/11</u>	<u>18:20</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-95-50</u>	<u>10/11</u>	<u>19:20</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-100-50</u>	<u>10/11</u>	<u>21:50</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>APCO-PTA-SU-1-105-50</u>	<u>10/11</u>	<u>21:50</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Turnaround Time (TAT) Requested (please circle)  
Standard  
(Standard TAT is subject to laboratory approval and surcharge)

Date results are needed: SOON

E-mail address: N. ...@eurofins.com

Data Package Options (circle if required)  
 Type I (EPA Level 3 Equivalent non-CLP)  
 Type II (Reduced non-CLP)  
 NYSDEC Category A or B  
 Type VI (Raw Data Only)  
 NJ DKOP  
 MA MCP  
 TX TRRP-13  
 CT RCP

Requested by: <u>[Signature]</u>	Date: <u>10/11</u>	Time: <u>10:30</u>	Received by:	Date:	Time:
Requisitioned by:	Date:	Time:	Received by:	Date:	Time:
Requisitioned by:	Date:	Time:	Received by:	Date:	Time:
Requisitioned by:	Date:	Time:	Received by:	Date:	Time:
Requisitioned by:	Date:	Time:	Received by:	Date:	Time:

EDD Required? (Yes) No  
 if yes, format: \_\_\_\_\_  
 Site-Specific QC (MS,MSD,Dup)? (Yes) No  
 if yes, indicate QC format and volume: \_\_\_\_\_

Relinquished by Commercial Carrier:  
 UPS  FedEx  Other   
 Temperature upon receipt: \_\_\_\_\_ °C

813346307567 813346307567

Eurofins Lancaster Laboratories Environmental  
 The white copy should accompany samples to Eurofins Ltd

Keep this liner for your records.



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method: Fed Ex                      Arrival Timestamp: 08/30/2018 10:15  
 Number of Packages: 2                              Number of Projects: 1  
 State/Province of Origin: WI

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Zane Hollinger (10251) at 14:26 on 08/30/2018*

**Samples Chilled Details**

Thermometer Types:    *DT = Digital (Temp. Bottle)    IR = Infrared (Surface Temp)    All Temperatures in °C.*

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-01	2.8	DT	Wet	Y	Bagged	N
2	DT131	1.0	DT	Wet	Y	Bagged	N

**Sample Description:** BAAP-FFTA-SN-1-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779602  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 10:20  
**SDG#:** PF011-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 2.2	0.68	2.2	2.3	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 2.2	0.57	2.2	2.3	1
14478	<del>NEtFOSAA</del>	<del>2991-50-6</del>	<del>&lt; 2.3</del>	<del>0.57</del>	<del>2.3</del>	<del>3.4</del>	<del>1</del> R
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	<del>NMeFOSAA</del>	<del>2355-31-9</del>	<del>&lt; 2.3</del>	<del>0.57</del>	<del>2.3</del>	<del>3.4</del>	<del>1</del> R
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.68	0.23	0.68	0.91	1
14478	Perfluorobutanoic acid	375-22-4	< 0.78	0.23	0.78	0.91	1
14478	Perfluorodecanoic acid	335-76-2	< 0.78	0.34	0.78	1.1	1
14478	Perfluorododecanoic acid	307-55-1	< 0.78	0.23	0.78	0.91	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.78	0.23	0.78	0.91	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.73	0.23	0.73	0.91	1
14478	Perfluorohexanoic acid	307-24-4	< 0.78	0.23	0.78	0.91	1
14478	Perfluorononanoic acid	375-95-1	< 0.78	0.23	0.78	0.91	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.74	0.23	0.74	0.91	1
14478	Perfluorooctanoic acid	335-67-1	0.76 J	0.23	0.78	0.91	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.78	0.23	0.78	0.91	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.78	0.23	0.78	0.91	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.78	0.23	0.78	0.91	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.78	0.23	0.78	0.91	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>
02079	TOC Solids/Sludges Combustion	n.a.	1,490	162	486	486
		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>
00394	pH	n.a.	6.12 J	0.0100	0.0100	0.0100
		The pH was measured in water at 19.8 C.				

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
00111	Moisture	n.a.	14.9	0.50	0.50	0.50
		Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.				

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-5.0-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779602  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 10:20  
SDG#: PF011-01

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 12:36	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633A	09/08/2018 12:16	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779603  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 13:25  
**SDG#:** PF011-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.60	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.50	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.50	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.50	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.60	0.20	0.60	0.80	1
14478	Perfluorobutanoic acid	375-22-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorodecanoic acid	335-76-2	< 0.68	0.30	0.68	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.68	0.20	0.68	0.80	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.64	0.20	0.64	0.80	1
14478	Perfluorohexanoic acid	307-24-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorononanoic acid	375-95-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.65	0.20	0.65	0.80	1
14478	Perfluorooctanoic acid	335-67-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.68	0.20	0.68	0.80	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	13,500	854	2,560	2,560	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.21 <span style="color: red;">J</span>	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.8 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.3	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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



REVISED

**Sample Description:** BAAP-FFTA-SN-1-20-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779603  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 13:25  
SDG#: PF011-02

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 12:45	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667632A	09/10/2018 16:18	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779604  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 13:40  
**SDG#:** PF011-03

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.59	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.49	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.49	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.49	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.59	0.20	0.59	0.79	1
14478	Perfluorobutanoic acid	375-22-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorodecanoic acid	335-76-2	< 0.67	0.30	0.67	0.99	1
14478	Perfluorododecanoic acid	307-55-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.67	0.20	0.67	0.79	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.63	0.20	0.63	0.79	1
14478	Perfluorohexanoic acid	307-24-4	< 0.67	0.20	0.67	0.79	1
14478	Perfluorononanoic acid	375-95-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.64	0.20	0.64	0.79	1
14478	Perfluorooctanoic acid	335-67-1	< 0.67	0.20	0.67	0.79	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.67	0.20	0.67	0.79	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.67	0.20	0.67	0.79	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.67	0.20	0.67	0.79	1
<b>Wet Chemistry SW-846 9060A modified</b>							
02079	TOC Solids/Sludges Combustion	n.a.	2,480	104	311	311	1
<b>SW-846 9045D Nov 2004</b>							
00394	pH	n.a.	9.29 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.7 C.							
<b>Wet Chemistry SM 2540 G-2011 %Moisture Calc</b>							
00111	Moisture	n.a.	2.6	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-35-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779604  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 13:40  
SDG#: PF011-03

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 12:54	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18247667632A	09/04/2018 23:09	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779605  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 14:35  
**SDG#:** PF011-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.61	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.51	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.51	2.0	3.1	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.51	2.0	3.1	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.61	0.20	0.61	0.82	1
14478	Perfluorobutanoic acid	375-22-4	< 0.69	0.20	0.69	0.82	1
14478	Perfluorodecanoic acid	335-76-2	< 0.69	0.31	0.69	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.69	0.20	0.69	0.82	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.69	0.20	0.69	0.82	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.65	0.20	0.65	0.82	1
14478	Perfluorohexanoic acid	307-24-4	< 0.69	0.20	0.69	0.82	1
14478	Perfluorononanoic acid	375-95-1	< 0.69	0.20	0.69	0.82	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.66	0.20	0.66	0.82	1
14478	Perfluorooctanoic acid	335-67-1	1.1	0.20	0.69	0.82	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.69	0.20	0.69	0.82	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.69	0.20	0.69	0.82	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.69	0.20	0.69	0.82	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.69	0.20	0.69	0.82	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	3,730 J	108	325	325	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.39 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	3.0	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-50-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779605  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 14:35  
SDG#: PF011-04

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:03	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	2	18250667633A	09/08/2018 12:29	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779606  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submission Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 15:15  
SDG#: PF011-05BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.64	0.28	0.64	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.64	0.19	0.64	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.61	0.19	0.61	0.76	1
14478	Perfluorooctanoic acid	335-67-1	1.1	0.19	0.64	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.64	0.19	0.64	0.76	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	mg/kg	mg/kg	mg/kg	mg/kg
02079	TOC Solids/Sludges Combustion	n.a.	1,770	104	312	312

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	Std. Units	Std. Units	Std. Units	Std. Units
00394	pH	n.a.	9.41 J	0.0100	0.0100	0.0100
The pH was measured in water at 19.6 C.						

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	%	%	%	%
00111	Moisture	n.a.	3.9	0.50	0.50	0.50
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-65-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779606  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018 15:15  
SDG#: PF011-05BKG

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:12	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633A	09/08/2018 12:42	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

REVISED

**Sample Description:** BAAP-FB-SO-082818 Grab Water  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** WW 9779610  
**ELLE Group #:** 1981995  
**Matrix:** Water

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submittal Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018 10:30  
**SDG#:** PF011-06FB

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14434	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.88	1.8	2.6	1
14434	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.88	1.8	2.6	1
14434	NEtFOSAA	2991-50-6	< 2.1	0.88	2.1	2.6	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14434	NMeFOSAA	2355-31-9	< 2.1	0.88	2.1	2.6	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14434	Perfluorobutanesulfonate	375-73-5	< 0.97	0.26	0.97	1.8	1
14434	Perfluorobutanoic acid	375-22-4	< 4.2	1.8	4.2	5.3	1
14434	Perfluorodecanoic acid	335-76-2	< 1.1	0.44	1.1	1.8	1
14434	Perfluorododecanoic acid	307-55-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoroheptanoic acid	375-85-9	< 1.1	0.35	1.1	1.8	1
14434	Perfluorohexanesulfonate	355-46-4	< 0.97	0.35	0.97	1.8	1
14434	Perfluorohexanoic acid	307-24-4	< 1.1	0.44	1.1	1.8	1
14434	Perfluorononanoic acid	375-95-1	< 1.1	0.35	1.1	1.8	1
14434	Perfluoro-octanesulfonate	1763-23-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluorooctanoic acid	335-67-1	< 1.1	0.44	1.1	1.8	1
14434	Perfluoropentanoic acid	2706-90-3	< 4.2	1.8	4.2	5.3	1
14434	Perfluorotetradecanoic acid	376-06-7	< 1.1	0.53	1.1	1.8	1
14434	Perfluorotridecanoic acid	72629-94-8	< 1.1	0.53	1.1	1.8	1
14434	Perfluoroundecanoic acid	2058-94-8	< 1.1	0.44	1.1	1.8	1

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14434	PFAS in Water by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18249001	09/07/2018 12:49	Marissa C Drexinger	1
14465	PFAS Water Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18249001	09/06/2018 08:00	Courtney J Fatta	1

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



REVISED

**Sample Description:** BAAP-FD-SO-082818 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779611  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/28/2018  
**SDG#:** PF011-07FD

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.57	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.57	0.19	0.57	0.76	1
14478	Perfluorobutanoic acid	375-22-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorodecanoic acid	335-76-2	< 0.64	0.28	0.64	0.95	1
14478	Perfluorododecanoic acid	307-55-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.64	0.19	0.64	0.76	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.61	0.19	0.61	0.76	1
14478	Perfluorohexanoic acid	307-24-4	< 0.64	0.19	0.64	0.76	1
14478	Perfluorononanoic acid	375-95-1	< 0.64	0.19	0.64	0.76	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.62	0.19	0.62	0.76	1
14478	Perfluorooctanoic acid	335-67-1	2.5	0.19	0.64	0.76	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.64	0.19	0.64	0.76	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.64	0.19	0.64	0.76	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.64	0.19	0.64	0.76	1

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	2,040 J	102	307	307	1
		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.44 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	2.2	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FD-SO-082818 Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779611  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/28/2018  
SDG#: PF011-07FD

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:48	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 13:34	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039403A	09/07/2018 19:40	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779612  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 08:20  
**SDG#:** PF011-08

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.8	0.56	1.8	1.9	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.8	0.47	1.8	1.9	1
14478	NEtFOSAA	2991-50-6	< 1.9	0.47	1.9	2.8	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 1.9	0.47	1.9	2.8	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.56	0.19	0.56	0.75	1
14478	Perfluorobutanoic acid	375-22-4	< 0.63	0.19	0.63	0.75	1
14478	Perfluorodecanoic acid	335-76-2	< 0.63	0.28	0.63	0.93	1
14478	Perfluorododecanoic acid	307-55-1	< 0.63	0.19	0.63	0.75	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.63	0.19	0.63	0.75	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.60	0.19	0.60	0.75	1
14478	Perfluorohexanoic acid	307-24-4	< 0.63	0.19	0.63	0.75	1
14478	Perfluorononanoic acid	375-95-1	< 0.63	0.19	0.63	0.75	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.61	0.19	0.61	0.75	1
14478	Perfluorooctanoic acid	335-67-1	0.25 J	0.19	0.63	0.75	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.63	0.19	0.63	0.75	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.63	0.19	0.63	0.75	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.63	0.19	0.63	0.75	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.63	0.19	0.63	0.75	1

The recovery for the labeled compound used as extraction standards is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken: The sample was reextracted within holding time and extraction standard recoveries were again outside QC limits. Both sets of data are included in the data package.

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	1,690	103	308	308	1

<b>Wet Chemistry</b>		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.38 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.9 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	1.7	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-80-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779612  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 08:20  
SDG#: PF011-08

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
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### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 13:57	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667632B	09/08/2018 09:15	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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

**Sample Description:** BAAP-FFTA-SN-1-WT84-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

**ARCADIS**  
**ELLE Sample #:** SW 9779613  
**ELLE Group #:** 1981995  
**Matrix:** Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

**Submission Date/Time:** 08/30/2018 10:15  
**Collection Date/Time:** 08/29/2018 08:50  
**SDG#:** PF011-09

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Detection Limit*	Dry Limit of Detection	Dry Limit of Quantitation	DF
<b>LC/MS/MS Miscellaneous EPA 537 mod QSM 5.1 table B-15</b>							
14478	6:2 fluorotelomersulfonate	27619-97-2	< 1.9	0.60	1.9	2.0	1
14478	8:2 fluorotelomersulfonate	39108-34-4	< 1.9	0.50	1.9	2.0	1
14478	NEtFOSAA	2991-50-6	< 2.0	0.50	2.0	3.0	1
NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.							
14478	NMeFOSAA	2355-31-9	< 2.0	0.50	2.0	3.0	1
NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.							
14478	Perfluorobutanesulfonate	375-73-5	< 0.60	0.20	0.60	0.80	1
14478	Perfluorobutanoic acid	375-22-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorodecanoic acid	335-76-2	< 0.68	0.30	0.68	1.0	1
14478	Perfluorododecanoic acid	307-55-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroheptanoic acid	375-85-9	< 0.68	0.20	0.68	0.80	1
14478	Perfluorohexanesulfonate	355-46-4	< 0.64	0.20	0.64	0.80	1
14478	Perfluorohexanoic acid	307-24-4	< 0.68	0.20	0.68	0.80	1
14478	Perfluorononanoic acid	375-95-1	< 0.68	0.20	0.68	0.80	1
14478	Perfluoro-octanesulfonate	1763-23-1	< 0.65	0.20	0.65	0.80	1
14478	Perfluorooctanoic acid	335-67-1	5.0	0.20	0.68	0.80	1
14478	Perfluoropentanoic acid	2706-90-3	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotetradecanoic acid	376-06-7	< 0.68	0.20	0.68	0.80	1
14478	Perfluorotridecanoic acid	72629-94-8	< 0.68	0.20	0.68	0.80	1
14478	Perfluoroundecanoic acid	2058-94-8	< 0.68	0.20	0.68	0.80	1

<b>Wet Chemistry</b>		<b>SW-846 9060A modified</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	<b>mg/kg</b>	
02079	TOC Solids/Sludges Combustion	n.a.	822	104	311	311	1
		<b>SW-846 9045D Nov 2004</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	<b>Std. Units</b>	
00394	pH	n.a.	9.24 J	0.0100	0.0100	0.0100	1
The pH was measured in water at 19.8 C.							

<b>Wet Chemistry</b>		<b>SM 2540 G-2011 %Moisture Calc</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	
00111	Moisture	n.a.	1.5	0.50	0.50	0.50	1
Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.							

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

REVISED

**Sample Description:** BAAP-FFTA-SN-1-WT84-SO Grab Soil  
02118216-1000.7AL00  
Badger Army Ammunition Plant (BAAP)

ARCADIS  
ELLE Sample #: SW 9779613  
ELLE Group #: 1981995  
Matrix: Soil

**Project Name:** Badger Army Ammunition Plant (BAAP)

Submittal Date/Time: 08/30/2018 10:15  
Collection Date/Time: 08/29/2018 08:50  
SDG#: PF011-09

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14478	PFAS in Soil by LC/MS/MS-DoD	EPA 537 mod QSM 5.1 table B-15	1	18248026	09/06/2018 14:06	Joshua P Trost	1
14510	PFAS Solid Prep - DoD	EPA 537 mod QSM 5.1 table B-15	2	18248026	09/05/2018 17:30	Danielle D McCully	1
02079	TOC Solids/Sludges Combustion	SW-846 9060A modified	1	18250667633B	09/08/2018 14:13	Drew M Gerhart	1
00394	pH	SW-846 9045D Nov 2004	1	18250039402B	09/07/2018 18:50	Jeremy L Bolf	1
00111	Moisture	SM 2540 G-2011 %Moisture Calc	1	18243820003B	08/31/2018 11:09	William C Schwebel	1

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



## **Attachment 5**

Validated Sample Analytical Results



Attachment A-5. Validated Analytical Results (Groundwater)

Badger Army Ammunition Plant, Wisconsin

USACE PFAS PA/SI

Location					PBG-PBM-8201		PBG-PBN-1302A		PBG-PBN-1302B	
Sample/Parent ID					BAAP-PBG-PBM-8201		BAAP-PBG-PBN-1302A		BAAP-PBG-PBN-1302B	
Sample Date					09/05/2018		08/31/2018		08/31/2018	
Sample Type					N		N		N	
Matrix					Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2			ng/l	1.7	U	2.5	U	1.7	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4			ng/l	1.7	U	2.5	U	1.7	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6			ng/l	2.0	U	3.0	U	2.0	U
N-Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	2355-31-9			ng/l	2.0	U	3.0	U	2.0	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.91	U	1.4	U	0.94	U
Perfluorobutanoic acid (PFBA)	375-22-4			ng/l	4.0	U	6.0	U	11	
Perfluorodecanoic acid (PFDA)	335-76-2			ng/l	0.99	U	1.5	U	1.0	U
Perfluorododecanoic acid (PFDoA)	307-55-1			ng/l	0.99	U	1.5	U	1.0	U
Perfluoroheptanoic acid (PFHpA)	375-85-9			ng/l	0.99	U	1.5	U	1.0	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4			ng/l	0.91	U	1.4	U	0.94	U
Perfluorohexanoic acid (PFHxA)	307-24-4			ng/l	0.99	U	1.5	U	1.4	J
Perfluorononanoic acid (PFNA)	375-95-1			ng/l	0.99	U	1.5	U	1.0	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	0.99	U	1.5	U	3.4	
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	0.99	U	1.5	U	1.2	J
Perfluoropentanoic acid (PFPeA)	2706-90-3			ng/l	4.0	U	6.0	U	5.2	
Perfluorotetradecanoic acid (PFTeA)	376-06-7			ng/l	0.99	U	1.5	U	1.0	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			ng/l	0.99	U	1.5	U	1.0	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8			ng/l	0.99	U	1.5	U	1.0	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

Shaded = Value exceeds HAL

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

PBGP = Propellant Buring Ground Plume

Qual = qualifier

-- = Not Applicable

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Groundwater)

Badger Army Ammunition Plant, Wisconsin

USACE PFAS PA/SI

Location					PBG-PBN-1302C		PBG-PBN-1302D		PBG-PBN-8201A	
Sample/Parent ID					BAAP-PBG-PBN-1302C		BAAP-PBG-PBN-1302D		BAAP-PBG-PBN-8201A	
Sample Date					09/04/2018		08/31/2018		08/29/2018	
Sample Type					N		N		N	
Matrix					Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2			ng/l	1.8	U	2.5	U	5.1	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4			ng/l	1.8	U	2.5	U	5.1	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6			ng/l	2.1	U	3.0	U	2.0	U
N-Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	2355-31-9			ng/l	2.1	U	3.0	U	2.0	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.98	U	1.4	U	0.93	U
Perfluorobutanoic acid (PFBA)	375-22-4			ng/l	4.3	U	8.5		4.0	U
Perfluorodecanoic acid (PFDA)	335-76-2			ng/l	1.1	U	1.5	U	1.0	U
Perfluorododecanoic acid (PFDoA)	307-55-1			ng/l	1.1	U	1.5	U	1.0	U
Perfluoroheptanoic acid (PFHpA)	375-85-9			ng/l	1.1	U	1.5	U	1.0	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4			ng/l	0.98	U	1.4	U	0.93	U
Perfluorohexanoic acid (PFHxA)	307-24-4			ng/l	1.1	U	1.7	J	1.0	U
Perfluorononanoic acid (PFNA)	375-95-1			ng/l	1.1	U	1.5	U	1.0	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	1.1	U	1.5	U	1.3	J
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	3.5		1.5	U	1.0	U
Perfluoropentanoic acid (PFPeA)	2706-90-3			ng/l	4.3	U	7.7		4.0	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7			ng/l	1.1	U	1.5	U	1.0	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			ng/l	1.1	U	1.5	U	1.0	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8			ng/l	1.1	U	1.5	U	1.0	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

Shaded = Value exceeds HAL

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

PBGP = Propellant Buring Ground Plume

Qual = qualifier

-- = Not Applicable

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Groundwater)

Badger Army Ammunition Plant, Wisconsin

USACE PFAS PA/SI

Location					PBG-PBN-8201B		PBG-PBN-8201C		PBG-PBN-8205B	
Sample/Parent ID					BAAP-PBG-PBN-8201B		BAAP-PBG-PBN-8201C		BAAP-PBG-PBN-8205B	
Sample Date					08/29/2018		08/28/2018		08/29/2018	
Sample Type					N		N		N	
Matrix					Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2			ng/l	1.8	U	1.9	U	1.7	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4			ng/l	1.8	U	1.9	U	1.7	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6			ng/l	2.2	U	2.3	U	2.0	U
N-Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	2355-31-9			ng/l	2.2	U	2.3	U	2.0	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.99	U	1.0	U	0.93	U
Perfluorobutanoic acid (PFBA)	375-22-4			ng/l	4.3	U	4.5	U	4.1	U
Perfluorodecanoic acid (PFDA)	335-76-2			ng/l	1.1	U	1.1	U	1.0	U
Perfluorododecanoic acid (PFDoA)	307-55-1			ng/l	1.1	U	1.1	U	1.0	U
Perfluoroheptanoic acid (PFHpA)	375-85-9			ng/l	1.1	U	1.1	U	1.0	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4			ng/l	0.99	U	1.0	U	0.93	U
Perfluorohexanoic acid (PFHxA)	307-24-4			ng/l	1.4	J	1.1	U	1.0	U
Perfluorononanoic acid (PFNA)	375-95-1			ng/l	1.1	U	1.1	U	1.0	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	1.1	U	1.1	U	1.0	U
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	1.6	J	1.1	U	1.0	U
Perfluoropentanoic acid (PFPeA)	2706-90-3			ng/l	4.3	U	4.5	U	4.1	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7			ng/l	1.1	U	1.1	U	1.0	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			ng/l	1.1	U	1.1	U	1.0	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8			ng/l	1.1	U	1.1	U	1.0	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

Shaded = Value exceeds HAL

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

PBGP = Propellant Buring Ground Plume

Qual = qualifier

-- = Not Applicable

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Groundwater)

Badger Army Ammunition Plant, Wisconsin

USACE PFAS PA/SI

Location					PBGP-PBN-9301B	PBGP-PBN-9301C	PBGP-PBN-9303B			
Sample/Parent ID					BAAP-PBGP-PBN-9301B	BAAP-PBGP-PBN-9301C	BAAP-PBGP-PBN-9303B			
Sample Date					09/04/2018	09/04/2018	09/05/2018			
Sample Type					N	N	N			
Matrix					Ground Water	Ground Water	Ground Water			
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2			ng/l	1.7	U	1.7	J	1.8	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4			ng/l	1.7	U	1.7	U	1.8	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6			ng/l	2.0	U	4.3		2.1	U
N-Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	2355-31-9			ng/l	2.0	U	2.0	U	2.1	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.93	U	0.93	U	0.96	U
Perfluorobutanoic acid (PFBA)	375-22-4			ng/l	4.0	U	5.6		6.6	
Perfluorodecanoic acid (PFDA)	335-76-2			ng/l	1.0	U	1.0	U	1.1	U
Perfluorododecanoic acid (PFDoA)	307-55-1			ng/l	1.0	U	1.0	U	1.1	U
Perfluoroheptanoic acid (PFHpA)	375-85-9			ng/l	1.0	U	1.0	U	1.1	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4			ng/l	0.93	U	0.93	U	0.96	U
Perfluorohexanoic acid (PFHxA)	307-24-4			ng/l	1.0	U	1.0	J	1.1	U
Perfluorononanoic acid (PFNA)	375-95-1			ng/l	1.0	U	1.0	U	1.1	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	1.0	U	1.6	J	1.1	U
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	1.0	U	2.0		1.2	J
Perfluoropentanoic acid (PFPeA)	2706-90-3			ng/l	4.0	U	4.0	U	4.2	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7			ng/l	1.0	U	1.0	U	1.1	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			ng/l	1.0	U	1.0	U	1.1	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8			ng/l	1.0	U	1.0	U	1.1	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

Shaded = Value exceeds HAL

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

PBGP = Propellant Buring Ground Plume

Qual = qualifier

-- = Not Applicable

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.



Attachment A-5. Validated Analytical Results (Groundwater)

Badger Army Ammunition Plant, Wisconsin

USACE PFAS PA/SI

Location					PBG-PBN-9303C		PBG-PBN-9303D		PGB-PGM-8203	
Sample/Parent ID					BAAP-PBG-PBN-9303C		BAAP-PBG-PBN-9303D		BAAP-PBG-PBM-8203	
Sample Date					09/05/2018		09/05/2018		08/30/2018	
Sample Type					N		N		N	
Matrix					Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2			ng/l	1.8	U	2.5	U	1.7	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4			ng/l	1.8	U	2.5	U	1.7	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6			ng/l	2.1	U	3.0	U	2.1	U
N-Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	2355-31-9			ng/l	2.1	U	3.0	U	2.1	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.98	U	1.4	U	0.95	U
Perfluorobutanoic acid (PFBA)	375-22-4			ng/l	7.1		30		4.2	U
Perfluorodecanoic acid (PFDA)	335-76-2			ng/l	1.1	J	1.5	U	1.0	U
Perfluorododecanoic acid (PFDoA)	307-55-1			ng/l	1.1	U	1.5	U	1.0	U
Perfluoroheptanoic acid (PFHpA)	375-85-9			ng/l	1.2	J	2.9		1.0	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4			ng/l	0.98	U	1.7	J	0.95	U
Perfluorohexanoic acid (PFHxA)	307-24-4			ng/l	1.6	J	5.6		1.0	U
Perfluorononanoic acid (PFNA)	375-95-1			ng/l	1.1	J	1.5	U	1.0	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	7.8		14		1.0	U
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	3.8		5.5		1.0	U
Perfluoropentanoic acid (PFPeA)	2706-90-3			ng/l	4.3	U	24		4.2	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7			ng/l	1.1	U	1.5	U	1.0	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			ng/l	1.1	U	1.5	U	1.0	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8			ng/l	1.1	U	1.5	U	1.0	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

Shaded = Value exceeds HAL

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

PBGP = Propellant Buring Ground Plume

Qual = qualifier

-- = Not Applicable

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Groundwater)

Badger Army Ammunition Plant, Wisconsin

USACE PFAS PA/SI

Location					PGBP-PGM-8203		PGBP-PGN-8205A		PGBP-PGN-8205C	
Sample/Parent ID					BAAP-FD-GW-083018FD / BAAP-PBGP-PBM-8203		BAAP-PBGP-PBN-8205A		BAAP-PBGP-PBN-8205C	
Sample Date					08/30/2018		08/30/2018		08/30/2018	
Sample Type					FD		N		N	
Matrix					Ground Water		Ground Water		Ground Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2			ng/l	1.8	U	1.8	U	2.0	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4			ng/l	1.8	U	1.8	U	2.0	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6			ng/l	2.2	U	2.1	U	2.4	U
N-Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	2355-31-9			ng/l	2.2	U	2.1	U	2.4	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	0.99	U	0.96	U	1.1	U
Perfluorobutanoic acid (PFBA)	375-22-4			ng/l	4.3	U	4.2	U	6.8	
Perfluorodecanoic acid (PFDA)	335-76-2			ng/l	1.1	U	1.1	U	1.2	U
Perfluorododecanoic acid (PFDoA)	307-55-1			ng/l	1.1	U	1.1	U	1.2	U
Perfluoroheptanoic acid (PFHpA)	375-85-9			ng/l	1.1	U	1.1	U	1.2	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4			ng/l	0.99	U	0.96	U	1.1	U
Perfluorohexanoic acid (PFHxA)	307-24-4			ng/l	1.1	U	1.1	U	1.2	J
Perfluorononanoic acid (PFNA)	375-95-1			ng/l	1.1	U	1.1	U	1.2	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	1.5	J	1.1	U	2.2	
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	1.1	U	1.1	U	2.8	
Perfluoropentanoic acid (PFPeA)	2706-90-3			ng/l	4.3	U	4.2	U	4.8	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7			ng/l	1.1	U	1.1	U	1.2	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			ng/l	1.1	U	1.1	U	1.2	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8			ng/l	1.1	U	1.1	U	1.2	U

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:

BAAP = Badger Army Ammunition Plant

**Bold = Detected result above the level of detection**

Shaded = Value exceeds HAL

CAS = Chemical Abstracts Service number

FD = field duplicate sample

ID = identification

N = primary sample

ng/L = nanograms per liter

% = percent

PBGP = Propellant Buring Ground Plume

Qual = qualifier

-- = Not Applicable

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only

U = The analyte was analyzed for but the result was not detected above the method detection limit.

**Attachment A-5. Validated Analytical Results (Field and Equipment Blanks)**  
**Badger Army Ammunition Plant, Wisconsin**  
**USACE PFAS PA/SI**

AOPI			Equip Blank		Equip Blank		Equip Blank		Equip Blank	
Location			Equip Blank		Equip Blank		Equip Blank		Equip Blank	
Sample/Parent ID			BAAP-EB-083018-3		BAAP-EB-GW-082818-2		BAAP-EB-GW-082918-1		BAAP-EB-GW-082918-3	
Sample Date			08/30/2018		08/28/2018		08/29/2018		08/29/2018	
Sample Type			EB		EB		EB		EB	
Matrix			Water		Water		Water		Water	
Analyte	CAS	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2	ng/l	1.8	U	1.8	U	1.8	U	1.9	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4	ng/l	1.8	U	1.8	U	1.8	U	1.9	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	2991-50-6	ng/l	2.2	U	2.1	U	2.2	U	2.2	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	2355-31-9	ng/l	2.2	U	2.1	U	2.2	U	2.2	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/l	1.0	U	0.97	U	1.0	U	1.0	U
Perfluorobutanoic acid (PFBA)	375-22-4	ng/l	4.4	U	4.2	U	4.4	U	4.5	U
Perfluorodecanoic acid (PFDA)	335-76-2	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluorododecanoic acid (PFDoA)	307-55-1	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/l	1.0	U	0.97	U	1.0	U	1.0	U
Perfluorohexanoic acid (PFHxA)	307-24-4	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluorononanoic acid (PFNA)	375-95-1	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluorooctanoic acid (PFOA)	335-67-1	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/l	4.4	U	4.2	U	4.4	U	4.5	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	ng/l	1.1	U	1.1	U	1.1	U	1.1	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/l	1.1	U	1.1	U	1.1	U	1.1	U

Notes:

**Bold = Detected result above the level of detection**

CAS = Chemical Abstracts Service number

EB = equipment blank

FB = field blank

GW = groundwater

ID = identification

ng/l = nanograms per liter

Qual = qualifier

SE = sediment

SO = soil

SW = surface water

Qualifier

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.

U = The analyte was analyzed for but the result was not detected above the method detection limit

Attachment A-5. Validated Analytical Results (Field and Equipment Blanks)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

AOPI			Equip Blank		Equip Blank		Equip Blank		Equip Blank	
Location			Equip Blank		Equip Blank		Equip Blank		Equip Blank	
Sample/Parent ID			BAAP-EB-GW-082918-4		BAAP-EB-GW-082918-5		BAAP-EB-GW-083118-4		BAAP-EB-SO-082918-1	
Sample Date			08/29/2018		08/29/2018		08/31/2018		08/29/2018	
Sample Type			EB		EB		EB		EB	
Matrix			Water		Water		Water		Water	
Analyte	CAS	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>										
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2	ng/l	1.7	U	1.8	U	1.7	U	1.8	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4	ng/l	1.7	U	1.8	U	1.7	U	1.8	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	2991-50-6	ng/l	2.1	U	2.2	U	2.1	U	2.2	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	2355-31-9	ng/l	2.1	U	2.2	U	2.1	U	2.2	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/l	0.95	U	1.0	U	0.95	U	0.99	U
Perfluorobutanoic acid (PFBA)	375-22-4	ng/l	4.2	U	4.4	U	4.1	U	4.3	U
Perfluorodecanoic acid (PFDA)	335-76-2	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluorododecanoic acid (PFDoA)	307-55-1	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/l	0.95	U	1.0	U	0.95	U	0.99	U
Perfluorohexanoic acid (PFHxA)	307-24-4	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluorononanoic acid (PFNA)	375-95-1	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluorooctanoic acid (PFOA)	335-67-1	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/l	4.2	U	4.4	U	4.1	U	4.3	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	ng/l	1.0	U	1.1	U	1.0	U	1.1	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/l	1.0	U	1.1	U	1.0	U	1.1	U

Notes:  
**Bold = Detected result above the level of detection**

- CAS = Chemical Abstracts Service number
- EB = equipment blank
- FB = field blank
- GW = groundwater
- ID = identification
- ng/l = nanograms per liter
- Qual = qualifier
- SE = sediment
- SO = soil
- SW = surface water

Qualifier  
 J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
 U = The analyte was analyzed for but the result was not detected above the method detection limit

**Attachment A-5. Validated Analytical Results (Field and Equipment Blanks)**  
**Badger Army Ammunition Plant, Wisconsin**  
**USACE PFAS PA/SI**

AOPI			Equip Blank		Field Blank		Field Blank	
Location			Equip Blank		Field Blank		Field Blank	
Sample/Parent ID			BAAP-EB-SO-082918-2		BAAP-FB-GW-083018		BAAP-FB-SE-090618	
Sample Date			08/29/2018		08/30/2018		09/06/2018	
Sample Type			EB		FB		FB	
Matrix			Water		Water		Water	
Analyte	CAS	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>								
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2	ng/l	1.8	U	1.8	U	1.7	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4	ng/l	1.8	U	1.8	U	1.7	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	2991-50-6	ng/l	2.1	U	2.1	U	2.0	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	2355-31-9	ng/l	2.1	U	2.1	U	2.0	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/l	0.98	U	0.98	U	0.93	U
Perfluorobutanoic acid (PFBA)	375-22-4	ng/l	4.3	U	4.3	U	4.1	U
Perfluorodecanoic acid (PFDA)	335-76-2	ng/l	1.1	U	1.1	U	1.0	U
Perfluorododecanoic acid (PFDoA)	307-55-1	ng/l	1.1	U	1.1	U	1.0	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/l	1.1	U	1.1	U	1.0	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/l	0.98	U	0.98	U	0.93	U
Perfluorohexanoic acid (PFHxA)	307-24-4	ng/l	1.1	U	1.1	U	1.0	U
Perfluorononanoic acid (PFNA)	375-95-1	ng/l	1.1	U	1.1	U	1.0	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	ng/l	1.1	U	1.1	U	1.0	U
Perfluorooctanoic acid (PFOA)	335-67-1	ng/l	1.1	U	1.1	U	1.0	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/l	4.3	U	4.3	U	4.1	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/l	1.1	U	1.1	U	1.0	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	ng/l	1.1	U	1.1	U	1.0	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/l	1.1	U	1.1	U	1.0	U

Notes:

**Bold = Detected result above the level of detection**

CAS = Chemical Abstracts Service number

EB = equipment blank

FB = field blank

GW = groundwater

ID = identification

ng/l = nanograms per liter

Qual = qualifier

SE = sediment

SO = soil

SW = surface water

Qualifier

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.

U = The analyte was analyzed for but the result was not detected above the method detection limit

**Attachment A-5. Validated Analytical Results (Field and Equipment Blanks)**  
**Badger Army Ammunition Plant, Wisconsin**  
**USACE PFAS PA/SI**

AOPI			Field Blank		Field Blank		Field Blank	
Location			Field Blank		Field Blank		Field Blank	
Sample/Parent ID			BAAP-FB-SO-082818		BAAP-FB-SO-082918		BAAP-FB-SW-090618	
Sample Date			08/28/2018		08/29/2018		09/06/2018	
Sample Type			FB		FB		FB	
Matrix			Water		Water		Water	
Analyte	CAS	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>								
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2	ng/l	1.8	U	1.9	U	1.8	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4	ng/l	1.8	U	1.9	U	1.8	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	2991-50-6	ng/l	2.1	U	2.2	U	2.1	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	2355-31-9	ng/l	2.1	U	2.2	U	2.1	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/l	0.97	U	1.0	U	0.97	U
Perfluorobutanoic acid (PFBA)	375-22-4	ng/l	4.2	U	4.4	U	4.2	U
Perfluorodecanoic acid (PFDA)	335-76-2	ng/l	1.1	U	1.1	U	1.1	U
Perfluorododecanoic acid (PFDoA)	307-55-1	ng/l	1.1	U	1.1	U	1.1	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/l	1.1	U	1.1	U	1.1	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/l	0.97	U	1.0	U	0.97	U
Perfluorohexanoic acid (PFHxA)	307-24-4	ng/l	1.1	U	1.1	U	1.1	U
Perfluorononanoic acid (PFNA)	375-95-1	ng/l	1.1	U	1.1	U	1.1	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	ng/l	1.1	U	1.1	U	1.1	U
Perfluorooctanoic acid (PFOA)	335-67-1	ng/l	1.1	U	1.1	U	1.1	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/l	4.2	U	4.4	U	4.2	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/l	1.1	U	1.1	U	1.1	U
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	ng/l	1.1	U	1.1	U	1.1	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/l	1.1	U	1.1	U	1.1	U

Notes:

**Bold = Detected result above the level of detection**

CAS = Chemical Abstracts Service number

EB = equipment blank

FB = field blank

GW = groundwater

ID = identification

ng/l = nanograms per liter

Qual = qualifier

SE = sediment

SO = soil

SW = surface water

Qualifier

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.

U = The analyte was analyzed for but the result was not detected above the method detection limit.



Attachment A-5. Validated Analytical Results (Sediment)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

AOPI					POND-1		POND-2		POND-3		POND-3	
Location					POND-1		POND-2		POND-3		POND-3	
Sample/Parent ID					BAAP-POND-1-SE		BAAP-POND-2-SE		BAAP-POND-3-SE		BAAP-FD-SE-090618FD / BAAP-POND-3-SE	
Sample Date					09/06/2018		09/06/2018		09/06/2018		09/06/2018	
Sample Type					N		N		N		FD	
Matrix					Sediment		Sediment		Sediment		Sediment	
Analyte	CAS	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>												
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2	--	--	mg/kg	0.0035	U	0.0035	U	0.0041	U	0.0038	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4	--	--	mg/kg	0.0035	U	0.0035	U	0.0041	U	0.0038	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6	--	--	mg/kg	0.0037	U	0.0037	U	0.0043	U	0.004	U
N-Methylperfluorooctane Sulfonamidoacetic Acid (MeFOSAA)	2355-31-9	--	--	mg/kg	0.0037	U	0.0037	U	0.0043	U	0.004	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1600	16000	mg/kg	0.0011	U	0.0011	U	0.0013	U	0.0012	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	--	mg/kg	0.0012	U	0.0012	U	0.0014	U	0.0013	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluorononanoic acid (PFNA)	375-95-1	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.6	16	mg/kg	0.0012	U	0.0012	U	0.0014	U	0.0013	U
Perfluorooctanoic acid (PFOA)	335-67-1	1.6	16	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	--	mg/kg	0.0013	U	0.0013	U	0.0015	U	0.0014	U
<b>General Chemistry</b>												
Percent Moisture	--	--	--	%	49.5		47.4		56.7		53.9	

Notes:  
 When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:  
 AOPI = Area of Potential Interest  
**Bold = Detected result above the level of detection**  
 CAS = Chemical Abstracts Service number  
 FD = field duplicate sample  
 ID = identification  
 mg/kg = micrograms per kilogram  
 N = primary sample  
 % = percent  
 Qual = qualifier  
 -- = Not Applicable  
 SE = sediment

Qualifier:  
 U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Soil)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

AOPI				FFTA-SN-01		FFTA-SN-01		FFTA-SN-01	
Location				FFTA-SN-01		FFTA-SN-01		FFTA-SN-01	
Sample/Parent ID				BAAP-FFTA-SN-1-20-SO		BAAP-FFTA-SN-1-35-SO		BAAP-FFTA-SN-1-5.0-SO	
Sample Date				08/28/2018		08/28/2018		08/28/2018	
Sample Type				N		N		N	
Matrix				Soil		Soil		Soil	
Analyte	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>									
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	--	--	mg/kg	0.0019	U	0.0019	U	0.0022	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	--	--	mg/kg	0.0019	U	0.0019	U	0.0022	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.002	U	0.002	U		R
N-Methylperfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.002	U	0.002	U		R
Perfluorobutane sulfonic acid (PFBS)	1600	16000	mg/kg	0.0006	U	0.00059	U	0.00068	U
Perfluorobutanoic acid (PFBA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluorodecanoic acid (PFDA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluorododecanoic acid (PFDoA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluoroheptanoic acid (PFHpA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluorohexane sulfonic acid (PFHxS)	--	--	mg/kg	0.00064	U	0.00063	U	0.00073	U
Perfluorohexanoic acid (PFHxA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluorononanoic acid (PFNA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluorooctanesulfonic acid (PFOS)	1.6	16	mg/kg	0.00065	U	0.00064	U	0.00074	U
Perfluorooctanoic acid (PFOA)	1.6	16	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluoropentanoic acid (PFPeA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluorotetradecanoic acid (PFTeA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluorotridecanoic acid (PFTrDA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
Perfluoroundecanoic acid (PFUdA)	--	--	mg/kg	0.00068	U	0.00067	U	0.00078	U
<b>TOC</b>									
Total Organic Carbon	--	--	mg/kg	13500		2480		1490	
<b>Grain Size</b>									
Clay	--	--	%	3		1.5		24	
Gravel	--	--	%	21.2		18.3		1	U
Sand	--	--	%	57.1		77.4		23.2	
Sieve 0.75 inch, % passing	--	--	%	96		94.5		100	

Sieve 1.5 inch, % passing	--	--	%	100		100		100	
Sieve 3 inch, % passing	--	--	%	100		100		100	
Sieve No. 20, % passing	--	--	%	5.5		1.5		44	
Sieve, 1 micron, % passing	--	--	%	0.5	U	0.5	U	19.5	
Sieve, 1180 micron, % passing	--	--	%	63.4		75.4		96.5	
Sieve, 150 micron, % passing	--	--	%	26		8.5		79	
Sieve, 2 micron, % passing	--	--	%	1.5		1		21	
Sieve, 2360 micron, % passing	--	--	%	67.6		77.6		97	
Sieve, 300 micron, % passing	--	--	%	33.9		37.4		87.4	
Sieve, 3350 micron, % passing	--	--	%	72.7		79.3		98.7	
Sieve, 4750 micron, % passing	--	--	%	78.8		81.7		99.1	
Sieve, 5 micron, % passing	--	--	%	3		1.5		24	
Sieve, 50 micron, % passing	--	--	%	12.5		2.5		65	
Sieve, 600 micron, % passing	--	--	%	54.3		69.9		95.3	
Sieve, 64 micron, % passing	--	--	%	19		3		73	
Sieve, 75 micron, % passing	--	--	%	21.8		4.3		76	
Silt	--	--	%	18.8		2.8		52	
<b>General Chemistry</b>									
Percent Moisture	--	--	%	3.3		2.6		14.9	
pH	--	--	SU	9.210000038	J	9.289999962	J	6.119999886	J

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Soil)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

AOPI				FFTA-SN-01		FFTA-SN-01		FFTA-SN-01		FFTA-SN-01		FFTA-SN-01	
Location				FFTA-SN-01		FFTA-SN-01		FFTA-SN-01		FFTA-SN-01		FFTA-SN-01	
Sample/Parent ID				BAAP-FFTA-SN-1-50-SO		BAAP-FFTA-SN-1-65-SO		BAAP-FFTA-SN-1-80-SO		BAAP-FFTA-SN-1-WT84-SO		BAAP-FFTA-SN-1-50-SO	
Sample Date				08/28/2018		08/28/2018		08/29/2018		08/29/2018		08/28/2018	
Sample Type				N		N		N		N		FD	
Matrix				Soil		Soil		Soil		Soil		Soil	
Analyte	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>													
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	--	--	mg/kg	0.0019	U	0.0018	U	0.0018	U	0.0019	U	0.0018	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	--	--	mg/kg	0.0019	U	0.0018	U	0.0018	U	0.0019	U	0.0018	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.002	U	0.0019	U	0.0019	U	0.002	U	0.0019	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.002	U	0.0019	U	0.0019	U	0.002	U	0.0019	U
Perfluorobutane sulfonic acid (PFBS)	1600	16000	mg/kg	0.00061	U	0.00057	U	0.00056	U	0.0006	U	0.00057	U
Perfluorobutanoic acid (PFBA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluorodecanoic acid (PFDA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluorododecanoic acid (PFDoA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluoroheptanoic acid (PFHpA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluorohexane sulfonic acid (PFHxS)	--	--	mg/kg	0.00065	U	0.00061	U	0.0006	U	0.00064	U	0.00061	U
Perfluorohexanoic acid (PFHxA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluorononanoic acid (PFNA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluorooctanesulfonic acid (PFOS)	1.6	16	mg/kg	0.00066	U	0.00061	U	0.00061	U	0.00065	U	0.00062	U
Perfluorooctanoic acid (PFOA)	1.6	16	mg/kg	<b>0.0011</b>		<b>0.0011</b>		0.00063	U	<b>0.005</b>		<b>0.0025</b>	
Perfluoropentanoic acid (PFPeA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluorotetradecanoic acid (PFTeA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluorotridecanoic acid (PFTTrDA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
Perfluoroundecanoic acid (PFUdA)	--	--	mg/kg	0.00069	U	0.00064	U	0.00063	U	0.00068	U	0.00064	U
<b>TOC</b>													
Total Organic Carbon	--	--	mg/kg	3730	J	1770		1690		822		2040	J
<b>Grain Size</b>													
Clay	--	--	%	1	U	3		3		1			
Gravel	--	--	%	10.3		1	U	1	U	1	U		
Sand	--	--	%	85.9		95.2		91.3		94.5			
Sieve 0.75 inch, % passing	--	--	%	100		100		100		100			

Sieve 1.5 inch, % passing	--	--	%	100		100		100		100			
Sieve 3 inch, % passing	--	--	%	100		100		100		100			
Sieve No. 20, % passing	--	--	%	1.5		3		3		2			
Sieve, 1 micron, % passing	--	--	%	0.5		0.5	U	3		1			
Sieve, 1180 micron, % passing	--	--	%	79.3		98.5		98.4		98.6			
Sieve, 150 micron, % passing	--	--	%	6.6		9.4		12.3		10			
Sieve, 2 micron, % passing	--	--	%	0.5		2		3		1			
Sieve, 2360 micron, % passing	--	--	%	85.1		98.9		99.9		99.9			
Sieve, 300 micron, % passing	--	--	%	34.7		56.6		25		30.1			
Sieve, 3350 micron, % passing	--	--	%	87.3		99		100		100			
Sieve, 4750 micron, % passing	--	--	%	89.7		99.2		100		100			
Sieve, 5 micron, % passing	--	--	%	0.5		3		3		1			
Sieve, 50 micron, % passing	--	--	%	2		3		5		3			
Sieve, 600 micron, % passing	--	--	%	68		95		72.8		81.1			
Sieve, 64 micron, % passing	--	--	%	3		3.5		8		5			
Sieve, 75 micron, % passing	--	--	%	3.8		4		8.7		5.5			
Silt	--	--	%	3.3		1	U	5.7		4.5			
<b>General Chemistry</b>													
Percent Moisture	--	--	%	3		3.9		1.7		1.5		2.2	
pH	--	--	SU	9.390000343	J	9.409999847	J	9.380000114	J	9.239999771	J	9.43999958	J

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Soil)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

AOPI				FFTA-SN-02		FFTA-SN-02		FFTA-SN-02		FFTA-SN-02		FFTA-SN-02	
Location				FFTA-SN-02		FFTA-SN-02		FFTA-SN-02		FFTA-SN-02		FFTA-SN-02	
Sample/Parent ID				BAAP-FFTA-SN-2-20-SO		BAAP-FFTA-SN-2-35-SO		BAAP-FFTA-SN-2-5.0-SO		BAAP-FFTA-SN-2-50-SO		BAAP-FFTA-SN-2-65-SO	
Sample Date				08/29/2018		08/29/2018		08/29/2018		08/29/2018		08/29/2018	
Sample Type				N		N		N		N		N	
Matrix				Soil		Soil		Soil		Soil		Soil	
Analyte	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>													
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	--	--	mg/kg	0.0018	U	0.0018	U	0.0021	U	0.0019	U	0.0018	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	--	--	mg/kg	0.0018	U	0.0018	U	0.0021	U	0.0019	U	0.0018	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg		R	0.0019	U	0.0022	U	0.0021	U	0.0019	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg		R	0.0019	U	0.0022	U	0.0021	U	0.0019	U
Perfluorobutane sulfonic acid (PFBS)	1600	16000	mg/kg	0.00057	U	0.00057	U	0.00065	U	0.00062	U	0.00057	U
Perfluorobutanoic acid (PFBA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluorodecanoic acid (PFDA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluorododecanoic acid (PFDoA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluoroheptanoic acid (PFHpA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluorohexane sulfonic acid (PFHxS)	--	--	mg/kg	0.00061	U	0.00061	U	0.0007	U	0.00066	U	0.0006	U
Perfluorohexanoic acid (PFHxA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluorononanoic acid (PFNA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluorooctanesulfonic acid (PFOS)	1.6	16	mg/kg	0.00062	U	0.00062	U	0.00071	U	0.00067	U	0.00061	U
Perfluorooctanoic acid (PFOA)	1.6	16	mg/kg	0.00065	U	<b>0.0011</b>		0.00074	U	0.0007	U	0.00064	U
Perfluoropentanoic acid (PFPeA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluorotetradecanoic acid (PFTeA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluorotridecanoic acid (PFTTrDA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
Perfluoroundecanoic acid (PFUdA)	--	--	mg/kg	0.00065	U	0.00065	U	0.00074	U	0.0007	U	0.00064	U
<b>TOC</b>													
Total Organic Carbon	--	--	mg/kg	4570		5400		2090		3430		2860	J
<b>Grain Size</b>													
Clay	--	--	%	2		1.5		28.1		2		1	
Gravel	--	--	%	28.5		33.8		1	U	12.9		10.9	
Sand	--	--	%	60		64.3		15.8		83.6		80.3	
Sieve 0.75 inch, % passing	--	--	%	97		80.5		100		97.3		93.5	

Sieve 1.5 inch, % passing	--	--	%	100		100		100		100		100	
Sieve 3 inch, % passing	--	--	%	100		100		100		100		100	
Sieve No. 20, % passing	--	--	%	3		1.5		44		2		4	
Sieve, 1 micron, % passing	--	--	%	0.5	U	0.5	U	19		0.5	U	0.5	
Sieve, 1180 micron, % passing	--	--	%	58.4		52.8		89.7		75.9		85.9	
Sieve, 150 micron, % passing	--	--	%	15.5		3.3		84.8		7.6		13.6	
Sieve, 2 micron, % passing	--	--	%	0.5		1.5		22		1		0.5	
Sieve, 2360 micron, % passing	--	--	%	61.7		59.3		89.8		80		86.5	
Sieve, 300 micron, % passing	--	--	%	28.5		12.9		87.1		42.5		41.2	
Sieve, 3350 micron, % passing	--	--	%	66.1		62.4		97.1		84		87.4	
Sieve, 4750 micron, % passing	--	--	%	71.5		66.2		99.9		87.1		89.1	
Sieve, 5 micron, % passing	--	--	%	2		1.5		25.5		2		1	
Sieve, 50 micron, % passing	--	--	%	7		1.5		72		2		7	
Sieve, 600 micron, % passing	--	--	%	51.2		39.7		89.1		66		80.8	
Sieve, 64 micron, % passing	--	--	%	10		1.5		80		3		8	
Sieve, 75 micron, % passing	--	--	%	11.5		1.9		84.1		3.5		8.8	
Silt	--	--	%	9.5		1	U	56		1.5		7.8	
<b>General Chemistry</b>													
Percent Moisture	--	--	%	3.5		3.8		16.4		2.5		2	
pH	--	--	SU	9.239999771	J	9.220000267	J	7.590000153	J	9.239999771	J	8.979999542	J

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Soil)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

AOPI				FFTA-SN-02		FFTA-SN-02		FFTA-SN-03		FFTA-SN-03		FFTA-SN-03	
Location				FFTA-SN-02		FFTA-SN-02		FFTA-SN-03		FFTA-SN-03		FFTA-SN-03	
Sample/Parent ID				BAAP-FFTA-SN-2-WT80-SO		BAAP-FFTA-SN-2-WT80-SO		BAAP-FFTA-SN-3-20-SO		BAAP-FFTA-SN-3-35-SO		BAAP-FFTA-SN-3-5.0-SO	
Sample Date				08/29/2018		08/29/2018		08/29/2018		08/29/2018		08/29/2018	
Sample Type				N		FD		N		N		N	
Matrix				Soil		Soil		Soil		Soil		Soil	
Analyte	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>													
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	--	--	mg/kg	0.0019	U	0.0018	U	0.0018	U	0.0019	U	0.0022	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	--	--	mg/kg	0.0019	U	0.0018	U	0.0018	U	0.0019	U	0.0022	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.002	U	0.0019	U	0.0019	U	0.002	U		R
N-Methylperfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.002	U	0.0019	U	0.0019	U	0.002	U		R
Perfluorobutane sulfonic acid (PFBS)	1600	16000	mg/kg	0.00059	U	0.00058	U	0.00058	U	0.00061	U	0.00069	U
Perfluorobutanoic acid (PFBA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluorodecanoic acid (PFDA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluorododecanoic acid (PFDoA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluoroheptanoic acid (PFHpA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluorohexane sulfonic acid (PFHxS)	--	--	mg/kg	0.00062	U	0.00062	U	0.00062	U	0.00065	U	0.00074	U
Perfluorohexanoic acid (PFHxA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluorononanoic acid (PFNA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluorooctanesulfonic acid (PFOS)	1.6	16	mg/kg	0.00063	U	0.00063	U	0.00063	U	0.00067	U	0.00075	U
Perfluorooctanoic acid (PFOA)	1.6	16	mg/kg	<b>0.00067</b>	J	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluoropentanoic acid (PFPeA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluorotetradecanoic acid (PFTeA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluorotridecanoic acid (PFTTrDA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
Perfluoroundecanoic acid (PFUdA)	--	--	mg/kg	0.00066	U	0.00066	U	0.00066	U	0.0007	U	0.00078	U
<b>TOC</b>													
Total Organic Carbon	--	--	mg/kg	937		5410		12500		3130		2150	
<b>Grain Size</b>													
Clay	--	--	%	1	U			1	U	1	U	27	
Gravel	--	--	%	1	U			47.3		30		1	U
Sand	--	--	%	90.3				47.4		66.4		13.3	
Sieve 0.75 inch, % passing	--	--	%	100				73.7		91.1		100	



Sieve 1.5 inch, % passing	--	--	%	100				100			100			100			
Sieve 3 inch, % passing	--	--	%	100				100			100			100			
Sieve No. 20, % passing	--	--	%	1				1			2			45			
Sieve, 1 micron, % passing	--	--	%	1				0.5	U		0.5	U		20			
Sieve, 1180 micron, % passing	--	--	%	96.1				39.1			54.7			99.8			
Sieve, 150 micron, % passing	--	--	%	12.1				7.8			5.7			88.4			
Sieve, 2 micron, % passing	--	--	%	1				0.5	U		0.5	U		21			
Sieve, 2360 micron, % passing	--	--	%	98.2				43.2			61.8			99.8			
Sieve, 300 micron, % passing	--	--	%	50				16.2			24.7			94.7			
Sieve, 3350 micron, % passing	--	--	%	99				47.4			65.6			99.9			
Sieve, 4750 micron, % passing	--	--	%	99.7				52.7			70			99.9			
Sieve, 5 micron, % passing	--	--	%	1				0.5			0.5			27			
Sieve, 50 micron, % passing	--	--	%	3.5				3			2.5			73			
Sieve, 600 micron, % passing	--	--	%	95.5				30.3			46.4			99.1			
Sieve, 64 micron, % passing	--	--	%	7.5				4			3.5			83			
Sieve, 75 micron, % passing	--	--	%	9.3				5.3			3.6			86.6			
Silt	--	--	%	8.5				4.8			3.1			59.6			
<b>General Chemistry</b>																	
Percent Moisture	--	--	%	2.4				3.9			2.4			4.2	14.8		
pH	--	--	SU	9.260000229	J			9.289999962	J		9.239999771	J		9.359999657	J	7.880000114	J

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest  
 BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
 CAS = Chemical Abstracts Service number  
 FD = field duplicate sample  
 ID = identification  
 mg/kg = micrograms per kilogram  
 N = primary sample  
 % = percent  
 Qual = qualifier  
 -- = Not Applicable  
 SN = sonic drilling  
 SO = soil

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
 U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Soil)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

AOPI				FFTA-SN-03		FFTA-SN-03		FFTA-SN-03	
Location				FFTA-SN-03		FFTA-SN-03		FFTA-SN-03	
Sample/Parent ID				BAAP-FFTA-SN-3-50-SO		BAAP-FFTA-SN-3-65-SO		BAAP-FFTA-SN-3-WT80-SO	
Sample Date				08/30/2018		08/30/2018		08/30/2018	
Sample Type				N		N		N	
Matrix				Soil		Soil		Soil	
Analyte	US DOD Ind 0.1	US DOD Ind 1.0	Units	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>									
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	--	--	mg/kg	0.002	U	0.0019	U	0.0019	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	--	--	mg/kg	0.002	U	0.0019	U	0.0019	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.0021	U	0.002	U	0.002	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	--	--	mg/kg	0.0021	U	0.002	U	0.002	U
Perfluorobutane sulfonic acid (PFBS)	1600	16000	mg/kg	0.00062	U	0.00059	U	0.00061	U
Perfluorobutanoic acid (PFBA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluorodecanoic acid (PFDA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluorododecanoic acid (PFDoA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluoroheptanoic acid (PFHpA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluorohexane sulfonic acid (PFHxS)	--	--	mg/kg	0.00066	U	0.00063	U	0.00065	U
Perfluorohexanoic acid (PFHxA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluorononanoic acid (PFNA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluorooctanesulfonic acid (PFOS)	1.6	16	mg/kg	0.00067	U	0.00064	U	0.00066	U
Perfluorooctanoic acid (PFOA)	1.6	16	mg/kg	0.0007	U	0.00067	U	<b>0.0013</b>	
Perfluoropentanoic acid (PFPeA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluorotetradecanoic acid (PFTeA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluorotridecanoic acid (PFTrDA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
Perfluoroundecanoic acid (PFUdA)	--	--	mg/kg	0.0007	U	0.00067	U	0.00069	U
<b>TOC</b>									
Total Organic Carbon	--	--	mg/kg	4100		1930		5200	
<b>Grain Size</b>									
Clay	--	--	%	1.4		1	U	2	
Gravel	--	--	%	7.4		11.2		5.1	
Sand	--	--	%	80.9		87.5		87.1	
Sieve 0.75 inch, % passing	--	--	%	97.7		98.6		100	

Sieve 1.5 inch, % passing	--	--	%	100		100		100	
Sieve 3 inch, % passing	--	--	%	100		100		100	
Sieve No. 20, % passing	--	--	%	3		0.5		2	
Sieve, 1 micron, % passing	--	--	%	1		0.5		0.5	U
Sieve, 1180 micron, % passing	--	--	%	88.7		86.3		86.3	
Sieve, 150 micron, % passing	--	--	%	23.2		5.2		12.2	
Sieve, 2 micron, % passing	--	--	%	1		0.5		1	
Sieve, 2360 micron, % passing	--	--	%	89.5		87.1		89.7	
Sieve, 300 micron, % passing	--	--	%	62.8		47.8		29	
Sieve, 3350 micron, % passing	--	--	%	90.8		88		92.3	
Sieve, 4750 micron, % passing	--	--	%	92.6		88.8		95	
Sieve, 5 micron, % passing	--	--	%	1		0.5		2	
Sieve, 50 micron, % passing	--	--	%	6		0.5		4	
Sieve, 600 micron, % passing	--	--	%	85.9		82		72	
Sieve, 64 micron, % passing	--	--	%	10		0.5		7	
Sieve, 75 micron, % passing	--	--	%	11.8		1.3		7.8	
Silt	--	--	%	10.4		1	U	5.8	
<b>General Chemistry</b>									
Percent Moisture	--	--	%	8.1		2.1		2.4	
pH	--	--	SU	8.829999924	J	9.319999695	J	9.319999695	J

Notes:

When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Industrial/Commercial Screening Levels (US DOD Ind 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Ind 1.0 screening level.

Acronyms:

AOPI = Area of Potential Interest  
BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
CAS = Chemical Abstracts Service number  
FD = field duplicate sample  
ID = identification  
mg/kg = micrograms per kilogram  
N = primary sample  
% = percent  
Qual = qualifier  
-- = Not Applicable  
SN = sonic drilling  
SO = soil

Qualifier:

J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.  
U = The analyte was analyzed for but the result was not detected above the method detection limit.

Attachment A-5. Validated Analytical Results (Surface Water)  
 Badger Army Ammunition Plant, Wisconsin  
 USACE PFAS PA/SI

Location					POND-1		POND-1		POND-2		POND-3	
Sample/Parent ID					BAAP-POND-1-SW		BAAP-FD-SW-090618FD / BAAP-POND-1-SW		BAAP-POND-2-SW		BAAP-POND-3-SW	
Sample Date					09/06/2018		09/06/2018		09/06/2018		09/06/2018	
Sample Type					N		FD		N		N	
Matrix					Surface Water		Surface Water		Surface Water		Surface Water	
Analyte	CAS	DOD Tapwater RSL 0.1	DOD Tapwater RSL 1.0	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
<b>PFASs</b>												
6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)	27619-97-2			ng/l	9.9	U	10	U	10	U	9.9	U
8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)	39108-34-4			ng/l	9.9	U	10	U	10	U	9.9	U
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)	2991-50-6			ng/l	12	U	12	U	12	U	12	U
N-Methylperfluorooctane Sulfonamidoacetic Acid	2355-31-9			ng/l	12	U	12	U	12	U	12	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	40000	400000	ng/l	5.4	U	5.5	U	5.5	U	5.4	U
Perfluorobutanoic acid (PFBA)	375-22-4			ng/l	24	U	24	U	24	U	24	U
Perfluorodecanoic acid (PFDA)	335-76-2			ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluorododecanoic acid (PFDoA)	307-55-1			ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluoroheptanoic acid (PFHpA)	375-85-9			ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4			ng/l	5.4	U	5.5	U	5.5	U	5.4	U
Perfluorohexanoic acid (PFHxA)	307-24-4			ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluorononanoic acid (PFNA)	375-95-1			ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	40	400	ng/l	5.9	U	<b>6.1</b>	J	6.0	U	5.9	U
Perfluorooctanoic acid (PFOA)	335-67-1	40	400	ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluoropentanoic acid (PFPeA)	2706-90-3			ng/l	24	U	24	U	24	U	24	U
Perfluorotetradecanoic acid (PFTeA)	376-06-7			ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8			ng/l	5.9	U	6.0	U	6.0	U	5.9	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8			ng/l	5.9	U	6.0	U	6.0	U	5.9	U

Notes:  
 When only one PFAS compound is detected in a sample, the Regional Screening Levels for PFOS, PFOA, and PFBS fall under United States Department of Defence Tapwater Screening Levels (US DOD Tapwater 1.0). When multiple PFAS compounds are detected, a factor of 0.1 is applied to the US DOD Tapwater 1.0 screening level.

Acronyms:  
 AOPI = Area of Potential Interest  
 BAAP = Badger Army Ammunition Plant  
**Bold = Detected result above the level of detection**  
 Shaded = Value exceeds HAL  
 CAS = Chemical Abstracts Service number  
 FD = field duplicate sample  
 ID = identification  
 N = primary sample  
 ng/L = nanograms per liter  
 % = percent  
 Qual = qualifier  
 -- = Not Applicable  
 SW = surface water

Qualifier:  
 J = The analyte was positively identified; however the associated numerical value is an estimated concentration only  
 U = The analyte was analyzed for but the result was not detected above the method detection limit.

## **Attachment 6**

Office of the Secretary of Defense. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances with in the Department of Defense Cleanup Program. October 15.



## ASSISTANT SECRETARY OF DEFENSE

3500 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3500

OCT 15 2019

### SUSTAINMENT

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS,  
ENERGY AND ENVIRONMENT)  
ASSISTANT SECRETARY OF THE NAVY (ENERGY,  
INSTALLATIONS AND ENVIRONMENT)  
ASSISTANT SECRETARY OF THE AIR FORCE  
(INSTALLATIONS, ENVIRONMENT AND ENERGY)  
DIRECTOR, NATIONAL GUARD BUREAU (JOINT STAFF, J8)  
DIRECTOR, DEFENSE LOGISTICS AGENCY (INSTALLATION  
SUPPORT)

SUBJECT: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense  
Cleanup Program

The Department of Defense (DoD) conducts cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Defense Environmental Restoration Program (DERP). Our goal is protection of human health and the environment in a risk-based, fiscally-sound manner. This memorandum provides clarifying technical guidance on the investigation of perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS). This guidance is applicable to investigating PFOS, PFOA, and PFBS at Environmental Restoration Account-funded, Base Realignment and Closure Account-funded, and Operation and Maintenance accounts for the National Guard-funded sites.

PFOS, PFOA, and PFBS are part of a larger class of chemicals known as per- and polyfluoroalkyl substances (PFAS). PFAS shall be addressed in the same manner as other contaminants of concern within the DERP.

Under CERCLA, site-specific regional screening levels<sup>1</sup> (RSLs) for PFOS and PFOA are calculated using the Environmental Protection Agency (EPA) online calculator using the oral reference dose (RfD) of 2E-05 mg/kg-day. The RSL for PFBS is calculated using the EPA Provisional Peer Reviewed Toxicity Value (PPRTV) RfD of 2E-02 mg/kg-day, or it may be read off the tables available on the EPA RSL website. The values are provided in the attachment. These RSLs should be used for screening to determine if further investigation in the remedial investigation (RI) phase is warranted or if the site can proceed to site closeout. When multiple PFAS are encountered at a site, a 0.1 factor is applied to the screening level. For example, in cases where there are multiple PFAS, the screening level for PFOS and PFOA individually in tap water is 40 parts per trillion (ppt) ( $0.1 \times 400 \text{ ppt} = 40 \text{ ppt}$ ) and for PFBS it is 40 parts per billion (40,000 ppt).

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<sup>1</sup> For sites on the National Priorities List, the DoD Components will use the EPA site specific screening levels, if provided.

During the RI phase, the RfDs for PFOS, PFOA, and PFBS and the oral cancer slope factor (CSF) for PFOA of  $0.07 \text{ (mg/kg-day)}^{-1}$  will be used to conduct site specific risk assessments in accordance with Risk Assessment Guidance for Superfund Volume I, Part A (EPA/540/1-89/002, December 1989). Site-specific risk assessment results will be used to determine if any necessary remedial actions are required in accordance with CERCLA, DERP, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

My point of contact for this matter is Ms. Deborah Morefield at 703-571-9067 or [deborah.a.morefield.civ@mail.mil](mailto:deborah.a.morefield.civ@mail.mil).

A handwritten signature in black ink, appearing to read 'R. McMahon', with a long horizontal line extending to the right.

Robert H. McMahon

Attachment:  
As stated

**Attachment: Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil Using EPA’s RSL Calculator**

Chemical	Carcinogenic Slope Factor - Oral (SF) (mg/kg-day) <sup>-1</sup>	Non-Carcinogenic Reference Dose (RfD) (mg/kg-day)	Residential Scenario Screening Levels Calculated Using EPA RSL Calculator								Industrial/Commercial Composite Worker Screening Levels Calculated Using EPA RSL Calculator			
			Tap Water (µg/L or ppb)				Soil (mg/kg or ppm)				Soil (mg/kg or ppm)			
			HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04	HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04	HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04
PFOS	NA	2.00E-05	0.040	0.40	NA	NA	0.13	1.3	NA	NA	1.6	16	NA	NA
PFOA	7.00E-02	2.00E-05	0.040	0.40	1.1	111	0.13	1.3	7.8	775	1.6	16	33	3,280
PFBS	NA	2.00E-02	40	400	NA	NA	130	1300	NA	NA	1600	16000	NA	NA

HQ=Hazard Quotient

ILCR=Incremental Lifetime Cancer Risk

NA=Not available/applicable

**NOTES:**

- The table represents screening levels based on residential and industrial/commercial worker receptor scenarios for either direct ingestion of groundwater (residential scenario only) or incidental ingestion of contaminated soil (both residential and composite worker scenarios).
- All values were calculated using slope factors or reference doses for PFOS and PFOA published by EPA Office of Water in support of the LHA, and default exposure assumptions for each potential receptor scenario, contained in EPA's RSL Calculator on April 6, 2018.
- Peer reviewed toxicity values considered valid for risk assessment exist for PFBS, and the screening levels may be found in EPA’s RSL table or EPA’s RSL calculator used to develop them.
- Other potential receptor scenarios (e.g., recreational user, site trespasser, construction worker) are not included in the above table, but could be relevant receptors at a site potentially contaminated with PFOS, PFOA and/or PFBS. These receptors, and their associated exposure scenarios, should be further considered in the scoping phase and completion of the Baseline Human Health Risk Assessment typically completed during an RI.
- The shaded values represent conservative screening levels for PFOS and PFOA in groundwater or soil that when exceeded should be considered a contaminant of potential concern in the risk assessment process and calculations of site-specific risk posed.