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Pennsylvania Department of Environmental Protection
Bureau of Safe Drinking Water
PFAS Sampling Plan

PHASE 1: PLAN TO PRIORITIZE SAMPLING OF PUBLIC WATER SYSTEMS (PWS)
2019 - 2020

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I. Introduction

Per- and polyfluoroalkyl substances (PFAS) are a large group of man-made chemicals that have been widely used in commercial and industrial processes since the 1940s. This class of chemicals includes more than 3,000 substances that have been used in a variety of industrial and consumer products including firefighting foam, textiles (stain and water repellant clothing, carpet, upholstery), paper and packaging (microwave popcorn bags), non-stick cookware, personal care products (dental floss, cosmetics, toothpaste, shampoo), adhesives, latex paint, metal plating, wire manufacturing, industrial surfactants and many other uses. PFAS chemicals have been found in the blood serum of 97 percent of the general U.S. population. PFAS chemicals have been detected in water in at least 38 states, including Pennsylvania. However, there is limited statewide occurrence data in Pennsylvania.

PFAS are very stable compounds that remain in the environment for a very long time and bioaccumulate. The half-life of some of the common PFAS is estimated to range from 2 to 10 years. Two of the most widely-known PFAS are perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Animal studies of PFAS exposure report: developmental effects, liver toxicity, kidney toxicity, immune effects, and increased risk of cancer. Only a few of the PFAS have been studied for their human health impacts. Human epidemiology data report associations between PFAS exposure and high cholesterol, increased liver enzymes, decreased vaccination response, thyroid disorders, pregnancy-induced hypertension and preeclampsia, and increased risk of cancer (testicular and kidney).

PFAS chemicals are currently unregulated at both the federal and state level. In 2009, EPA issued a provisional Health Advisory Level (HAL) for PFOA and PFOS of 400 ng/L and 200 ng/L, respectively. EPA issued a Final HAL in May of 2016. According to EPA, the final combined lifetime HAL for PFOA and PFOS of 70 ng/L is protective of all consumers, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOA and PFOS from drinking water. While PFAS chemicals have received much attention in both the scientific and regulatory communities, there remains a lack of knowledge regarding these chemicals, how they impact the human body and what lasting, long-term health effects may be realized as a result of exposure.

On September 19, 2018, Governor Wolf signed an Executive Order for the formation of a PFAS Action Team comprised of agency heads from several state agencies including DEP, DOH, DMVA, DCED, PDA, PennDOT, and the State Fire Marshal. This team was formed to develop a comprehensive response to identify and eliminate sources of contamination, ensure drinking water is safe, and manage environmental contamination. In order to better understand the extent of this issue, the Governor also directed DEP to develop a PFAS Sampling Plan to test public water systems (PWS) across the Commonwealth.

II. Plan Purpose and Use

Phase 1 of the Sampling Plan is intended to prioritize sites for PFAS sampling and generate statewide occurrence data. Several factors were considered in developing the plan, including:

- Location of potential sources of PFAS contamination (PSOC)
- Known locations of PFAS contamination
- Relative risk to users of nearby PWS sources of drinking water
- Selection of PWS sources to serve as a control group
- Available funds - $250,000

Phase 1 will include the following:

- Contract with a Pennsylvania-accredited lab to analyze approximately 400 samples
    - EPA Method 537.1
    - Suite of 6 PFAS (PFOS, PFOA, PFNA, PFHxS, PFHpA, PFBS) to be consistent with EPA's Unregulated Contaminant Monitoring Rule 3 (UCMR3)
- Sample collection costs/supplies

The sample collection and quality assurance protocols will be described in separate documents.

Refer to Section III for more information about the factors and site selection.

*It should be noted that, for the purpose of this report, the term "**potential sources of PFAS contamination (PSOC)**" refers to facilities or locations that are generally considered a potential source of PFAS based on existing literature and/or the nature of the facility. This term is not meant to imply that these locations do in fact produce, use or discharge PFAS chemicals specifically, only that previous published work indicates the type of facility or activity can be associated with PFAS presence. Also, it should be noted that the term "**known locations of PFAS**" refers specifically to locations where DEP, through direct investigation and/or partnering, is aware of PFAS impacts in or around those areas. This term in no way implies a conclusion of research or activity in this location, nor does it imply an intent to begin or continue any activity in this location; this term only indicates a limited specific awareness.*

It should be noted that implementation of this sampling plan is not intended to determine source or to identify causality between potential sources of PFAS and PFAS found in drinking water sources. The purpose of this plan and the sampling to be performed as a result of this plan is intended to provide additional data regarding the occurrence of PFAS in PWSs in Pennsylvania.

III. Selection Method

The selection process involved a combination of spatial analysis and programmatic review. The spatial analysis included the creation of a Geographic Information System (GIS) project using ArcMap 10.4.1 that focused on PWS source locations and information about PSOCs.

There are currently 8,373 PWSs in the Commonwealth. There are various types of PWSs including:

- **Community Water Systems (CWS):** A PWS that provides water to the same population year-round. Examples are municipal water systems, authorities, mobile home parks and residential subdivisions with their own water supplies.
- **Nontransient Noncommunity Water Systems (NTNCWS):** A PWS that is not a CWS, but that regularly serves at least 25 of the same people at least six months of the year. Examples include schools, factories, and hospitals that have their own water supplies.
- **Transient Noncommunity Water Systems (TNCWS):** A PWS that serves transitory customers in non-residential settings such as campgrounds, motels, and restaurants having their own water supplies.

The list of PWSs was prioritized based on relative risk. Consumers served by CWSs and NTNCWSs have a higher risk of exposure from drinking, cooking, bathing and showering, and other water uses. For this reason, the Phase 1 sampling pool was limited to CWSs and NTNCWSs. There are 1,946 CWSs and 1,094 NTNCWSs, for a total initial sampling pool of 3,040 water systems. These 3,040 water systems provide drinking water from 6,256 sources (e.g. wells, springs, surface water sources).

In order to prioritize sampling, the selection process included an assessment of the potential risk from nearby PSOCs. Several layers containing locational and other information specific to PSOCs were created or otherwise included in the GIS. These layers include the following industries and land uses:

- Military bases
- Fire training schools/sites
- Airports
- Landfills
- HSCA sites
- Superfund sites
- Manufacturing facilities:
    - Apparel and other products made from fabrics

- Chemicals
- Electronic and electrical equipment
- Fabricated metal products
- Paper products
- Plastic products
- Textile and leather products
- Upholstered furniture

Known PFAS contamination sites were also reviewed for this project. Note: In order to minimize duplication of effort, any PWS sources within ½ mile of known PFAS contamination sites were excluded from the sampling pool if the sources were previously monitored and assessed for PFAS occurrence.

Layers showing geologic formations and HUC-12 watersheds with land use information were also included. (NOTE: a HUC-12 watershed is the smallest watershed area delimited by the USGS.)

Based on the compilation of PSOCs, the information was used to select PWS sources that are located within ½ mile of a PSOC. As of the date of this report, the target subset includes approximately **493** PWS sources. Based on available information, these **493** sources are considered the highest risk sites.*

A second query was performed from the list of active PWS sources. The query included PWS sources that are located in a HUC-12 watershed with greater than or equal to 75% forested land. The list was further refined to remove any PWS source that was located within five miles of a PSOC. The resulting list of **316** PWS sources is considered the Baseline Sources and will serve as a control group.

**Note: The list of PWS sources identified within ½ mile of a PSOC is subject to change as new information becomes available. Additional PWS sources may be added or removed from the list.*

IV. Industry, Use, and Source Discussion

As mentioned in the Introduction, this Sampling Plan relies on a spatial analysis of PSOCs relative to PWS sources. Likewise, much discussion in the current body of literature, both formal and informal allude to the ubiquitous nature of PFAS chemicals. As such, it is necessary to better refine the selection of PSOCs to consider. This decision making is guided by the availability of geographic data and a review of existing literature. In essence, these decisions consider the geographic information available, which will be discussed in greater detail in Section V of this plan, as well as a review of abstracts, articles, presentations, videos, technical papers, and other valid sources of information that discuss PFAS existence and use.

In reviewing available references, it was found that researchers and other professions will, at times, discuss a PFAS chemical's end use (e.g. firefighting foam), or that chemical's industry of use (e.g. aviation), or that chemical's actual source in the environment (e.g. airports and firefighting schools). As such, it was necessary to distill information into these categories and translate "industry and use" into potential physical location. For the purposes of this Plan the terms *industry, use,* and *source* are defined as follows:

- **Industry:** A group of providers/producers of goods and services who manufacture, distribute or otherwise use/provide a similar set of goods and services.
- **Use:** The purpose for a product; how or why a product or service is used.
- **Source:** The physical location where a PFAS chemical may be found as influenced by industry and use.

Note: Some research indicates that, given the omnipresence of PFAS chemicals, point and diffuse sources may be considered. Some research indicates that, in general, urban areas are a diffuse source of PFAS chemicals, as is rain. For the purpose of this Sampling Plan, potential point sources were of primary concern and potential background levels of PFAS resulting from diffuse sources are considered through the selection of Baseline Sources.

Table 1: A linear connection between industries producing or using PFAS, the general uses of PFAS by industry and the likely physical location associated with the industry or use.

Industry	Use	Source
Aviation, aerospace and defense	Wire insulation, AFFF, hydraulic fluids	Airports, military bases
Automotive	Wire insulation, fluids	Automotive garages, race tracks
Biocides	Pesticides	Farms, residential gardens
Cable and wiring	Wire insulation	Construction sites, landfills, homes, business and commercial districts
Construction products	Wire insulation, hydraulic fluids	Construction sites
Electronics	Wire insulation	Homes, offices, commercial and business districts, military bases, institutions of higher education, tech schools
Energy	-----	Well pads, other energy development sites
Fire-fighting	AFFF	Locations of incident response, airports, military bases
Household products	Shampoos, dental floss, cleaners, stain removers	Residential areas
Medical articles	Dental floss	Hospitals, clinics
Metal plating	Dust suppression	Industrial sites
Oil and mining production	Proprietary drilling fluids, hydraulic fluids	Well pads, other energy development sites
Paper and packaging	Oil resistant coatings	Landfills
Polymer manufacturing	-----	Industrial sites
Semiconductors	-----	Landfills, commercial and industrial areas
Textiles, leather, carpets, apparel and upholstery	Oil, stain, and water-resistant coatings	Landfills, residential areas
Outdoor recreation	Durable water repellant (DWR) coatings, ski wax	Ski resorts, recreational areas, residential areas
Cosmetics and other personal care products	Make-up, lotion, sunscreen, bug spray, dental floss	Landfills, developed lands

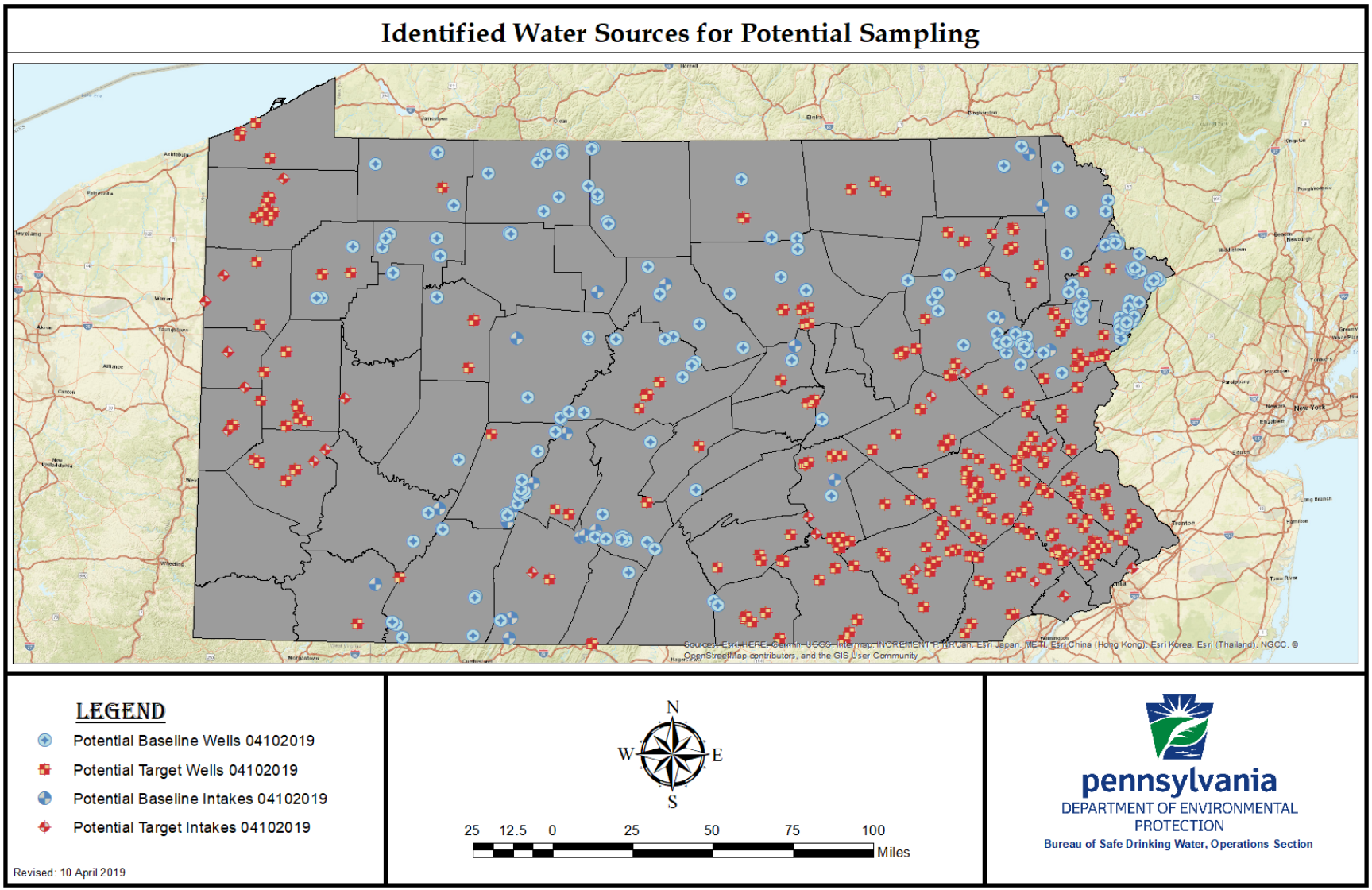
V. GIS Details and Citations

The GIS used for the spatial analysis described in the previous section is built on a foundation of layers from several different sources of information. Many of these layers were further refined to allow for the consideration of more specific information. Four of the layers were created "in-house" by the Bureau of Safe Drinking Water (BSDW), Operations and Monitoring Division. These layers include the Airports, Fire Schools, Military Installations, and Known PFAS Contamination Locations layers. A second source of information is the Pennsylvania Spatial Data Access (PASDA), a publicly accessible geospatial clearninghouse specific to Pennsylvania. Layers obtained from PASDA include Municipal and Residual Waste Facilities, land-use information, and karst features among others. Layers from EPA's EnviroFACTS site include manufacturing facilities such as apparel and other products made from fabrics, chemicals, electronic and electrical equipment, fabricated metal products, paper products, plastic products, textile and leather products, and upholstered furniture. Other layers are maintained within DEP and are obtained through translation of long-standing internal databases (PA Drinking Water Information System (PADWIS)) into spatially viewable information, such as the PWS Sources layer.

Table 2: A listing of layers which comprise the GIS used to perform the spatial analysis portion of PWS source selection. Note, for the purpose of this table, "source" does not refer to the original creator of the layer, but the general location where the layer may be found.

	Layer Name	Source	Description
1	Airports	BSDW, OMD	Considers known airports, runways, and landing strips
2	Part 139 Airports	BSDW, OMD	Shows all airports regulated under Part 139 of the CFR
3	Fire Training Schools	BSDW, OMD	Shows academic and practical firefighting schools and facilities
4	Military Installations	BSDW, OMD	Shows known military installations
5	Known PFAS Locations	BSDW, OMD	Shows locations known to contain PFAS
6	GDC.PADWIS_SOURCE	Internal DEP Database	Confidential layer showing current and historic source locations
7	Sources of Concern	BSDW, OMD	Derived from the PADWIS_SOURCE layer above
8	Suspect Sources	BSDW, OMD	Derived from the PADWIS_SOURCE layer above, sources within ½ mile of the potential PFAS sources that were considered
9	Baseline Sources	BSDW, OMD	Derived from the PADWIS_SOURCE layer above, consists of sources in forested watersheds greater than 5 miles from the suite of potential PFAS sources that were considered
10	PWS Service Areas	PASDA	Shows areas of PA serviced by specific public water suppliers
11	Residual Waste Facilities	PASDA	Shows a variety of facilities regulated or otherwise known to waste programs within DEP to be associated with the generation, transport, or management of residual waste
12	Municipal Waste Facilities	PASDA	Shows a variety of facilities regulated or otherwise known to waste programs within DEP to be associated with the generation, transport, or management of municipal waste
13	Riparia_HUC12_2011	PASDA	Shows HUC-12 watersheds and provides a wealth of land-use data as well
14	Environmental Justice Areas 2015	PASDA	Shows areas considered Environmental Justice Communities as of 2015
15	DCNR_PAKarst	PASDA	Provides information specific to sinkholes, caves, closed depressions and other such karst features
16	Bedrock (pagpoly)	DCNR	Provides information on the underlain geology of PA
17	Limestone and Dolomite	BSDW, OMD	Derived from the bedrock layer above, focuses on limestone and dolomite formations
18	Counties	PASDA	Provides county boundaries
19	DEP Regions	BSDW, OMD	Derived from the Counties layer above and shows DEP regional boundaries
20	Select Industries (EnviroFacts)	EnviroFacts (EPA Website)	Derived from a table obtained via the EnviroFacts website providing a list of user selected industrials sites located within Pennsylvania.

The layers described above were used to perform a spatial analysis of PWS sources relative to PSOCs. The following map depicts a visual representation of the PWS sources identified for monitoring. The Baseline Sources are also included.



Map 1: Identified wells and intakes to be sampled. Both Target and Baseline selections are shown.

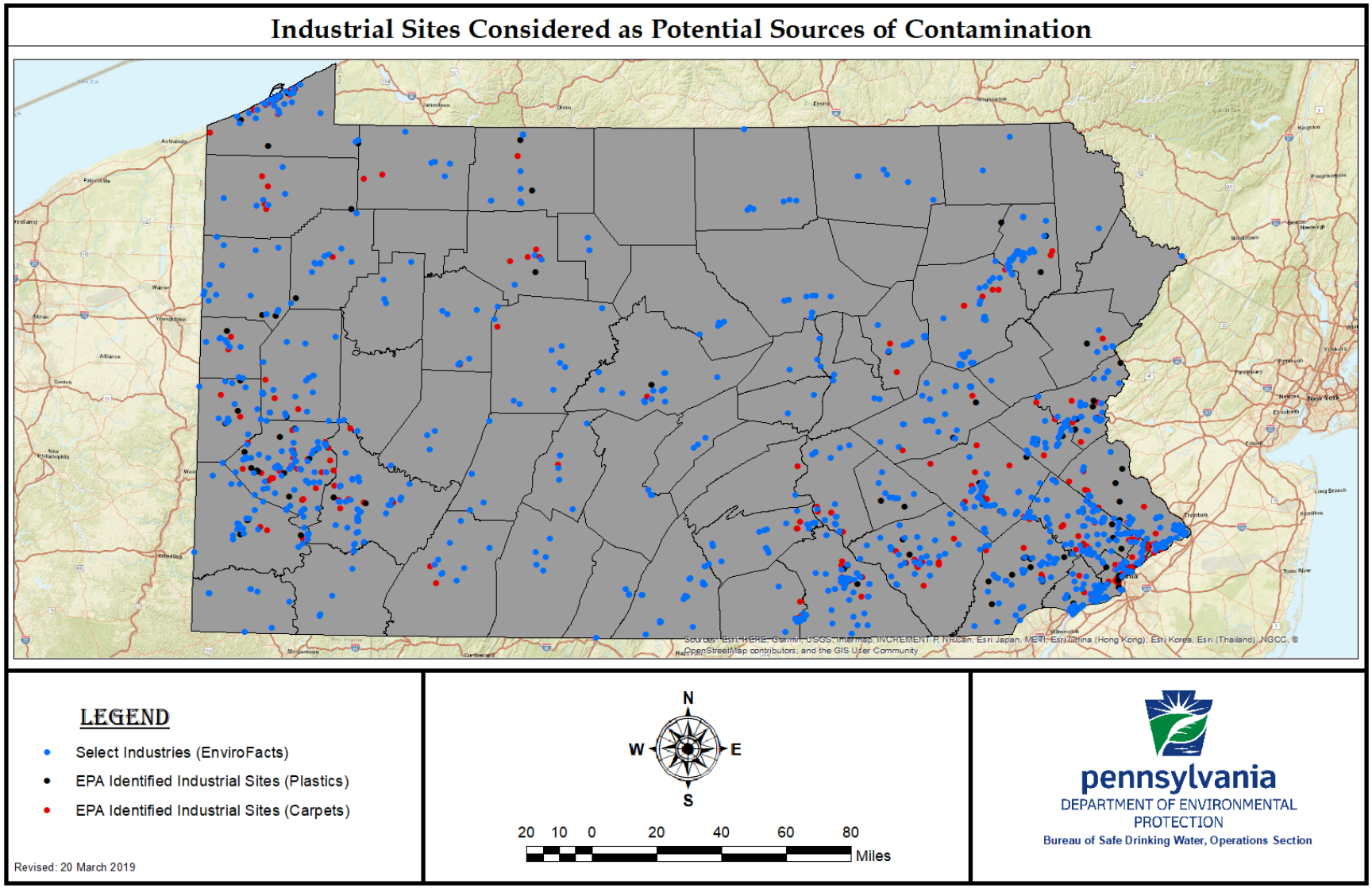
It should be stated again, that the term "potential sources" is not meant to be all-inclusive; these types of facilities were selected as a result of existing literature indicating that activities and products associated with these sources is also associated with PFAS use. This

set of sources is not meant to be exhaustive, nor is it intended to suggest that all such facilities produce or distribute PFAS; only that these general types of facilities and industries have been associated with PFAS manufacture or use.

The following section details more specific information that can be found within each layer. Further, upon completion of the analysis, the "Sample Population" was examined for location relative to potential source.

Industrial Sites

Research indicates that PFAS chemicals are used in a wide variety of industries including textiles, metal plating, food contact packaging, semiconductors and electronics, automotive and aviation materials and many others. Considering the wide use of these chemicals, a review of industries currently active in Pennsylvania through the use of EnviroFacts as well as research performed by EPA during earlier PFC research was conducted. This review produced three unique layers, two provided by EPA and one created from an EnviroFacts state-specific download. These layers comprised the industrial PSOC consideration for this spatial analysis. Map 2 below shows the locations of the industrial PSOCs that were considered when identifying wells and intakes.



Map 2: A map showing the locations of industrial sites that were considered as part of the total population of Potential Sources of Contamination (PSOC).

Select Industries (EnviroFacts)

Originator: Department of Environmental Protection, Bureau of Safe Drinking Water, Operations and Monitoring Division
Publication_Date:
Title: Select Industries (EnviroFacts)
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place: RCSOB
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage:

Layer Description:

Sample PWS wells within ½ mile of Select Industries (EnviroFacts): 235
Sample PWS intakes within ½ mile of Select Industries (EnviroFacts): 21

This layer was created by BSDW by performing a state-specific data download from EnviroFacts then selecting SIC codes specific to industries linked to the production or use of PFAS.

Note: The summary numbers in this section may change as new information becomes available regarding PSOCs.

EPA Identified Industrial Sites (Plastics)

Originator:
Publication_Date:
Title:
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:

Layer Description:

Sample PWS wells within ½ mile of EPA Identified Industrial Sites (Plastics): 42
Sample PWS intakes within ½ mile of EPA Identified Industrial Sites (Plastics): 0

This layer was provided to BSDW when EPA performed earlier research into PFCs.

EPA Identified Industrial Sites (Carpets)

Originator:
Publication_Date:
Title:
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:

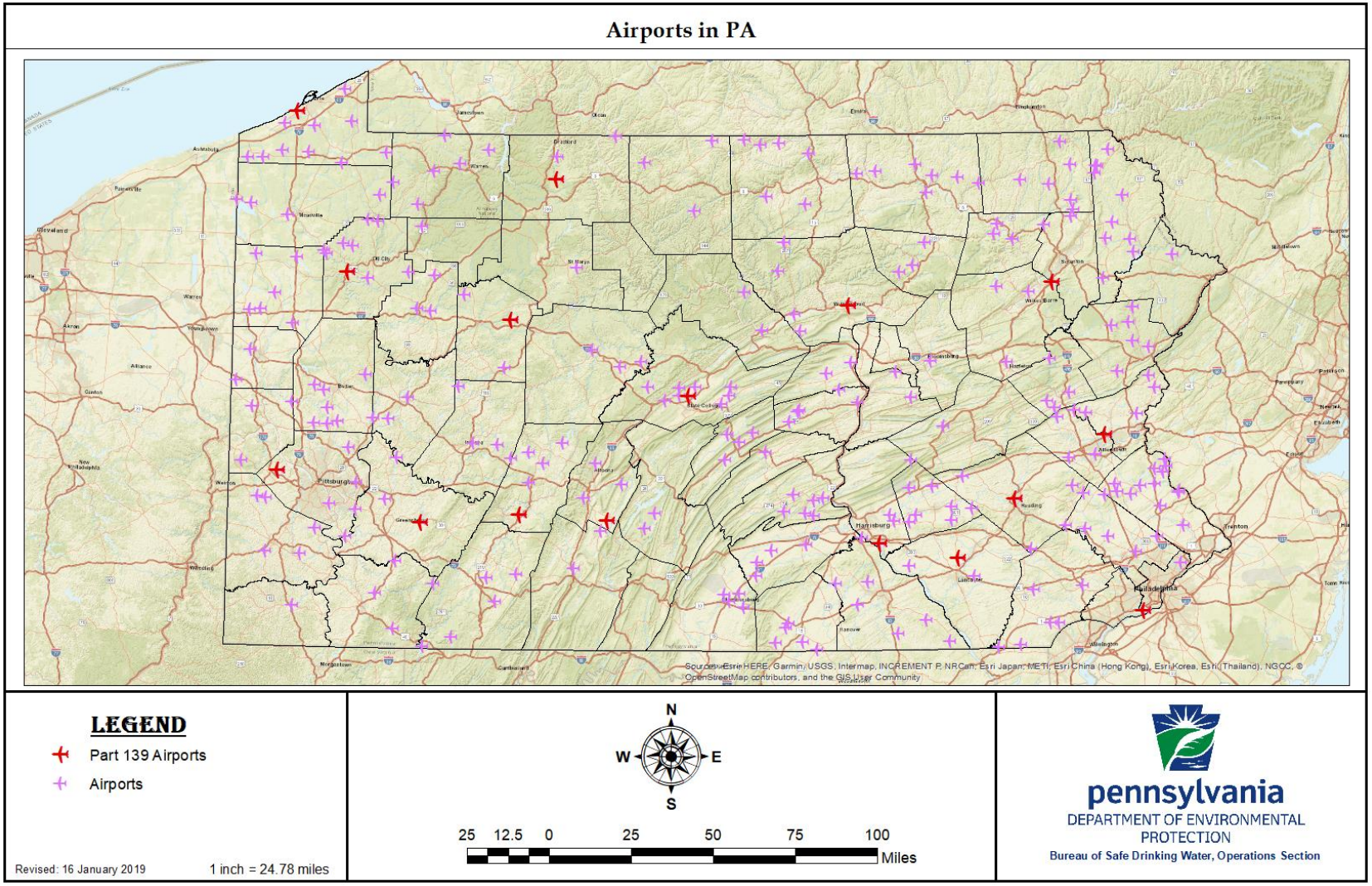
Layer Description:

Sample PWS wells within ½ mile of EPA Identified Industrial Sites (Carpets): 45
Sample PWS intakes within ½ mile of EPA Identified Industrial Sites (Carpets): 2

This layer was provided to BSDW when EPA performed earlier research into PFCs.

Airports

A significant portion of the peer-reviewed, published literature on PFAS contamination focuses on contamination resulting from the use of Aqueous Fire Fighting Foam (AFFF), a product mandate for use by the Federal Aviation Administration (FAA). Mis-Spec AFFF is a common source of PFAS and is commonly found at both military and civilian airports. Other sources of PFAS associated with airports and the aeronautical industry include wire insulation and certain mechanical fluids. Given the number of products that can be found at airports and that potentially contain PFAS, airports are considered a likely source of PFAS contamination. In consideration of airports two layers were primarily used for this part of the spatial analysis. The first was a layer created by the Safe Drinking Water Program that includes all known airports, runways and landing strips in Pennsylvania. Most of these airports are still active and a surprising number of these airports could be described as small, private landing strips. This layer included information specific to Part 139 regulated airports (Part 139 of the FAA regulations requires the use of AFFF). For the purpose of the spatial analysis only Part 139 airports were considered; however, the smaller airports are so prolific that a number of identified wells are located within ½ mile of these smaller, private airports. A second layer that was used for the spatial analysis was a layer created by the EPA as part of earlier research into Perfluroalkyl Substances (PFCs). This layer combined with the Part 139 Airports information gathered by BSDW staff comprise the focus of airports as PSOCs for this spatial analysis.



Map 3: A map of all known airports, airfields and landing strips in Pennsylvania. Airports known to be regulated by the FAA and 14CFR139 are shown in red.

AirportsInPA

Originator: Department of Environmental Protection, Bureau of Safe Drinking Water, Operations and Monitoring Division
Publication_Date:
Title: Airports in PA
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place: RCSOB
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage:

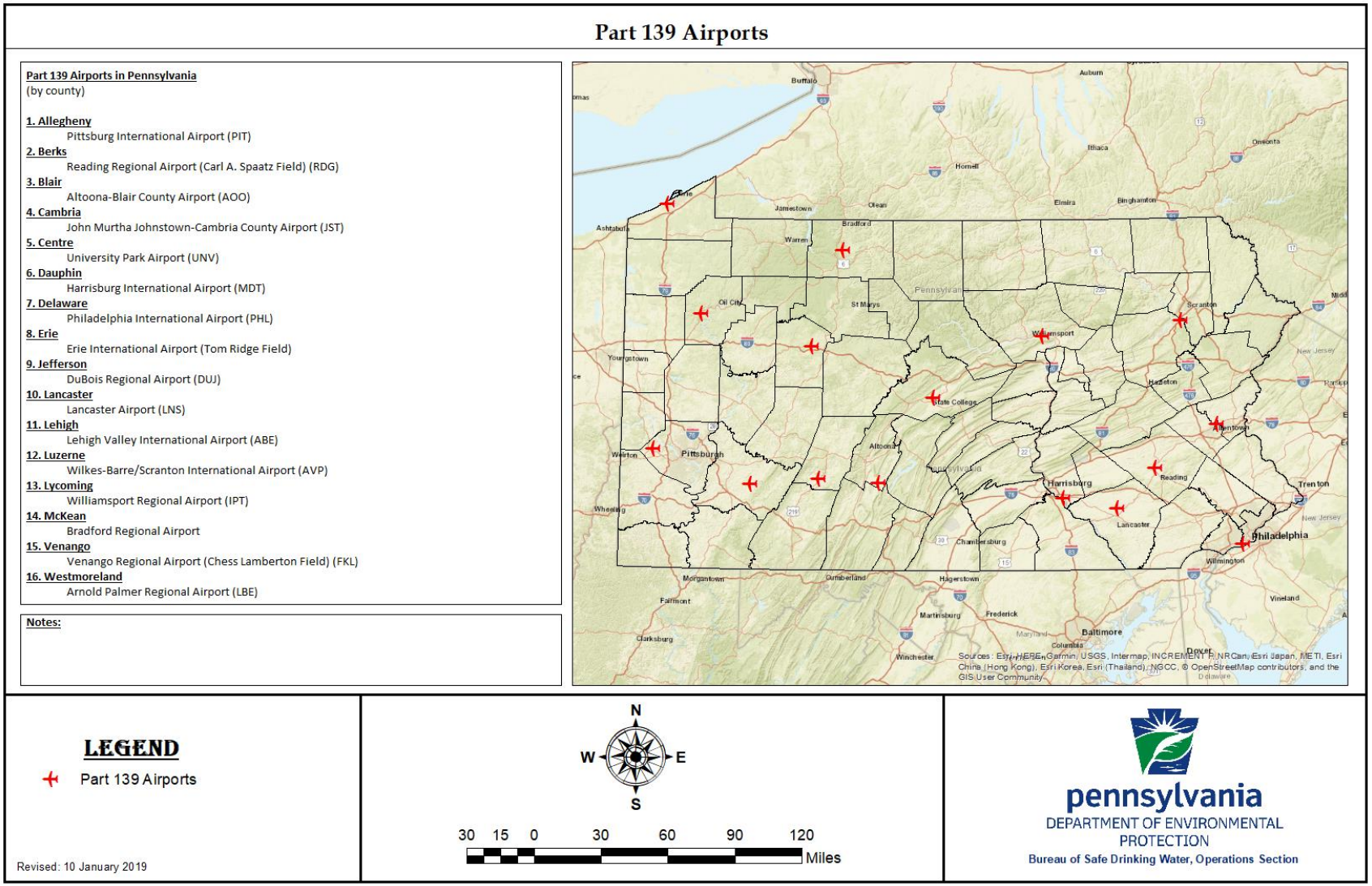
Layer Description:

Sample PWS wells within ½ mile of airports: 21
Sample PWS intakes within ½ mile of airports: 0

This layer was created by BSDW by reviewing readily available information on line including FAA records as well as a source map which depicted airport locations. The location of airports was further verified through a review of aerial photos. In most cases the point selected for airport coordinates was placed on the center of hanger area, or, in some cases center of runway. In the case of larger facilities, center of area was used.

The total number of airports, runways and landing strips found in Pennsylvania is 282; this includes large Part 139 airports such as the one found in Philadelphia as well as small, grass landing strips.

Part 139 Airports



Map 4: A map of all known airports in PA that are regulated by the FAA under 14CFR139. A listing of airport name and FAA ID by county is provided.

AirportsInPA

Originator: Department of Environmental Protection, Bureau of Safe Drinking Water, Operations and Monitoring Division
Publication_Date:
Title: Airports in PA
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place: RCSOB
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage:

Layer Description:

Sample PWS wells within ½ mile of Part 139 airports: 4
Sample PWS intakes within ½ mile of Part 139 airports: 0

This layer was derived from the Airports layer described above. Information regarding Part 139 regulated airports was taken from FAA records.

EPA Identified Airports

Originator:
Publication_Date:
Title:
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:

Layer Description:

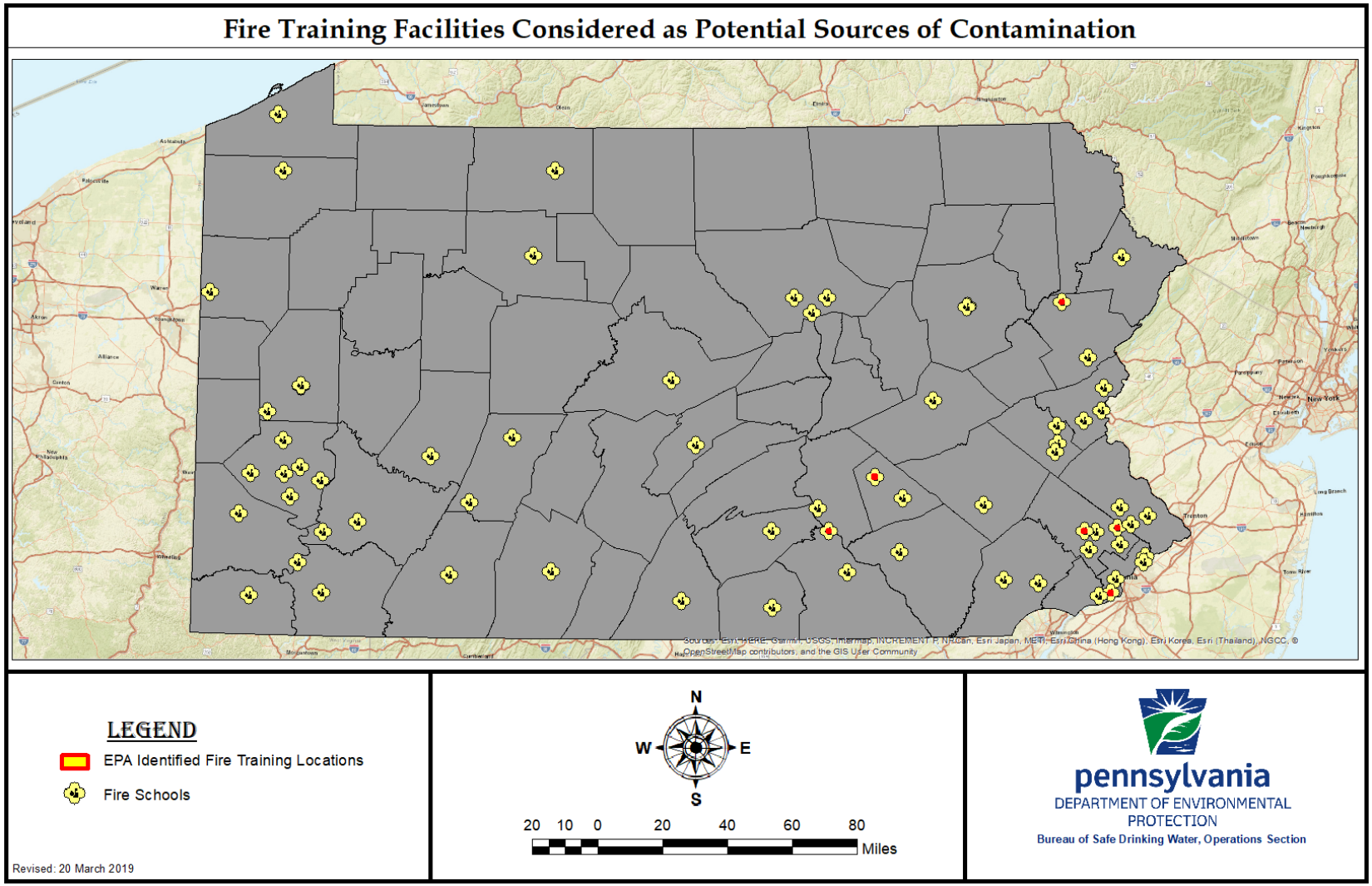
Sample PWS wells within ½ mile of EPA Identified Airports: 42
Sample PWS intakes within ½ mile of EPA Identified Airports: 2

This layer was provided to BSDW by EPA when EPA was conducting earlier research into PFCs.

Fire Schools

A significant portion of the peer-reviewed, published research regarding PFAS contamination focuses on PFAS found in Aqueous Fire Fighting Foam (AFFF). AFFF has proven itself as an effective tool when fighting certain types of liquid fuel fires. As such, institutions that provide training on the appropriate use of AFFF may serve as PSOCs for PFAS when a direct release of AFFF occurs. It should be noted that not all AFFF contains PFAS and some manufactures do make fluorine-free foam for training purposes.

For the purpose of this spatial analysis, two layers specific to fire training were considered. The first was a layer created primarily from research conducted by BSDW personnel on the existence of fire schools in PA. Any known school involved with the education and training of fire-fighting personal was considered. The State Fire Marshal also provided some information regarding fire training facilities in Pennsylvania and that information was added to this layer. The second layer used for spatial analysis of wells and intakes ambient fire schools was created by the EPA while performing earlier research on PFCs. This layer included polygons of specific locations in fields where they found AFFF training to occur.



Map 5: A map showing all known schools, both academic (classroom) and practical (field) locations are shown. A listing of schools by county is provided. These locations were considered when selecting wells for sampling.

FirefightingSchoolsInPA

Originator: Department of Environmental Protection, Bureau of Safe Drinking Water, Operations and Monitoring Division
Publication_Date:
Title: Fire Schools in PA
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place: RCSOB
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage:

Layer Description:

Sample PWS wells within ½ mile of Fire schools: 15
Sample PWS intakes within ½ mile of Fire schools: 1

This layer was created by reviewing school websites, the PA Fire Marshal website, use of local knowledge and review of aerial photographs. This layer includes academic as well as practical facilities. It was decided to include both classroom and practical training facilities to account for the potential transport of PFAS by individuals who may be exposed to PFAS as a result of practical training.

EPA Identified Fire Training Locations

Originator:
Publication_Date:
Title:
Edition:
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:

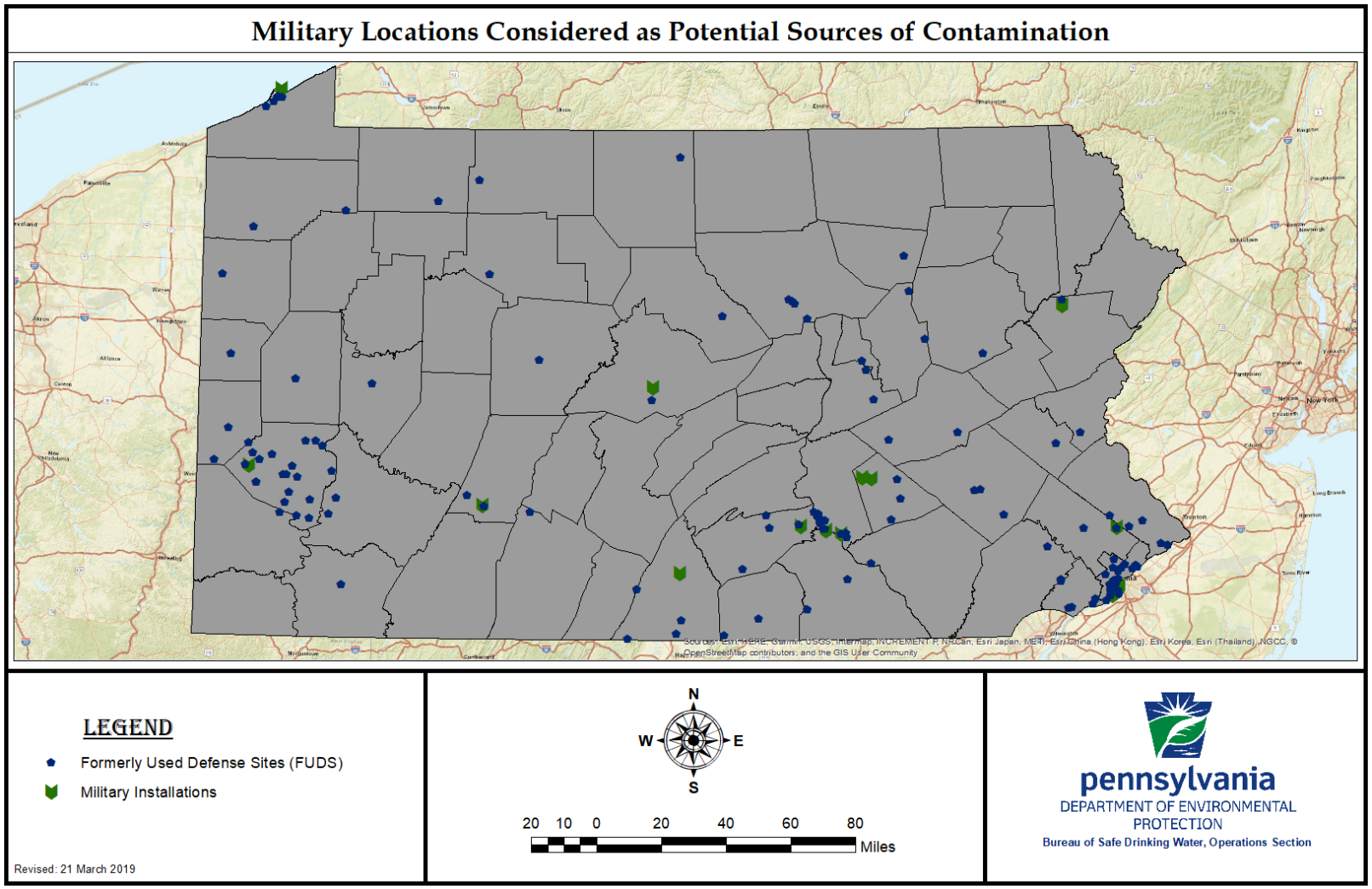
Layer Description:

Sample PWS wells within ½ mile of EPA-Identified Fire Training Locations: 0
Sample PWS intakes within ½ mile of EPA-Identified Fire Training Locations: 0

This layer was provided to BSDW by EPA when EPA was conducting earlier research into PFCs. While it may appear on this map that some of the locations overlap, that is most likely a cartographic issue associated with scale. The layer created by EPA is a polygon layer that outlines areas on the surface of the earth where it is believed PFAS containing AFFF was discharged for the purpose of training. This layer differs from the FirefightingSchoolsinPA layer created by BSDW, which is a point layer showing the locations of schools and training facilities.

Military Locations

Research indicates that military locations are commonly considered potential sources of contamination for PFAS. This correlation is primarily the result of the military's use of AFFF. Further, research has shown that PFAS contamination has been found near a number of current and former military installations. To allow for the consideration of military facilities in this spatial analysis, two layers were used. The first is a layer created by the BSDW that includes known locations of military bases in Pennsylvania. This research found that the Coast Guard, Navy, and Army have a notable presence in Pennsylvania. One military logistics/supply facility in New Cumberland was also found. It is reasonable to assume that a logistics/supply facility and any facility where large ships or aircraft are stored, stationed, or maintained will include PFAS containing AFFF. Recruiting facilities were excluded from this layer. A second layer used for this spatial analysis was a layer of Formerly Used Defense Sites (FUDS). This layer was created by the EPA while conducting earlier PFC research. The FUDS layer includes polygons around areas known to the EPA to qualify as FUDS.



Map 6: A map showing the locations of all known military installations in PA. A listing of military installations by county is provided. Note, Fort Indian Town Gap is shown twice to differentiate between the Air National Guard and Army National Guard use. These locations were considered when selecting wells for sampling.

MilitaryLocationsInPA

Originator: Department of Environmental Protection, Bureau of Safe Drinking Water, Operations and Monitoring Division
Publication_Date:
Title: Military Locations in PA
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place: RCSOB
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage:

Layer Description:

Sample PWS wells within ½ mile of Military installations: 2
Sample PWS intakes within ½ mile of Military installations: 0

This layer was created through the review of National Guard, Navy, Coast Guard and other web resources as well as aerial photo review and the use of local knowledge. In cases where multiple branches of service are known to use a single location (eg: Fort Indiantown Gap) multiple points were plotted.

EPA Identified Formerly Used Defense Sites (FUDS)

Originator:
Publication_Date:
Title:
Edition: 1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:

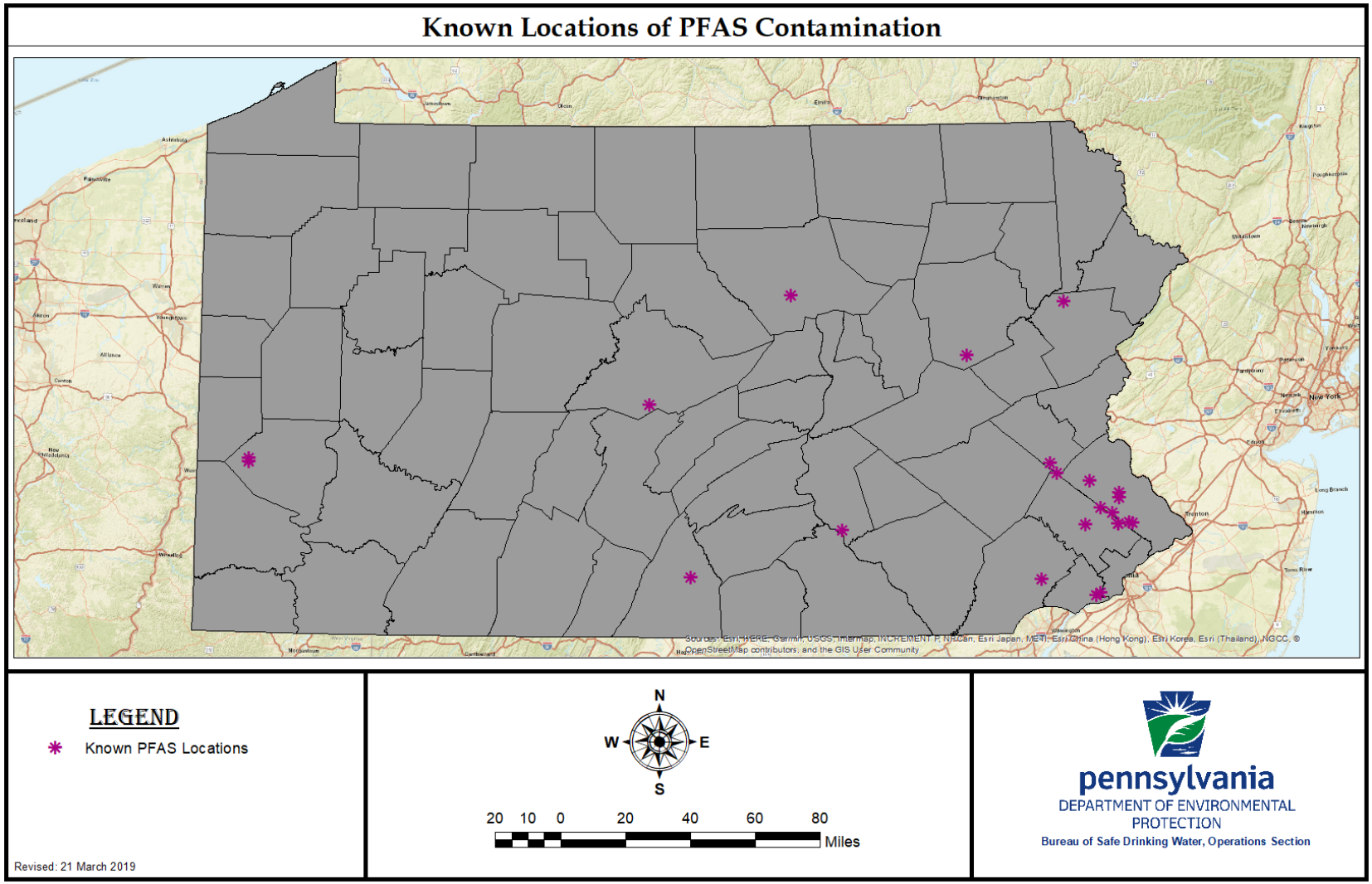
Layer Description:

Sample PWS wells within ½ mile of EPA Identified FUDS: 18
Sample PWS intakes within ½ mile of EPA Identified FUDS: 3

This layer was created by EPA and provided to BSDW when EPA was conducting earlier research into PFCs. This layer shows locations of Formerly used defense sites, some of which are no longer discernable through aerial photo interpretation.

Known PFAS Locations

Locations where PFAS contamination of ground water is currently known was considered as part of the spatial analysis performed for the selection of at-risk water supplies. Unlike other PSOCs, rather than including all water sources ambient to known locations of PFAS contamination, those water supply sources that were within ½ mile of a known location were not included in the sampling pool if they were already monitored. Given the overarching purpose of this plan, the focus on determining occurrence of PFAS contamination state-wide in a manner that minimizes duplication of effort, it is reasonable to not examine areas where occurrence is already known. The layer used for this portion of the spatial analysis was a collaborative effort between the BSDW and the Environmental Cleanup and Brownfields program. This layer is considered "living" in that, as additional sources of contamination are found, the layer will be updated.



Map 7: A map showing all known locations in PA where PFAS has been found. Wells within ½ mile of these locations were excluded from consideration (if already sampled) when selecting wells for sampling.

KnownPFASLocations

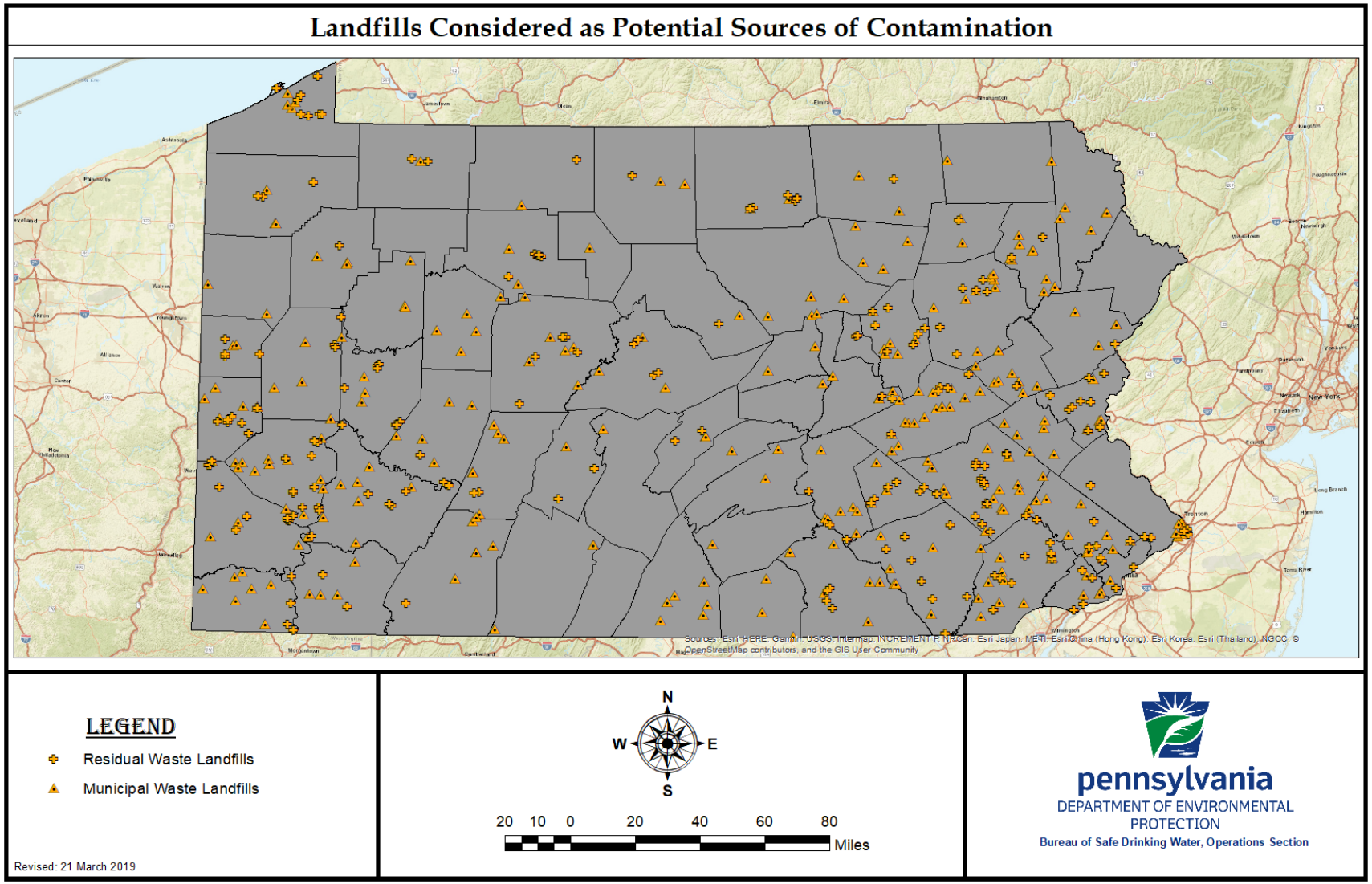
Originator: Department of Environmental Protection, Bureau of Safe Drinking Water, Operations and Monitoring Division
Publication_Date:
Title: Known PFAS Locations in PA
*Edition:*1
Geospatial_Data_Presentation_Form:
Publication_Information:
Publication_Place: RCSOB
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage:

Layer Description:

This layer was created from information currently available on DEP's and EPA's websites. This layer was created to show the known locations of PFAS contamination. This layer was updated in March of 2019 to accommodate two additional sites. It is expected that as awareness of PFAS presence grows, this layer will continue to be maintained to show new locations.

Landfills

Peer-reviwed, published research indicates that landfills, specifically landfill leachate are a source of PFAS contamination. Landfill leachate likely obtains PFAS from the myriad of consumer products that include PFAS and are commonly placed in the garbage. Without going into the full list of likely consumer products, food contact packaging, cosmetics, and electronics are all examples of PFAS containing products that can commonly be found in the garbage. To focus on landfills above other waste facilities, the Residual Waste Layer and Municipal Waste Layer available on PASDA were used. Within these layers is information specific to the types of facilities that exist and are regulated by DEP's Waste Management program. Landfills were singled out and new layers were created: one specific to Residual Waste Landfills and one specific to Municipal Waste Landfills.



Map 8: Residual and Municipal Waste Landfills that were considered when selecting wells for sampling.

Residual Waste Landfills

Originator: Pennsylvania Department of Environmental Protection
Publication_Date: 201810
Title: Residual Waste Operations
Geospatial_Data_Presentation_Form: vector digital data
Publication_Information:
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage: http://www.pasda.psu.edu/

Layer Description:

Sample PWS wells within ½ mile of Residual Waste Landfills: 39
Sample PWS intakes within ½ mile of Residual Waste Landfills: 4

This layer is derived from a layer available on PASDA. A layer specific to Residual Waste Facilities was used to select only those sites known as residual waste landfills. The landfills were separated from other types of residual waste facilities and only the landfills were considered as PSOC for this sample site selection.

Municipal Waste Landfills

Originator: Pennsylvania Department of Environmental Protection
Publication_Date: 201810
Title: Municipal Waste Operations
Geospatial_Data_Presentation_Form: vector digital data
Publication_Information:
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage: http://www.pasda.psu.edu/

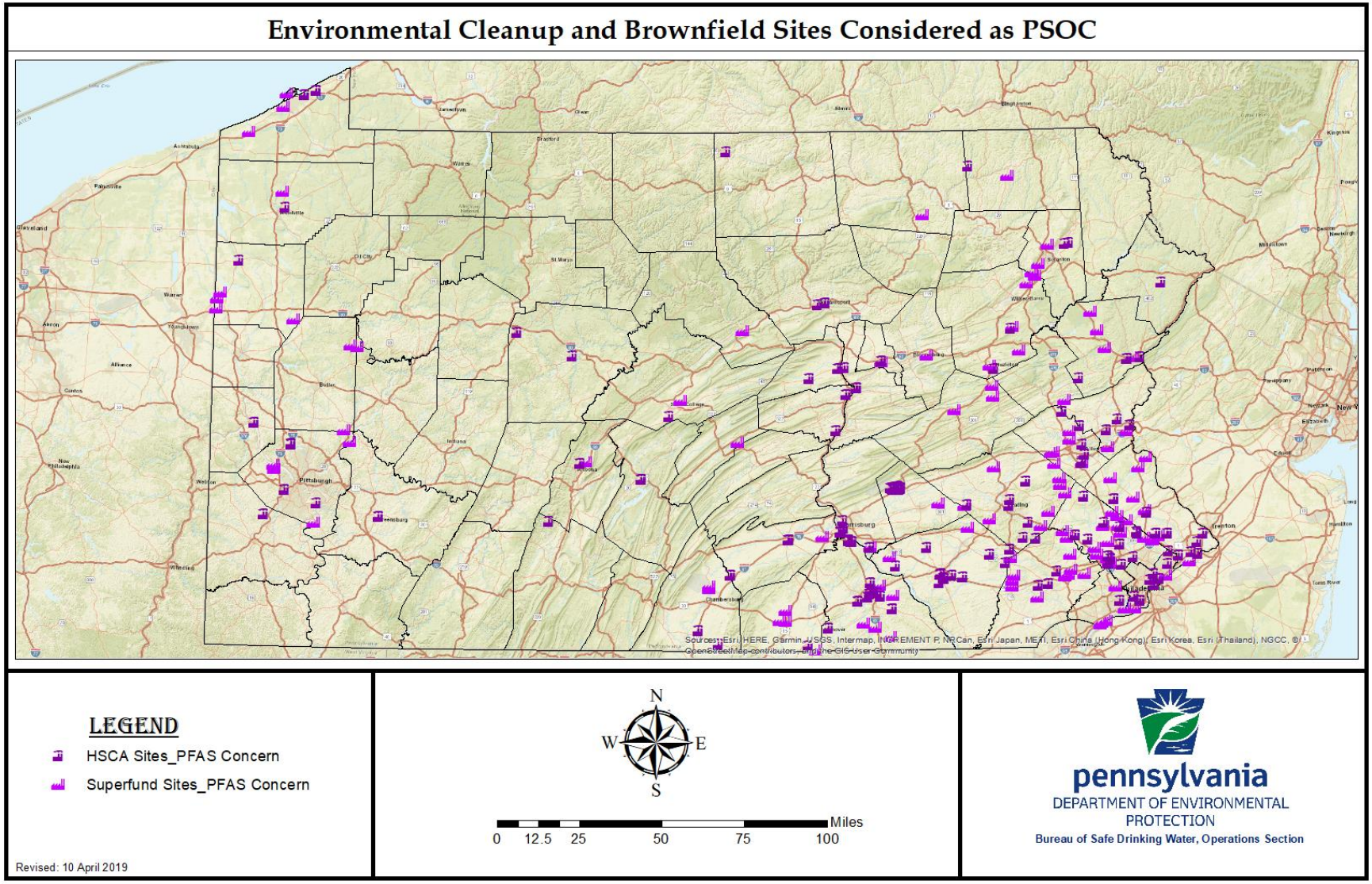
Layer Description:

Sample PWS wells within ½ mile of Municipal Waste Facilities: 33
Sample PWS intakes within ½ mile of Municipal Waste Facilities: 1

This layer is derived from a layer available on PASDA. A layer specific to Municipal Waste Facilities was used to select only those sites known as residual waste landfills. The landfills were separated from other types of municipal waste facilities and only the landfills were considered as PSOCs for this sample site selection.

Environmental Cleanup and Brownfields

Some concern has been expressed regarding the potential for PFAS contamination to exist at sites where other forms of contamination have already been identified. The EPA has in some cases incorporated PFAS sampling at Superfund Sites during the existing Five-Year Review (FYR) process. Given that known Superfund and HSCA sites may function as sources of contamination for PFAS, two layers were created so that these sites, as appropriate, could also be considered as PSOCs. One layer was created specific to HSCA sites and a second layer was created for Superfund sites. These sites differ from the "Known Locations of PFAS" sites in that, while HSCA and Superfund sites are known to be contaminated, it is not known whether these sites are contaminated by PFAS.



Map 9: Environmental Cleanup and Brownfield sites considered as potential sources of PFAS contamination.

HSCA Sites_PFAS Concern

Originator: Pennsylvania Department of Environmental Protection
Publication_Date: 201904
Title:
Geospatial_Data_Presentation_Form:vector digital data
Publication_Information:
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage: http://www.pasda.psu.edu

Layer Description:

Sample PWS wells within ½ mile of HSCA Sites: 26
Sample PWS intakes within ½ mile of HSCA Sites: 3

This layer is derived from a layer available on PASDA named Land Recycling Cleanup Locations. From the parent layer, locations associated with activities that are linked through research to PFAS production or use were selected. Further, from those PFAS related activities, only those that impacted media of concern (eg: soil, surface water, groundwater) were used. This selection produced a list of 301 locations.

Superfund Sites_PFAS Concern

Originator: Department of Environmental Protection, Bureau of Safe Drinking Water, Operations and Monitoring Division
Publication_Date: 201904
Title: SuperfundSitesInPA
Geospatial_Data_Presentation_Form:
Publication_Information:
Publisher: Pennsylvania Department of Environmental Protection
Online_Linkage:

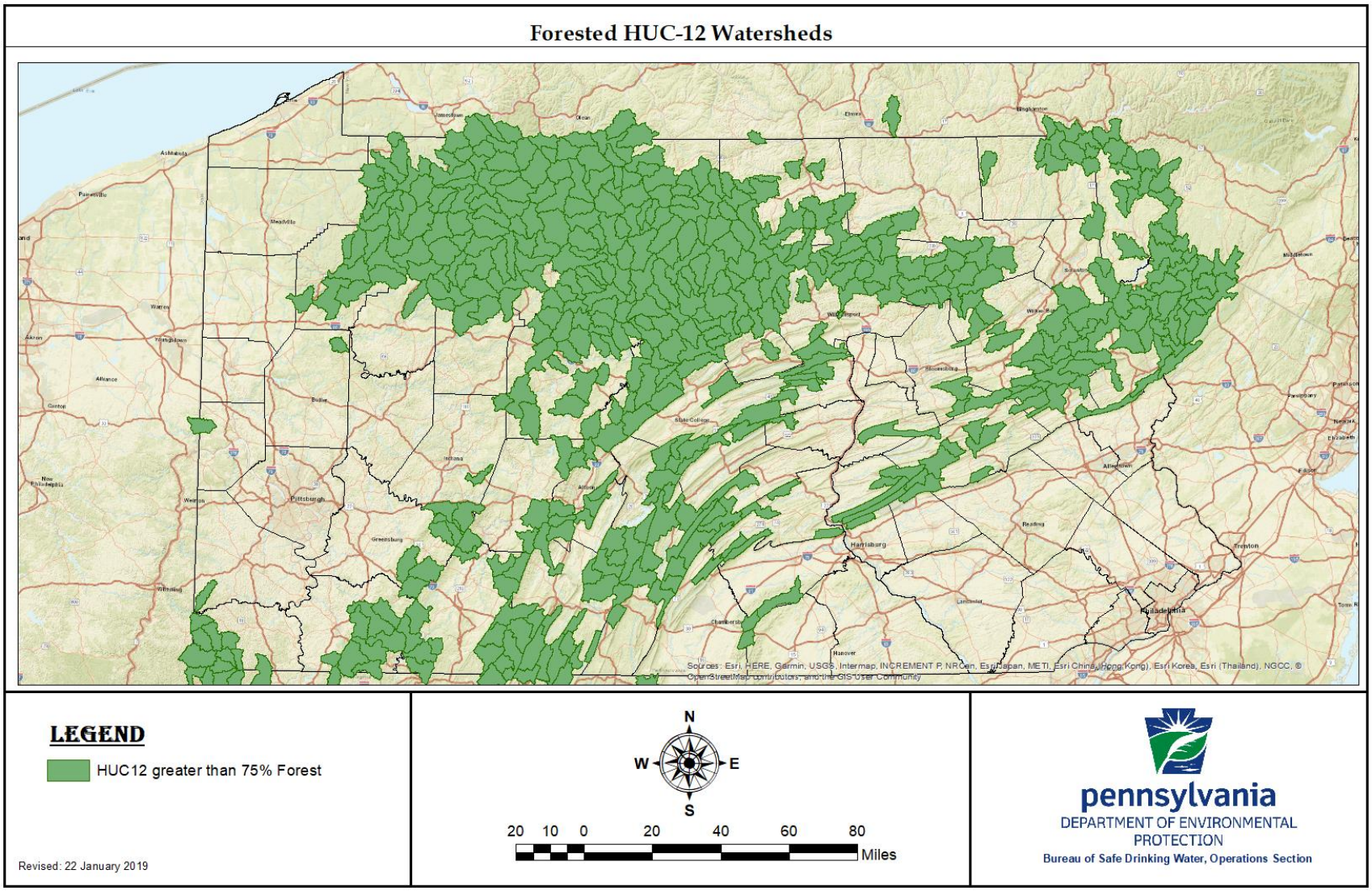
Layer Description:

Sample PWS wells within ½ mile of Superfund Sites: 41
Sample PWS intakes within ½ mile of Superfund Sites: 2

This layer was created as original xy data with information obtained from the EPA's superfund website titled "Search for Superfund Sites Where You Live. That website provided a list of 127 Superfund Sites in Pennsylvania. Using locational information provided within that website to verify coordinates from other online resources, the geodatabase table was created. Additional information was taken from the "Background" section provided by EPA to determine site history. Sites with a history of use that has a potential connection to PFAS (eg: landfills, residual waste dumping etc.) were selected and sites that seem to have no logical connection to PFAS (eg: asbestos) were excluded. The final list of locations used in this layer included 112 sites.

Riparia_HUC12_2011

Hydrologic Unit Codes (HUC) codes are numeric codes created by the USGS in an attempt to better standardize the concept of a watershed. HUC codes range in size from HUC-2 or two-digit HUCs that are very large in size to 12-digit HUCs that are smaller in size. Watersheds form boundaries on the surface of the earth based on surface topography and are reasonable tools for land-use management, stream and lake restoration. A layer was available from Penn State University that included land-use data by HUC-12. This layer was used to select watersheds with at least 75% forest cover. As certain peer-reviewed, published research considers urban areas to be a diffuse source of PFAS, forested land use was used as the antithesis of urban land use. It is reasonable to suggest that less PFAS contamination and fewer PSOCs will be found in forested areas as opposed to agricultural or developed areas. From this layer of HUC-12s those forested HUC-12 watersheds were used as the base from which to select wells and intakes less likely to be ambient PSOCs. It is believed that water sources in these areas are less likely to be contaminated by PFAS.



Map 10: Forested HUC-12 watersheds. This layer was used as part of the analysis used to select the "Baseline Wells."

Riparia_HUC12_2011

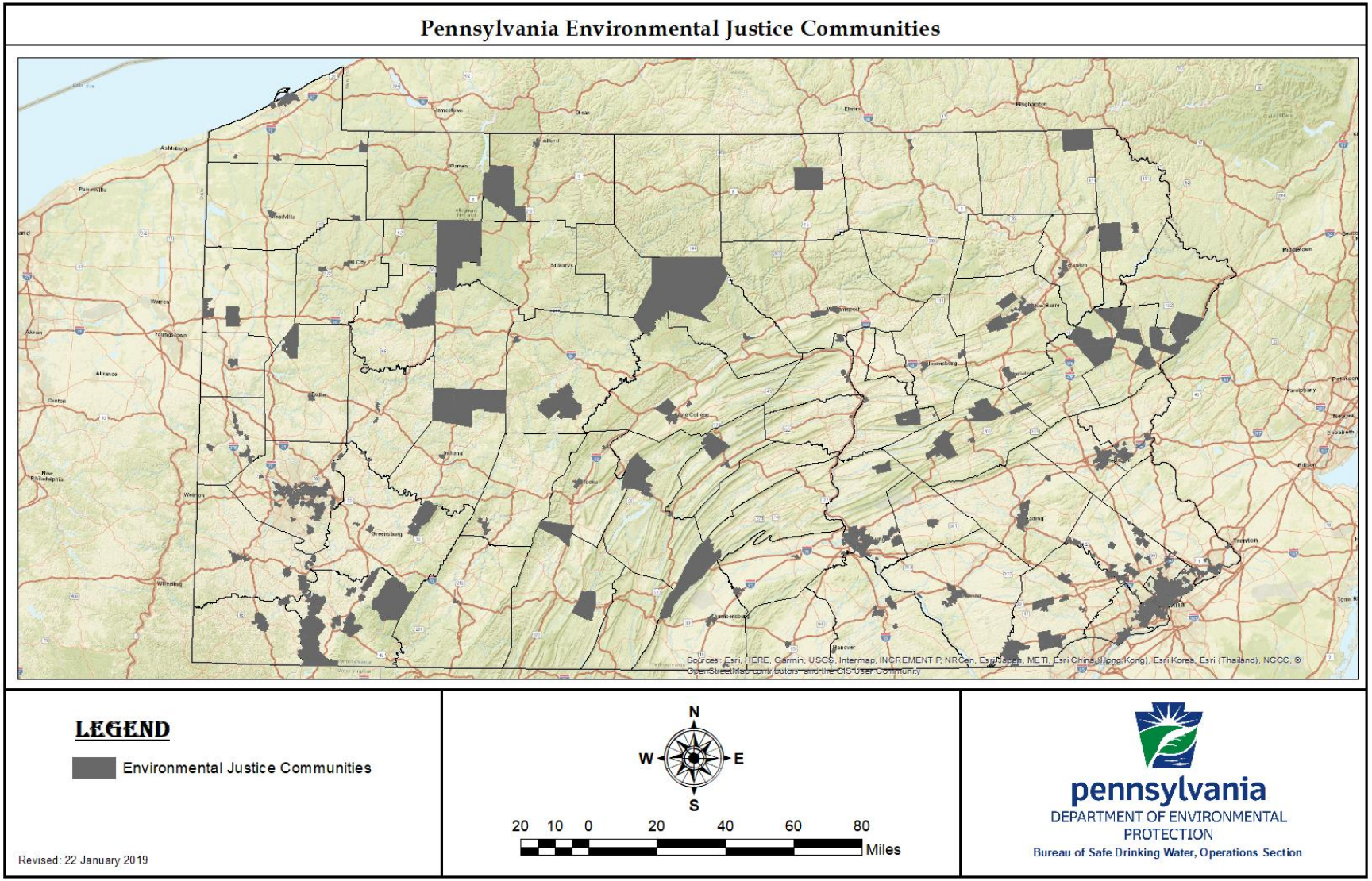
Originator: The Pennsylvania State University
Title: Pennsylvania Land Cover by HUC 12, 2011
Geospatial_Data_Presentation_Form: vector digital data
Online_Linkage: http://www.datacommons.psu.edu/

Layer Description:

This layer was produced by PSU and obtained via PASDA. This layer shows HUC-12 watersheds and provides a wealth of land use data. Information from this layer was used to select HUC-12 watersheds with greater than or equal to 75% forested land use. This layer served as the foundation for the selection of the Baseline PWS Sources.

Environmental Justice 2015

The Pennsylvania Department of Environmental Protection maintains an Office of Environmental Justice. This office was established as a point of contact for PA residents in low income areas and areas with larger populations of minorities. This office provides a layer depicting Environmental Justice (EJ) community locations throughout Pennsylvania. This layer was included in the spatial analysis to verify that the process of source identification ambient PSOCs did not inadvertently exclude EJ communities. Inclusion of the EJ layer and a review of identified wells and intakes did find that approximately 11.5% of the wells and intakes identified are located within an EJ community.



Map 11: Communities included in Pennsylvania's Environmental Justice program as shown in the Environmental Justice Areas 2015 layer.

EnvironmentalJusticeAreas2015

Originator: PADEP Geospatial Data Center
Publication_Date: 2015
Title: Environmental Justice Areas
Geospatial_Data_Presentation_Form: vector digital data
Publication_Information:
Publication_Place: Harrisburg, PA
Publisher: PADEP GDC
Online_Linkage: http://www.pasda.psu.edu/

Layer Description:

Sample wells within Environmental Justice Communities: 56
Sample intakes within Environmental Justice Communities: 9

The Environmental Justice Communities layer was not used as part of the spatial analysis used to identify PWS sources for sampling; however, it was used after the identification was made to verify these underserved communities are not omitted from this research. Environmental Justice Communities are communities where 20% or more of the population live in poverty and/or 30% or more of the population is minority.

Geology

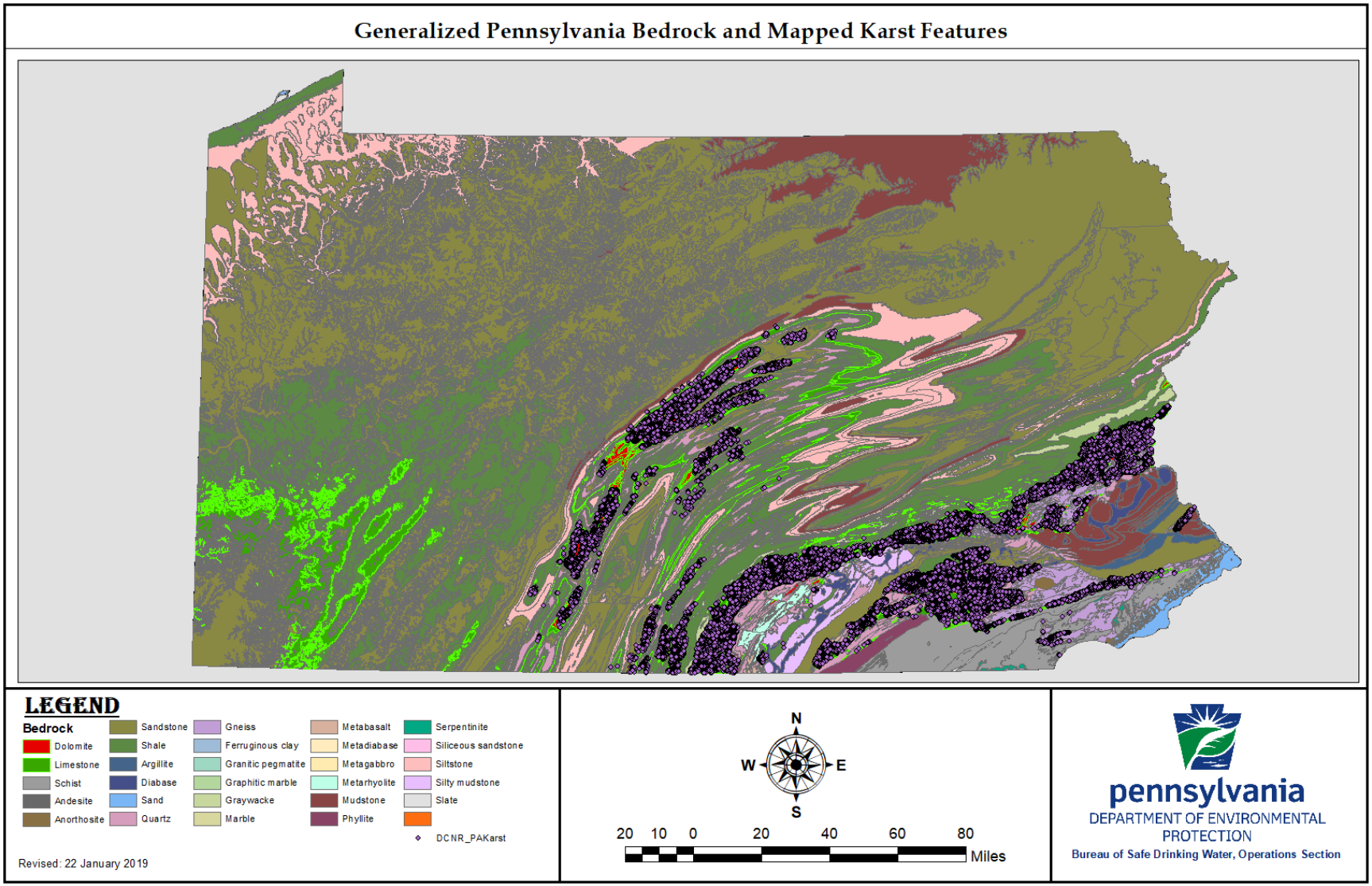
While surface watersheds provide useful tools for land managers and other professionals, it is known that ground watersheds can vary greatly from surface watersheds. As many of the sources of drinking water are groundwater sources, subsurface geology is an important factor in determining movement of contaminants in ground water. Two layers were included in this GIS specific to geology and it is believed that, based on the results of the initial round of sampling, this information may prove useful in better focusing future sampling. The first layer used was the DCNR_PAKarst layer created by DCNR showing specific points in the south central and south east portion of the state where karst features such as sinkholes, closed depressions, and caves have been found. The second geologic layer used is the bedrock layer also provided by DCNR. From that layer, bedrock layers including limestone and dolomite were identified as being potentially karstic. It is reasonable to suggest PSOCs located in karst regions may impact a larger area or greater number of water supply sources.

Table 3: A table showing the approximate number of PSOCs by type in Karst areas. The Limestone and Dolomite layer was used for this analysis.

PSOC Type	Layer Name	Number of points in Limestone or Dolomite
Industrial Sites		
	Select Industries (EnviroFacts)	249
	EPA Identified Industrial Sites (Plastics)	32
	EPA Identified Industrial Sites (Carpets)	47
Airports		
	AirportsinPA	52
	Part 139 Airports	6
	EPA Identified Airports	15
Fire Schools		
	FireschoolsinPA	23
	EPA Identified Fire Training Locations	0
Military Locations		
	MilitaryLocationsinPA	2
	Formerly Used Defense Sites	25
Landfills		
	Residual Waste Landfills	56
	Municipal Waste Landfills	54

Table 4: The Approximate Number of Target and Baseline Wells and Intakes located in Limestone and Dolomite areas. The Limestone and Dolomite layer was used for this analysis.

Potable Water Source	Number in Karst
Target Wells	114
Baseline Wells	13
Target Intakes	6
Baseline Intakes	2



Map 12: Generalized bedrock of Pennsylvania including the mapped karst features available from DCNR.

DCNR_PAKarst

Originator: Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey
Publication_Date: 2007
Title: Digital data set of mapped karst features in south-central and southeastern Pennsylvania
Edition: 1.1
Geospatial_Data_Presentation_Form: vector digital data
Online_Linkage: http://www.pasda.psu.edu/

Layer Description:

Underlain geology may impact surface to groundwater interaction as well as groundwater flow. As such, the Karst and Bedrock layers were included to facilitate future research once PWS source sampling is complete and the review of results is conducted. The above referenced layer focuses on known karst features such as caves, sinkholes, and closed depressions, but is limited to south central PA. This layer was useful in validating the Limestone and Dolomite layer described below.

Limestone and Dolomite

Originator:
Publication_Date: 2019
Title:
Edition:
Geospatial_Data_Presentation_Form:
Online_Linkage:

Layer Description:

Sample Wells within the Limestone and Dolomite layer: 114
Sample Intakes within the Limestone and Dolomite layer: 6

This layer was created by selecting limestone and dolomite containing formations as shown in the "Lith 1" and "Lith 2" columns of the attribute table. Once created, this layer was used to verify that a number of identified PWS sources are located in karst bedrock. This information will be useful when analyzing sampling results and potentially when planning subsequent sampling efforts. Selected Formations include: Allentown (Cal), Annville (Oan), Axemann (Oa), Beekmantown Group (Ob), Bellefonte and Axemann undivided (Oba), Bellefonte (Obf), Benner Formation through Loysburg Frm undiv (Obl), Buffalo Springs Frm (Cbs), Buttermilk Falls Limestone through Esopus Frm undiv (Dbe), Chambersburg Frm (Oc), Clinton Group (Sc), Coburn Formation through loysburg Frm und (Ocl), Conestoga Frm (OCc), Elbrook Frm (Ce), Epler Frm (Ce), Epler Frm (Oe), Gatesburg Form (Cg), Hershey and Myerstown Formation, undiv (Ohm), Hershey Form through Annville frm und (Oha), Jacksonburg Formation (Ojk), Keyser and Tonoloway Frm, undiv (DSkt), Keyser Formation through Clinton Group, undiv (DSkc), Keyser Frm through Mifflintown Frm, undiv (DSkm), Ledger Formation (Cl), Leithsville Form (Clv), Limestone fanglomerate (Trfl), Limestone of Hamburg seq. (Ohl), Limestone of Martinsburg Frm (Oml), Lower Cambrian rocks, undiv (Cul), lower members of Gatesburg frm undiv (Cgl), Marcellus frm (Dm), Millbach and Schaefferstown Frm undiv (Cms), Millbach Frm (Cm), Mines member of Gatesburg Frm (Cgm), Monogahela Group (Pm), Nittany and Stonehenge/Larke Frm, undiv (Ons), Nittany Frm (On), Onodaga Frm (Don), Ontelaunee Frm (Oo), Pinesburg Station Frm (Ops), Pleasant Hill Form (Cph), Richland Form (Cr), Rickenbach Frm (Ori), rockdale Run Frm (Orr), Shadygrove Frm (Csg), Shriver, Mandata, Corriganville, and new Creek members of old Port Frm, undiv (Dosn), Snitz Creek and Buffalo Springs Frm undiv (Csb), Snitz Creek Frm (Csc), St. Paul Group (Osp), Stonehenge Frm (Os), Stonehenge/Larke Frm (Osl), Tomstown Form (Ct), Valentine member of Benner Form (Obv), Vintage Frm (Cv), Warrior Frm (Cw), Zooks Corner Frm (Czc), and Zullinger Form (Cz).

"Bedrock"

Originator: Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey
Title: dcnr_015962
Geospatial_Data_Presentation_Form:
Online_Linkage: https://www.dcnr.pa.gov/Geology/PublicationsAndData/Pages/default.aspx

Layer Description:

Underlain geology may impact surface to groundwater interaction as well as groundwater flow. As such, the Karst and Bedrock layers were included to facilitate future research once PWS source sampling is complete and the review of results is conducted.

PSOCs That May be Considered in Future Monitoring

The body of literature focused on PFAS sources lists many PSOCs, industries, and facility types which may contribute to the total amount of PFAS now found in the natural world. The GIS data layer for Phase I was compiled with a deliberate intent to focus on the most likely sources of contamination to Pennsylvania's PWSs. This was done to focus limited resources on areas most likely impacted by these emerging contaminants. As such, PSOCs believed to have a greater likelihood of resulting in contamination to Pennsylvania's drinking water supply were selected. Not all potential sources were considered and not all existing layers were used. PSOCs that could be included in future monitoring are: municipal and industrial stormwater, wastewater treatment plants (WWTP), biosolids application sites, air emissions from certain facilities, and railroads. Regarding WWTP discharges, an information GIS review was performed, and it was found that the majority of WWTP discharges are downstream of surface water intakes. Regarding industrial stormwater, some of this information may have been inadvertently considered through the consideration of the previously discussed industrial sites. Also, given the number of target wells and intakes located in developed areas it is likely these PSOCs are located ambient target wells and intakes. A review of target wells and PSOCs ambient those wells and intakes may support this supposition. Subsequent to the initial sampling, if a correlation is found between positive results and industrial stormwater, municipal stormwater, or any other as yet unconsidered PSOC, that information can be used to guide future sample collection efforts.

VI. Final Identification and Description

The following section describes the results of the spatial analysis and program review that was performed to identify the "Sample Population" as well as the "Baseline Population." This section will describe the two sets of PWS sources based on certain, relevant attributes (e.g. System Type, Owner Type, etc.) as well as certain geographic information (e.g. number of identified PWS sources by county).

Note: This summary data is based on information as of the date of this report. Additional PWS sources may be added or removed from the list as new information becomes available regarding PSOCs.

Sample Population (n=493)

The following information details the identification of PWS sources for the initial round of PFAS sampling. These are the PWS sources referred to as the Sample Population. A subsequent section will detail the Baseline Sources.

Table 5: Definitions for codes used in each column are as follows: System Type: C-Community, P-Nontransient Noncommunity; Owner Type: A-Authority, F-Federal, I-Investor, M- Municipality, O-Other, P-Private Individual, S-State, W-Water Association; Source Code: G-Groundwater, WS-Surface Water, Y-Groundwater Under Direct Influence (of Surface Water).

SYSTEM TYPE			OWNER TYPE			SOURCE CODE		
	Wells	Intakes		Wells	Intakes		Wells	Intakes
C	294	35	A	116	14	G	443	0
P	162	2	F	5	0	Y	13	0
			I	193	12	S	0	37
			M	66	9			
			O	47	1			
			P	19	0			
			S	0	0			
			W	10	1			

Number of Unique Systems (based on unique PWS IDs) (Wells / Intakes) = approximately 250 / 28

Number of target sources/EPs serving large (> 10,000) populations (Wells / Intakes) = approximately 28 / 17

Number of target sources/EPs serving very small (< 100) populations (Wells / Intakes) = approximately 97 / 0

Number of target sources/EPs in EJ Communities (Wells / Intakes) = approximately 56 / 9

Number of target sources/EPs in karst geology (Wells / Intakes) = approximately 114 / 6

Table 6: A list of target wells and intakes by DEP Region.

Region	Wells	Intakes
NWRO	56	6
NCRO	49	1
NERO	90	6
SWRO	25	5
SCRO	145	10
SERO	91	9

Number of PWS sources by county

Table 7: Listing of the number of PWS sources per county.

	Wells	Intakes		Wells	Intakes		Wells	Intakes
Adams	10	0	Elk	0	0	Montgomery	42	6
Allegheny	15	2	Erie	7	0	Montour	0	0
Armstrong	0	1	Fayette	2	0	Northampton	13	0
Beaver	7	2	Forest	0	0	Northumberland	0	0
Bedford	1	1	Franklin	0	0	Perry	0	0
Berks	56	0	Fulton	3	0	Philadelphia	1	1
Blair	2	0	Greene	0	0	Pike	4	0
Bradford	4	0	Huntingdon	2	0	Potter	0	0
Bucks	33	0	Indiana	0	0	Schuylkill	12	1
Butler	17	0	Jefferson	3	0	Snyder	5	0
Cambria	1	0	Juniata	0	0	Somerset	0	0
Cameron	0	0	Lackawanna	8	1	Sullivan	0	0
Carbon	3	1	Lancaster	29	1	Susquehanna	0	0
Centre	8	0	Lawrence	0	2	Tioga	2	0
Chester	15	2	Lebanon	2	0	Union	1	1
Clarion	0	0	Lehigh	13	2	Venango	3	0
Clearfield	0	0	Luzerne	6	1	Warren	2	0
Clinton	0	0	Lycoming	19	0	Washington	0	0
Columbia	10	0	McKean	0	0	Wayne	0	0
Crawford	21	1	Mercer	3	2	Westmoreland	0	1
Cumberland	4	1	Mifflin	2	0	Wyoming	7	0
Dauphin	20	7	Monroe	24	0	York	14	0
Delaware	0	0						

Baseline Population (n=316)

The following information details the selection of baseline sources used to determine the initial round of baseline PFAS sampling. These sources are referred to as baseline in that they were identified for their geographic location far removed from PSOCs and may provide insight into residual or background levels of PFAS.

Table 8: Results of sample selection for the Baseline Sources population. Definitions for codes used in each column are as follows: System Type: C-Community, and P-Nontransient, Noncommunity; Owner Type: A-Authority, F-Federal, I-Investor, O-Other, P-Private Individual, S-State, W-Water Association; Source Code: G-Groundwater, WS-Surface Water, Y-Groundwater Under Direct Influence (of Surface Water).

SYSTEM TYPE			OWNER TYPE			SOURCE CODE		
	Wells	Intakes		Wells	Intakes		Wells	Intakes
C	210	27	A	59	11	G	279	0
P	79	0	F	2	0	Y	10	0
			I	121	5	S	0	27
			M	44	11			
			O	15	0			
			P	13	0			
			S	4	0			
			W	31	0			

Number of Unique Systems (based on unique PWS ID's) (Wells / Intakes) = 155 / 22

Number of sources/EPs serving large (> 10,000) populations (Wells / Intakes) = 1 / 8

Number of sources/EPs serving small (< 100) populations (Wells / Intakes) = 60 / 1

Number of identified sources/EPs in EJ Communities (Wells / Intakes) = 40 / 5

Number of identified sources/EPs in karst geology (Wells / Intakes) = 13 / 2

Table 9: A listing of baseline wells and intakes by DEP region.

Region	Wells	Intakes
NWRO	54	0
NCRO	50	6
NERO	133	5
SWRO	31	7
SCRO	21	9
SERO	0	0

Number of sources by county

Table 10: Listing of the number of sources per county identified for the baseline population.

	Wells	Intakes		Wells	Intakes		Wells	Intakes
Adams	2	0	Elk	8	0	Montgomery	0	0
Allegheny	0	0	Erie	0	0	Montour	0	0
Armstrong	0	0	Fayette	0	1	Northampton	0	1
Beaver	0	0	Forest	14	0	Northumberland	3	1
Bedford	1	6	Franklin	1	0	Perry	0	0
Berks	0	0	Fulton	1	0	Philadelphia	0	0
Blair	0	2	Greene	0	0	Pike	57	0
Bradford	0	0	Huntingdon	14	0	Potter	8	0
Bucks	0	0	Indiana	1	0	Schuylkill	0	0
Butler	0	0	Jefferson	2	0	Snyder	0	0
Cambria	15	4	Juniata	1	0	Somerset	13	1
Cameron	0	1	Lackawanna	0	0	Sullivan	2	0
Carbon	27	0	Lancaster	0	0	Susquehanna	4	2
Centre	8	0	Lawrence	0	0	Tioga	4	0
Chester	0	0	Lebanon	0	0	Union	3	0
Clarion	1	0	Lehigh	0	0	Venango	6	0
Clearfield	7	2	Luzerne	11	1	Warren	12	0
Clinton	5	2	Lycoming	10	0	Washington	0	0
Columbia	0	0	McKean	10	0	Wayne	9	0
Crawford	0	0	Mercer	0	0	Westmoreland	3	1
Cumberland	0	0	Mifflin	0	0	Wyoming	0	0
Dauphin	1	1	Monroe	25	1	York	0	0
Delaware	0	0						

VII. List of Acronyms

AFFF – Aqueous Fire Fighting Foam

BSDW – Bureau of Safe Drinking Water

CFR – Code of Federal Regulations

CWS – Community Water System

DCED – Pennsylvania Department of Community and Economic Development

DCNR – Department of Conservation of Natural Resources

DEP – Pennsylvania Department of Environmental Protection

DMVA – Pennsylvania Department of Military and Veterans Affairs

DOH – Pennsylvania Department of Health

DWR – Durable Water Repellant

EJ – Environmental Justice

EP – Entry Point

EPA – Environmental Protection Agency

FAA – Federal Aviation Administration

FUDS – Formerly Used Defense Sites

GIS - Geographic Information System

HAL – Health Advisory Level

HUC – Hydrologic Unit Code

NCRO – Northcentral Regional Office

NERO – Northeast Regional Office

NTNCWS – Nontransient Noncommunity Water System

NWRO – Northwest Regional Office

OMD – Operations and Monitoring Division

PASDA – Pennsylvania Spatial Data Access

PDA – Pennsylvania Department of Agriculture

PennDOT – Pennsylvania Department of Transportation

PFAS - Per- and polyfluoroalkyl substances

PFC – Perfluorinated Compounds

PFOS – Perfluorooctane sulfonate

PSOC – Potential Source of PFAS Contamination

PWS – public water system

SCRO – Southcentral Regional Office

SERO – Southeast Regional Office

SIC – Standard Industrial Classification system

SWRO – Southwest Regional Office

TNCWS – Transient Noncommunity Water System

UCMR 3 – Unregulated Contaminant Monitoring Rule (3rd Round)

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