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Standard Guide for Per- and Polyfluoroalkyl Substances Site Screening and Initial Characterization[1]

This standard is issued under the fixed designation E3358; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

This guide discusses the key decision considerations and best practices for the screening and initial characterization of sites to evaluate the potential *release* of per- and polyfluoroalkyl substances (*PFAS*) into the environment. This guide provides a flexible, defensible framework applicable to a wide range of environment programs. It is structured to support a tiered approach with procedures and techniques of increasing complexity as the *user* proceeds through the site evaluation process to aid *users* in achieving project objectives. There are numerous *technical policy decisions* that must be made in the screening and initial characterization of sites. It is not the intent of this guide to define appropriate *technical policy decisions*, but rather to provide technical support within existing decision frameworks.

1. Scope

1.1 Per- and polyfluoroalkyl substances (*PFAS*) are a group of over 7,000 manmade compounds consisting of polymeric chains of carbon bonded to fluorine atoms, usually with a polar functional group at the head. This guide recognizes that *PFAS* can be categorized as polymeric or nonpolymeric, collectively amounting to more than 4,700 Chemical Abstracts Service (CAS)-registered substances. Environmental concerns pertaining to *PFAS* are centered primarily on the perfluoroalkyl acids (PFAA), a subclass of per-and polyfluoroalkyl substances, which display extreme persistence and chain-length dependent bioaccumulation and adverse effects in biota.

1.2 The regulatory framework for *PFAS* continues to evolve, both domestically and internationally. The United States Environmental Protection Agency (*EPA*) is proceeding with a wide-ranging set of *PFAS* regulatory actions (EPA, 2021). While the Comprehensive Environmental Response, Compensation, and Liability Act (*CERCLA*) does not currently recognize *PFAS* as *hazardous substances*, the statute does require actions to protect public health and the environment from contaminants and pollutants released to the environment. Other federal regulatory programs, such as the Safe Drinking Water Act are being used to address drinking water supplies adversely impacted by *releases* of *PFAS*. The Clean Water Act's National Pollutant Discharge Elimination System (*NPDES*) permitting program is tool that both federal and state regulators are using to regulate the inflows of *PFAS*-impacted *wastewaters* at both publicly-owned treatment works (*POTW*) and federally-owned *wastewater* treatment plants and the concentration of *PFAS* in permitted effluent. *EPA* continues to add additional per-and polyfluoroalkyl substances to the list of substances reportable under the federal Toxic Release Inventory (*TRI*) reporting program. International efforts to address per-and polyfluoroalkyl substances include Australia's PFAS National Environmental Management Plan, Version 2 (2020), Canada's Prohibition of Certain Toxic Substances Regulations, (2022), the Stockholm Convention on Persistent Organic Pollutants, and the European Union's Water Framework Directive (**1**).[2]

1.3 *Hazardous waste* treatment, *storage*, and *disposal* facilities (*TSDF*) currently operating under the Resource Conservation and Recovery Act (*RCRA*) via a Part B Permit may be ordered to investigate *releases* of *PFAS* under a *RCRA* Corrective Action order. *EPA* made a policy decision in the 1990s to defer many potential *CERCLA* enforcement actions to the *RCRA* Corrective Action Program (EPA, 1999). Permitted *TSDFs* at refineries may be subject to *RCRA* Corrective Action, as opposed to other regulatory programs, to address the *releases* of *PFAS* associated past and current use of *aqueous film-forming foam* (*AFFF*).

[1] This guide is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.04 on Corrective Action.

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[2] The boldface numbers in parentheses refer to the list of references at the end of this standard.

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1.4 Numerous states and Tribes are using their existing regulatory programs to direct investigation, site remediation, and correction action related to *releases* of *PFAS* to soil, groundwater, and surface waters. These actions range from health advisories and guidelines to enforceable regulatory standards. Regulatory considerations include *PFAS* risks to both human health and ecological receptors that are protected under a broad array of federal, state, and tribal regulatory programs as well as by treaty rights.

1.5 This guide assists *users* in the identification of real property concerns that may be the source of *PFASreleases* or that may be adversely impacted by *releases* of *PFAS*. The goal of this guide is to assist managers of environmental risk in their resource allocation decision-making.

1.6 This guide does not constitute "All Appropriate Inquiries" as defined in 40 CFR Part 312 and is not intended to provide the *user* with any of the landowner liability protections codified in *CERCLA* §101(35)(A)(i), *CERCLA* §101(40)(B)(iii), or CERCLA §107(q)(1)(A)(viii)..

1.7 This guide describes widely accepted considerations and best practices used in the site screening and initial site characterization process, with specific consideration of the potential for the *release* of *PFAS* into the environment. This guide complements but does not replace existing technical guidance and regulatory requirements.

1.8 This guide does not address and is not applicable to sampling and analysis of public or private domestic water supply systems subject to regulation under the Safe Drinking Water Act and state private well testing act requirements. Regulatory agencies responsible for implementing the Safe Drinking Water Act may have established sampling and reporting requirements for public, community, and privately operated water systems.

1.9 All references to specific federal or state programs are current as of the date of publication. The *user* is cautioned not to rely on this guide alone but to consult directly with the appropriate program and legal counsel regarding this complex and rapidly evolving concern.

1.10 This guide is intended to complement, not replace, existing regulatory requirements or guidance. ASTM International (ASTM) guides are not regulations; they are consensus-based standards that may be followed as needed.

1.11 *Units*—The values stated in SI units are to be regarded as the standard. Other units, such as fractional units of parts per billion (ppb) and parts per trillion (ppt), are also included in this guide.

1.12 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.13 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D6008 Practice for Determining the Environmental Condition of Federal Property

D6235 Practice for Expedited Site Characterization of Vadose Zone and Groundwater Contamination at Hazardous Waste Contaminated Sites

D7968 Test Method for Determination of Polyfluorinated Compounds in Soil by Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS)

D7979 Test Method for Determination of Per- and Polyfluoroalkyl Substances in Water, Sludge, Influent, Effluent, and Wastewater by Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS)

D8421 Test Method for Determination of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Matrices by Co-solvation followed by Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS)

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E1527 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

E1689 Guide for Developing Conceptual Site Models for Contaminated Sites

E1903 Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process

E2020 Guide for Data and Information Options for Conducting an Ecological Risk Assessment at Contaminated Sites

E2081 Guide for Risk-Based Corrective Action

E2173 Guide for Disclosure of Environmental Liabilities

E2205 Guide for Risk-Based Corrective Action for Protection of Ecological Resources

E2247 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property

E3123 Guide for Recognition and Derecognition of Environmental Liabilities

E3274 Guide for Management of Investigation-Derived Waste Associated with PFAS

E3302 Guide for PFAS Analytical Methods Selection

2.2 *Other Referenced Documetns:*

Agency for Toxic Substances and Disease Registry, Toxicological Profile for Perfluoroalkyls, May 2021

California Office of Environmental Health Hazard Assessment, Toxicity Criteria Database, https://data.ca.gov/dataset/toxicity-criteria-database, May 2019

California Department of Toxic Substances Control, Preliminary Endangerment Assessment Manual, 2015

CRC CARE 2018, Technical Report 43, Practitioner guide to risk-based assessment, remediation and management of PFAS site contamination

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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Department of Defense Instruction 4715.18, Emerging Chemicals (ECs) of Environmental Concern, September 4, 2019

ISO 21365:2019 Soil quality — Conceptual site models for potentially contaminated sites

OECD, Lists of PFOS, PFAS, PFOA, PFCA Related Compounds and Chemicals that may Degrade to PFCA. Environment, Health and Safety Publications Series on Risk Management No. 21, ENV/JM/MONO (2006, rev. 2007)15, 157 pp.

Pubchem Databases, pubchem.ncbi.nlm.nih.gov

2.3 *USEPA References and Databases:*[4]

Envirofacts (https://enviro.epa.gov/): A single point of access to select U.S. *EPA* environmental data. This website provides access to several *EPA* databases to provide the *user* with information about environmental activities that may affect air, water, and land anywhere in the United States

Superfund Enterprise Management System (https://www.epa.gov/enviro/sems-search)

FEDFacts (https://www.epa.gov/fedfac): Information about the Federal Electronic Docket Facilities regarding contaminated federal facility sites in specific communities, technical fact sheets and tools and resources to help government agencies and their contractors fulfill cleanup obligations

U.S. EPA, Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations; Notice, 65 FR 19618, April 11, 2000

U.S. EPA, Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4, EPA/240/B-06-01, 2006

U.S. EPA, Comptox Dashboard: https://comptox.epa.gov/dashboard

U.S. EPA, ECOTOX database; https://cfpub.epa.gov/ecotox/index.cfm

U.S. EPA, Health and Environmental Research Online (HERO) https;//hero.epa.gov/hero

U.S. EPA, Recommendations from the EPA Groundwater Task Force, EPA 500-R-07-001, December 2007

U.S. EPA, Handbook on the Management of Munitions Response Actions. EPA 505-B-01-001. May 2005

U.S. EPA, Groundwater Issue: Best Practices for Environmental Site Management: A Practical Guide for Applying Environmental Sequence Stratigraphy to Improve Conceptual Site Models, EPA/600/R-17/293, 2017

U.S. EPA, PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024. USEPA, Washington, DC, EPA-100-K-21-002, October 2021. https://www.epa.gov/system/files/documents/2021-10/pfas-roadmap_final- 508.pdf

U.S. EPA, Office of the Inspector General. Superfund Sites Deferred to RCRA-E1SFF8-11-0006-9100116. March 1999.

[4] Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, http://www.epa.gov.

3. Terminology

3.1 This section provides definitions of terms not unique to this practice, descriptions of terms specific to this practice, and a list of acronyms and abbreviations used herein. The terms are an integral part of this guide and are critical to its understanding and use.

3.2 *Definitions:*

3.2.1 *aqueous film forming foam (AFFF), n*—a fire suppressant used to extinguish flammable liquid fires such as fuel fires.

3.2.1.1 *Discussion—Aqueous film forming foam* is often used in shipboard and shore facility fire suppression systems, fire fighting vehicles, and at fire training facilities. *AFFF* may be used to prevent fires at sites where alcohol-based products are potential fuel sources. Industrial facilities, such as refineries and petroleum terminals, with large quantities of flammable and combustible liquids in *storage* often use *AFFF* in the facility's fire suppression system.

3.2.2 *conceptual site model, n—for the purpose of this guide*, a written or pictorial representation of an environmental system and the biological, physical, and chemical processes that determine the transport of contaminants from sources through environmental media to human and ecological receptors within the system (see Guide E1689.)

3.2.3 *contaminated public wells, n*—public wells used for drinking water that have been designated by a government entity as contaminated by toxic substances (for example, chlorinated *solvents*), or as having water unsafe to drink without treatment.

3.2.4 *drum, n—as defined by the U.S. Department of Transportation*, is a flat-ended or convex-ended cylindrical packaging made of metal, fiberboard, plastic, plywood, or other suitable materials; this definition does not include cylinders, jerricans, wooden barrels or bulk packagings.

3.2.4.1 *Discussion*—At federal facilities, a metal or plastic container (typically, but not necessarily, holding 55 gal [208 L] of liquid) that may have been used to store *hazardous substances* or petroleum products.

3.2.4.2 *Discussion—AFFF* concentrate is routinely shipped and stored in 5-gallon poly *drums* known as carboys.

3.2.5 *emerging chemicals of environmental concern, n—as defined in DoDI 4715.18*, chemicals relevant to the Department of Defense (*DOD*) that are characterized by a perceived or real threat to human health or the environment and that have new or changing toxicity values or new or changing human health or environmental regulatory standards.

3.2.5.1 *Discussion*—These chemicals are defined as emerging contaminants in Practice E1527.

3.2.6 *hazardous substance, n*—means that group of substances defined as hazardous under CERCLA 101(14), and that appear at 40 CFR §302.

3.2.6.1 *Discussion*—Particular chemicals/compounds that are not defined as *hazardous substances* under *CERCLA* may be defined as *hazardous substances* under local, state, or Tribal laws and regulations. The definition of *hazardous substances* stated here only applies to CERCLA §101(14) and does not apply to local, state, provincial, or Tribal definitions and *user*

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must determine if the state or applicable regulatory authority's definition or *hazardous substance* includes *PFAS*.

3.2.7 *hazardous waste, n*—any *hazardous waste* having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act (42 USC § 6901 et seq.) (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress) and so forth.

3.2.7.1 *Discussion*—Some state waste management programs regulate additional solid wastes as *hazardous waste*.

3.2.8 *landfill, n*—a place, location, tract of land, area, or premises used for the *disposal* of solid wastes as defined by state solid waste regulations; the term is synonymous with the term *solid waste disposal site* and is also known as a garbage dump, trash dump, or similar term.

3.2.8.1 *Discussion*—The *user* is cautioned that not all garbage dumps and trash dumps have permits issued by either the state or local regulatory agency.

3.2.9 *National Contingency Plan (NCP), n*—the National Oil and Hazardous Substances Pollution Contingency Plan found at 40 CFR § 300, which is the *EPA's* regulations for how *hazardous substances* are to be cleaned up pursuant to *CERCLA*.

3.2.10 *NPDES permit, n*—the National Pollutant Discharge Elimination System permit program, created in 1972 by the Clean Water Act (CWA), helps address water pollution by regulating point sources that discharge pollutants to waters of the United States; the permit provides two levels of control: technology-based limits and water quality-based limits (if technology-based limits are not sufficient to provide protection of the water body).

3.2.11 *PFAS, n*—a group of manufactured chemicals consisting of polymeric chains of carbon bonded to fluorine atoms, usually with a polar functional group at the head.

3.2.11.1 *Discussion—PFAS* are fluorinated substances with a carbon chain structure. In perfluoroalkyl substances, each carbon atom in the chain is fully saturated with fluorine (carbon-fluorine bonds only), whereas the carbon chain in polyfluoroalkyl substances is mostly saturated with fluorine (carbon-fluorine bonds), but also contains carbon- hydrogen bonds. The non-polymers are also based on chains of carbon atoms, usually with a chain length between 2 and 13 atoms, much shorter than those of polymers. These non-polymers can be split into a further 3 groups. The basic structure of these groups are the same, being primarily made up of carbon and fluorine in a repeating pattern, but the difference is that each group has another chemical group added (either a carboxylic acid, a sulfonic acid or an alcohol). The shorter chain means, compared to polymers, they are more mobile, reactive and more easily transferred into wildlife and humans.

3.2.12 *Phase I Environmental Site Assessment, n*—the process described in Practice E1527 and Practice E2247.

3.2.13 *pits, ponds, or lagoons, n*—man-made or natural depressions in a ground surface that are likely to hold liquids or sludge containing *hazardous substances* or petroleum products.

3.2.13.1 *Discussion*—The likelihood of such liquids or sludge being present is determined by evidence of factors associated with the pit, pond, or lagoon, including, but not limited to, discolored water, distressed vegetation, or the presence of an obvious *wastewater* discharge.

3.2.14 *RCRA generators, n*—those persons or entities that generate *hazardous wastes*, as defined and regulated by *RCRA*; these entities have submitted Form 8700-12 to the *EPA*.

3.2.15 *RCRA generators list, n*—list kept by *EPA* of those persons or entities that have submitted EPA Form 8700-12 to the Agency.

3.2.16 *RCRA TSD facilities, n*—those facilities at which treatment, *storage*, or *disposal*, or a combination thereof, of *hazardous wastes* takes place, subject to regulation and permitting under *RCRA* or a delegated state's *hazardous waste* management program; these facilities have submitted EPA Form 8700-23 to the US *EPA*.

3.2.17 *RCRA TSD facilities list, n*—list kept by *EPA* of those facilities that have submitted Form 8700-23 to the Agency, on which treatment, *storage*, or *disposal*, or a combination thereof, of *hazardous wastes* takes place, as defined and regulated by *RCRA*.

3.2.18 *records of emergency release notifications (SARA§ 304), n*—Section 304 of *EPCRA* or Title III of *SARA* requires operators of facilities to notify their local emergency planning committee (as defined in *EPCRA*) and state emergency response commission (as defined in *EPCRA*) of any *release* beyond the facility's boundary of any reportable quantity of any extremely *hazardous substance*.

3.2.18.1 *Discussion*—Records of such notifications are "*records of emergency release notifications*" (SARA § 304) and may be found in the *ERNS* database.

3.2.19 *safety data sheet (SDS), n*—printed material concerning a *hazardous substance* which is prepared by chemical manufacturers, importers, and employers for hazardous chemicals pursuant to OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

3.2.20 *solid waste disposal site, n*—a place, location, tract of land, area, or premises used for the *disposal* of solid wastes as defined by state solid waste regulations.

3.2.20.1 *Discussion—Solid waste disposal site* is synonymous with the term *landfill* and is also known as a garbage dump, trash dump, or similar term.

3.2.21 *solvent, n*—a chemical compound that is capable of dissolving another substance and a *hazardous substance*, used in a number of manufacturing/industrial processes including but not limited to dry cleaning, the manufacture of paints and coatings for industrial and household purposes, equipment clean-up, and surface degreasing in industrial settings.

3.2.22 *state registered USTs, n*—state lists of *underground storage tanks* required to be registered under Subtitle I, Section 9002 of *RCRA*.

3.2.23 *subject property, n*—the real property that is the subject of the records review, site visit, and initial site assessment described in this guide.

3.2.23.1 *Discussion*—Real property includes the registered

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other fixtures and improvements located on the property and affixed to the land. E1527

3.2.24 *sump, n*—a pit, cesspool, or similar receptacle where liquids drain, collect, or are stored.

3.2.25 *Superfund Enterprise Management System (SEMS), n*—*SEMS* is the official repository for site and non-site- specific Superfund data in support of the Comprehensive Environmental Response, Compensation, and Liability Act; it contains information on *hazardous waste* site assessment and remediation from 1983 to the present.

3.2.26 *technical policy decision (TPD), n*—the choices specific to the *User* that are necessary to implement the risk- based corrective action framework described in Guides E2081 and E2205, or any replacement standards thereto, at a particular site.

3.2.26.1 *Discussion*—Examples of *technical policy decisions* are: data quality objectives, target risk levels, land use, reasonably anticipated future use, ground water use, natural resource protection, relevant ecological receptors and habitats, stakeholder notification and involvement, exposure factors, and cultural resource protection.

3.2.27 *toxics release inventory (TRI), n*—the *Toxics Release Inventory* is a publicly available database containing information on toxic chemical *releases* and other waste management activities in the United States.

3.2.28 *underground storage tank (UST), n*—any tank, including underground piping connected to the tank that is or has been used to contain *hazardous substances* or petroleum products and the volume of which is 10 % or more beneath the surface of the ground.

3.2.29 *USGS 7.5 minute topographic map, n*—the term "*USGS topographic map*" refers to maps that covers a quadrangle that measures 7.5 minutes of longitude and latitude on all sides, so these are also referred to as 7.5-minute maps, quadrangle maps, or "quad" maps with a wide range of scales, but the scale used for all modern *USGS topographic maps* is 1:24,000.

3.2.30 *wastewater, n*—water that *(1)* means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product or *(2)* conveys or has conveyed sewage.

3.2.30.1 *Discussion*—*Wastewater* does not include water originating on or passing through or adjacent to a site, such as stormwater flows, that has not been used in industrial or manufacturing processes, has not been combined with sewage, or is not directly related to manufacturing, processing, or raw materials *storage* areas at an industrial plant. *Wastewater* also includes washdown water that flows into drains that co-mingle and are discharged to a sewage system, leach field, collection pond, or *wastewater* treatment plant.

3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *aerial photographs, n*—photographs, taken from an aerial platform, having sufficient resolution to allow identification of development and activities of areas encompassing the property; *aerial photographs* are commonly available from government agencies or private collections unique to a local area.

3.3.1.1 *Discussion*—Digital imagery from satellites, while not technically *aerial photographs*, may also be used to identify land uses and development activities of real property.

3.3.2 *disposal, v*—the discharge, deposit, injection, dumping, spilling, leaking, or placing of any *hazardous substances*, or petroleum products or their derivatives into or on any land or water so that such *hazardous substances*, petroleum products or their derivatives, or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters including ground water.

3.3.3 *environmental investigation, n*—any investigation intended to determine the nature and extent of environmental contamination or to determine the environmental condition of property.

3.3.3.1 *Discussion*—*Environmental investigations* may include, but are not limited to, environmental site assessments, preliminary assessments, *site inspections*, remedial investigations, *RCRA* facility assessments, and *RCRA* facility investigations.

3.3.4 *fill dirt, n*—dirt, soil, sand, or other earth taken from a different location, that is used to fill holes or depressions, create mounds, or otherwise artificially change the grade or elevation of real property.

3.3.4.1 *Discussion*—*Fill dirt* does not include material that is used in limited quantities for normal landscaping activities.

3.3.4.2 *Discussion*—The potential for *fill dirt* to be contaminated with hazardous substances should be considered, and if appropriate, the material should be tested and analyzed for *chemicals of concern*.

3.3.5 *migration, v*—the movement of contaminant(s) away from a source through permeable subsurface media (such as the movement of a ground water plume of contamination), or movement of contaminant(s) by a combination of surficial and subsurface processes.

3.3.5.1 *Discussion*—Vapor intrusion is an example of *migration*.

3.3.6 *NACE, n*—the statistical classification of economic activities in the European Community.

3.3.6.1 *Discussion*—NACE (Nomenclature des Activités Économiques dans la Communauté Européenne) is a European industry standard classification system similar in function to Standard Industry Classification (SIC) and North American Industry Classification System (NAICS) for classifying business activities.

3.3.7 *North American Industry Classification System or NAICS, n*—a classification of business establishments by type of economic activity.

3.3.7.1 *Discussion*—The *North American Industry Classification System* is used by governments and businesses in Canada, Mexico, and the United States of America.

3.3.8 *physical setting sources, n*—sources that provide information about the geologic, hydrogeologic, hydrologic, or topographic characteristics of a property.

3.3.8.1 *Discussion*—Examples of *physical setting sources*

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include: U.S. Geological Survey 7.5-minute topographic maps, geological survey maps produced by state or local agencies, soil surveys produced by federal, state, and local government agencies.

3.3.9 *preliminary assesment (PA), n*—review of existing information and an off-site reconnaissance, if appropriate to determine if a *release* or potential *release* may require additional investigation or action.

3.3.9.1 *Discussion*—The term *preliminary assessment* as defined in this document is significantly different from the definition of the term in *CERCLA* guidance documents. A *preliminary assessment* may include an on-site reconnaissance, if appropriate.

3.3.10 *release, v*—any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any hazardous chemical, extremely *hazardous substance*, or *CERCLA hazardous substance*.

3.3.11 *remedial actions, n—as defined in CERCLA §101(22)*, those actions consistent with a permanent remedy taken instead of, or in addition to, *removal* action in the event of a *release* or threatened *release* of a *hazardous substance* into the environment, to prevent or minimize the *release* of *hazardous substances* so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment.

3.3.12 *removal, v*—the cleanup or *removal* of released *hazardous substances* from the environment; such actions as may be necessary to take in the event of the threat of *release* of *hazardous substances* into the environment; such actions as may be necessary to monitor, assess, and evaluate the *release* or the threat of *release* of *hazardous substances*; the *disposal* of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a *release* or threat of *release*.

3.3.12.1 *Discussion*—The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under section 104(b) of *CERCLA*, post-*removal* site control, where appropriate, and any emergency assistance which may be provided under the Disaster Relief Act of 1974.

3.3.13 *site inspection (SI), n*—a systematic examination to determine whether there is a *release* or potential *release* and the nature of the associated threats.

3.3.13.1 *Discussion*—The purpose of the *site inspection* is to augment the data collected in the preliminary assessment and to generate, if necessary, sampling and other field data to determine if further action or investigation is appropriate.

3.3.14 *standard industrial classification, n*—the *Standard Industrial Classification* is a system for classifying industries by a four-digit code; established in the United States in 1937, it is used by government agencies to classify industry areas.

3.3.15 *storage, v*—the containment of *hazardous substances*, petroleum products or their derivatives, either on a temporary basis or for a period of years, in such a manner as not to constitute *disposal* of such *hazardous substances*, petroleum products, or their derivatives.

3.3.15.1 *Discussion—Storage* of *RCRA*-regulated waste for a period that exceeds 90-days may require a permit issued by the *EPA* or a state with delegated authority to enforce *RCRA* regulations.

3.3.16 *user, n*—the party seeking to use this guide to screen and characterize the property for the purpose of confirming past or present uses of *PFAS* at the property and to confirm *releases* of *PFAS* to the environment.

3.3.17 *visual and/or physical inspection, v*—actions taken during a preliminary investigation to include observations made by vision while walking through or otherwise traversing a property and structures located on it and observations made by the sense of smell, particularly observations of sweet, aromatic, noxious or foul odors.

3.4 *Acronyms Abbreviations, and Initialisms:*

3.4.1 *AFFF—aqueous film-forming foam*

3.4.2 *ATSDR*—Agency for Toxic Substances and Disease Registry

3.4.3 *ARARs*—applicable or relevant and appropriate requirements

3.4.4 *CERCLA*—Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 USC 9620 *et seq.*)

3.4.5 *CFR*—Code of Federal Regulations

3.4.6 *CSM—conceptual site model*

3.4.7 *DoD*—Department of Defense

3.4.8 *EPA*—United States Environmental Protection Agency

3.4.9 *EPCRA*—Emergency Planning and Community Right to Know Act, 42 USC

3.4.10 *ERNS*—emergency response notification system

3.4.11 *ESA*—environmental site assessment

3.4.12 *GOCO*—government-owned/contractor operated

3.4.13 *LUST*—leaking *underground storage tank*

3.4.14 *NACE*—European Classification of Economic Activities

3.4.15 *NAICS*—North American Industrial Classification System

3.4.16 *NCP—National Contingency Plan* (40 CFR Part 300)

3.4.17 *NPDES*—National Pollutant Discharge Elimination System

3.4.18 *OB/OD*—open burning/open detonation

3.4.19 *PA*—preliminary assessment

3.4.20 *PFAS*—perfluoroalkyl and polyfluoroalkyl substances

3.4.21 *POTW*—publicaly-owned treatment works

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3.4.22 *RCRA*—Resource Conservation and Recovery Act, as amended, 42 USC 6901 *et seq.*

3.4.23 *SARA*—Superfund Amendments and Reauthorization Act of 1986

3.4.24 *SDS*—Safety Data Sheet

3.4.25 *SEMS—Superfund Enterprise Management System*

3.4.26 *SI—site inspection*

3.4.27 *SIC—Standard Industrial Classification*

3.4.28 *TPD—technical policy decision*

3.4.29 *TRI*—toxic *release* inventory

3.4.30 *TSDF*—treatment, *storage*, and *disposal* facility

3.4.31 *UFP-QAPP*—Uniform Federal Policy for Quality Assurance Project Plans

3.4.32 *USC*—United States Code

3.4.33 *USGS*—United States Geological Survey

3.4.34 *UST—underground storage tank*

3.4.35 *WWTP—wastewater* treatment tank

4. Significance and Use

4.1 *PFAS* are widely used in commercial and industrial applications worldwide (see Fig. 1). *PFAS* are of concern due to their documented persistence and their studied impacts on human health and the environmental. While there is no comprehensive source of information on the many individual *PFAS* substances and their functions in different applications, a range of resources are available to the practitioner. This guide provides information to assist the practitioner in navigating these challenges during the initial screening and site characterization process.

4.2 The *user* should note that *PFAS* regulatory management framework at the federal and state level are evolving quickly. Therefore, consultation with legal and technical representatives with knowledge of federal, state, and local *PFAS* regulations is advised prior to use of this guide. Environmental audit policies

FIG. 1 Activity/Industry that may be Sources of PFAS Use and Release

Source: AEI Consultants

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