



# **ACRP WebResource 21: Environmental Stewardship and Compliance Training for Airport Employees**

**Water Quality Training Course**

**ACRP** | AIRPORT  
COOPERATIVE  
RESEARCH  
PROGRAM

# Course Objectives and Overview

This course will provide a high-level overview of water quality, water quality regulations, and how regulations apply to airports.

In this course, you will learn:

- The importance of water quality at airports
- Water quality regulations relevant to airports and airport projects
- Water quality related permits and plans
- Typical airport water pollutants and their sources

Links to federal references may be modified over time. Please search FAA and other federal websites to find the most current reference material.

# Key Definitions and Terms

- **Aqueous Film Forming Foam (AFFF)** – firefighting foam used worldwide, known for its effectiveness in fighting aircraft fires; contains per- and polyfluoroalkyl substances (PFAS)
- **Best Management Practices (BMPs)** – schedules of activities, maintenance procedures, and management practices implemented to minimize point source discharge impacts
- **Clean Water Act (CWA)** – establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters
- **Impervious Surface** – “a hard surface area that either prevents or slows the entry of water into the soil mantle or causes water to run off the surface in greater quantities or at an increased rate of flow, which can potentially contribute to flooding and transport pollutants into lakes and streams”
- **National Pollutant Discharge Elimination System (NPDES)** – a permit issued by the EPA authorizing point source discharges into navigable waters of the United States
- **Non-point Source** – “a diffuse source of pollution, having no single point of origin”

Source: EPA. n.d. Home page. <https://www.epa.gov/>

# Key Definitions and Terms (cont'd)

- **Per- and Polyfluoroalkyl Substances (PFAS)** – a group of manufactured chemicals that have been used in industry and consumer products since the 1940s, also called “forever chemicals” because they do not break down easily
- **Perfluorooctane Sulfonic Acid (PFOS)** – a member of the PFAS chemical group, designated by the EPA as a drinking water contaminant that causes some negative health effects
- **Perfluorooctanoic Acid (PFOA)** – a member of the PFAS chemical group, designated by the EPA as a drinking water contaminant that causes some negative health effects
- **Point Source** – “a fixed location or facility that discharges pollution—for example, a factory smokestack, a ship, an ore pit, a ditch, or a pipe discharging treated industrial wastewater or treated sewage into a waterway”
- **Runoff Pollutants** – pollutants from point source and non-point source runoff, which may include metals, oils, greases, hazardous materials, solids, hydrocarbons, pesticides, and herbicides

Source: EPA. n.d. Home page. <https://www.epa.gov/>

# Key Definitions and Terms (cont'd)

- **Spill Prevention Control and Countermeasure (SPCC)** – a CWA regulation that requires facilities to develop an SPCC plan to prevent oil from reaching navigable waters and adjoining shorelines, as well as to contain discharges of oil
- **Stormwater Pollution Prevention Plan (SWPPP)** – a plan that outlines how stormwater runoff, erosion, and sediment will be controlled to minimize polluted stormwater runoff into waters
- **U.S. Army Corps of Engineers (USACE)** – an agency that conducts or verifies jurisdiction of waters of the U.S., develops CWA Section 404 policy and guidance, and administers Section 404 permits
- **U.S. Environmental Protection Agency (EPA)** – a federal organization established in 1970 to protect human health and the environment
- **Water Quality Certificate** – a certificate required for a project to ensure it does not violate state or Tribal water quality standards under Section 401 of the CWA; a certificate required by airport sponsors when applying for a CWA Section 404 permit from USACE

Source: EPA. n.d. Home page. <https://www.epa.gov/>

# Water Resources

Water resources, including both surface waters and groundwater, are important to life on Earth and have the following traits:

- Vital to society
- Vital to wildlife
- Provides drinking water

Water resources also support recreation, transportation and commerce, industry, agriculture, and aquatic ecosystems.



Photo credit: iStock/Getty Images/Bkamprath

# Holistic System

It is important to think of water resources as a holistic system:

- The natural water system is connected and acts as an integrated system
- Disruption or contamination of one water resource impacts the entire system
- Analysis should consider the system as a whole

Consider the entire water system when analyzing impacts to water.

# Primary Water Resources

The following primary water resources may be found in and around airports. Consider that there may be others present:

- **Wetlands** – areas where water covers the soil, or is present either at or near the surface of the soil, all year or for varying periods of time during the year, including during the growing season
- **Floodplains** - lowland areas adjoining inland and coastal waters that are periodically inundated by floodwaters
- **Surface water** – a body of water above ground, including streams, rivers, lakes, ponds, estuaries, and oceans
- **Groundwater** – a subsurface water body that occupies the space between sand, clay, and rock formations
- **Wild and scenic rivers** - rivers that have remarkable scenic, recreational, geological, fish, wildlife, historic, or cultural values as defined by the Wild and Scenic Rivers Act



# Importance of Water Quality at Airports

According to the FAA, without proper water quality management, the following may occur:

- Construction activities may cause sediment-laden runoff to enter waterways
- Seasonal pollutants from deicing activities may be present in stormwater runoff
- Water quality impacts can be from point sources and non-point sources
- Pollutants can accumulate on impervious surfaces and wash into creeks, streams, lakes, or other waters due to storm events
- Water quality impacts may adversely affect animal, plant, and human populations

Airport development and operations can result in water quality impacts.

# Water Pollutants and Sources at Airports

The following water pollutants and their sources are typically found at airports:

- Deicing/anti-icing of aircraft is a source of ethylene or propylene glycol pollutants
- Deicing/anti-icing of runways, aprons, and taxiways is a source of urea, acetate, and formate pollutants
- Spills during refueling and leaks from pipes or tanks are sources of fuel pollutants
- Firefighting exercises are a source of fire suppressant chemical and foam pollutants
- Paved surfaces and engine leaks are sources of dust, dirt, and hydrocarbon pollutants
- Vegetation and pest control are sources of herbicide and pesticide pollutants

Source: ICAO. n.d. Eco-Airport Toolkit E-collection. <https://www.icao.int/environmental-protection/pages/ecoairports.aspx>

# Clean Water Act

The Clean Water Act (CWA) is the overarching statutory framework used in federal decisions regarding water quality impacts. The FAA must evaluate proposed airport landside and airside projects that have the potential to impact water quality.

- Example landside projects include:
  - Construction, relocation, and repair of airport access roads
  - Repair and maintenance of remote parking facilities
  - Repair and maintenance of rental car lots
- Example airside projects include:
  - Building or expanding terminals and hangars
  - Building new or extending runways and taxiways
  - Installing navigational aids

The Clean Water Act **always** applies to airports, even if a federal action is not in play.

Source: FAA. 2023, October. 1050.1 Desk Reference (v3).

[https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/environ\\_policy\\_guidance/policy/faa\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref)

# Waters of the United States

Waters of the United States (WOTUS) are water bodies protected under the CWA. The definition of WOTUS has changed over time, but it is intended to protect water bodies such as:

- Traditional navigable waters (e.g., certain large rivers and lakes)
- Territorial seas
- Interstate waters
- Upstream waters that may affect the integrity of downstream waters

Current information regarding the classification of WOTUS can be found here: [U.S. EPA's Waters of the United States](#)

# Water Quality Regulations – Wetlands

The following statutes, regulations, and executive orders are in place to protect wetlands and aquatic systems:

- Executive Order 11990, Protection of Wetlands
- Clean Water Act
- Fish and Wildlife Coordination Act
- U.S. DOT Order 5660.1A, Preservation of the Nation's Wetlands
- State and local statutes protecting surface waters



Photo credit: iStock/Getty Images/Xavi Arroyo

Text Source: FAA. 2023, October. 1050.1 Desk Reference (v3).  
[https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/environ\\_policy\\_guidance/policy/faa\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref)

# Water Quality Regulations – Floodplains

The following statutes, regulations, and executive orders are in place to protect floodplains:

- Executive Order 11988, Floodplains Management
- National Flood Insurance Act
- U.S. DOT Order 5650.2, Floodplain Management and Protection
- State and local statutes protecting surface waters

Use the online FEMA Flood Map Service Center to see if your airport or airport project is outside the 100-year and 500-year floodplains, at [msc.fema.gov/portal](https://msc.fema.gov/portal).

Source: FAA. 2023, October. 1050.1 Desk Reference (v3).

[https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/environ\\_policy\\_guidance/policy/faa\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref)

# Water Quality Regulations – Surface Waters

The following statutes and regulations are in place to protect surface waters:

- Clean Water Act
- Fish and Wildlife Coordination Act
- Rivers and Harbors Act
- Safe Drinking Water Act
- State statutes protecting surface waters



Text Source: FAA. 2023, October. 1050.1 Desk Reference (v3).

[https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/enviro\\_n\\_policy\\_guidance/policy/faq\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/enviro_n_policy_guidance/policy/faq_nepa_order/desk_ref)

# Water Quality Regulations – Groundwater

The following statutes and regulations are in place to protect groundwater:

- Safe Drinking Water Act
- State statutes protecting surface waters



Spring



Well

Text Source: FAA. 2023, October. 1050.1 Desk Reference (v3).  
[https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/enviro\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/enviro_nepa_order/desk_ref)



# Water Quality Regulations – Wild and Scenic Rivers

The following statutes and regulations are in place to protect wild and scenic rivers:

- Wild and Scenic Rivers Act



Text Source: FAA. 2023, October. 1050.1 Desk Reference (v3).

[https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/environ\\_policy\\_guidance/policy/faa\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref)

# Water Quality Permits

The following are typical water quality permits that may apply to airports:

- National Pollutant Discharge Elimination System (NPDES) permit under Section 402 of CWA – for projects having a point source discharge to a navigable waterway or that would disturb at least one acre
- U.S. Army Corps of Engineers (USACE) Section 404 permit under Section 404 of CWA – for projects filling or dredging navigable waters of the U.S., including jurisdictional wetlands
- Water Quality Certificate – a CWA Section 401 certificate, required if a Section 404 permit is needed
- State and local permits also apply – vary by state and region
- For applicability of various permits, see Table 3-1 in *ACRP Research Report 169: Clean Water Act Requirements for Airports*

Source: Mericas, D., J. Longworth, and K. Shannon. 2016. *ACRP Research Report 169: Clean Water Act Requirements for Airports*. Transportation Research Board, Washington, DC. <https://doi.org/10.17226/24657>

# U.S. Army Corps of Engineers Section 404 Permit

The USACE Section 404 permit, in the context of airports, typically involves wetlands.

- A 404 permit may apply if airport property contains wetlands that are within WOTUS
- The need for a 404 permit is based on wetland acreage impacts
- Prior to beginning construction or development activities, the airport must confirm whether the wetlands are federally regulated as WOTUS
- If the wetlands are confirmed as federally regulated and the acreage impact is above regulatory thresholds, then a nationwide permit or individual permit is required



Text Source: Mericas, D., J. Longworth, and K. Shannon. 2016. *ACRP Research Report 169: Clean Water Act Requirements for Airports*. Transportation Research Board, Washington, DC. <https://doi.org/10.17226/24657>

# National Pollutant Discharge Elimination System Industrial Stormwater Permit

The National Pollutant Discharge Elimination System (NPDES) permit enables pollutant discharges from point sources into waters of the United States (WOTUS). The permit contains limits on what can be discharged, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health.

An NPDES permit is required if discharging into WOTUS and may apply to the following airport activities:

- Equipment cleaning and maintenance, which includes vehicle and equipment repairs, painting, fueling, and lubrication
- Deicing/anti-icing operations
- Construction with a disturbance of one acre or more



Text Source: EPA. 2023. NPDES Permit Basics.  
<https://www.epa.gov/npdes/npdes-permit-basics>

# Spill Prevention, Control, and Countermeasure

The Spill Prevention, Control, and Countermeasure (SPCC) plan describes equipment, workforce, procedures, and training to prevent, control, and provide adequate countermeasures to a discharge of oil.

An SPCC plan is required for:

- Facilities that store greater than 1,320 gallons of oil
- Facilities with completely buried oil storage capacity greater than 42,000 gallons
- Tanks and containers with individual oil storage capacity of 55 gallons or greater (typically drums and totes)
- Facilities that have a “reasonable expectation of an oil discharge” to water
- Non-transportation-related storage of oil, including gasoline, at airports

The SPCC plan is required by federal law and is a standalone plan separate from NPDES

# Storm Water Pollution Prevention Plan

The Storm Water Pollution Prevention Plan (SWPPP) outlines how stormwater runoff, erosion, and sediment will be controlled to minimize polluted stormwater runoff into waters.

- Required as part of an NPDES permit (for operations and construction)
- Identifies stormwater Best Management Practices (BMPs) to reduce the potential for industrial pollutants to mix with stormwater
- May require periodic updates to account for stormwater changes and new projects

Project-specific SWPPPs and SPCCs can be required in addition to overall airport plans.

Text Source: Mericas, D., J. Longworth, and K. Shannon. 2016. *ACRP Research Report 169: Clean Water Act Requirements for Airports*. Transportation Research Board, Washington, DC. <https://doi.org/10.17226/24657>



# Best Management Practices

Best Management Practices (BMPs) may be implemented to minimize point source discharge impacts. These can include:

- Modifications to schedules or activities
- Maintenance procedures
- Management practices
- Construction practices (such as erosion control)

BMPs can be employed in day-to-day operations to reduce water quality impacts. Protecting water quality can be accomplished without creating or enhancing hazardous wildlife habitat.

Source: FAA, 1050.1 Desk Reference (Oct. 2023), [https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/environ\\_policy\\_guidance/policy/faa\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref)

# Deicing and Anti-icing Guidelines

Deicing aircraft and airfield pavement is critical to ensuring safe flight operations during winter weather; however, runoff from deicing and anti-icing applications can have adverse environmental impacts.

- The EPA has established rules for discharges associated with aircraft and pavement deicing
- Without discharge controls in place, deicing operations can degrade nearby water bodies
- Airports are required to obtain stormwater discharge permits under the NPDES program and ensure that wastes from deicing operations are properly collected and treated
- For more information from the EPA on [effluent deicing guidelines](http://www.epa.gov/eg/airport-deicing-effluent-guidelines), visit [www.epa.gov/eg/airport-deicing-effluent-guidelines](http://www.epa.gov/eg/airport-deicing-effluent-guidelines)





# Per- and Polyfluoroalkyl Substances

Per- and polyfluoroalkyl substances (PFAS) are synthetic chemicals with unique properties, including both water and oil repellency and surfactant properties.

- Nicknamed “forever chemicals” because they do not break down easily
- PFAS are used in aqueous film forming foam (AFFF), which is used to extinguish Class B flammable liquid fires at a variety of facilities, including commercial airports
- If an airport has never stored, transported, or used AFFF, the airport is unlikely to have a concern associated with AFFF or PFAS
- The regulation of PFAS is evolving—additional information can be found at [www.epa.gov/pfas](http://www.epa.gov/pfas)

Source: Thalheimer, A.H. et al. 2017. *ACRP Research Report 173: Use and Potential Impacts of AFFF Containing PFASs at Airports*. Transportation Research Board, Washington, DC. <https://doi.org/10.17226/24800>

# Sources of PFAS at Airports

Potential sources of PFAS at airports include:

- Firefighting training areas where AFFF is used
- Firefighting equipment maintenance areas (e.g., from foam tests)
- Disposal areas
- Treatment lagoons
- Impacted soils
- Fire suppression systems in hangars
- Drainage and wastewater systems used to contain discharged fire-extinguishing materials
- Storage areas for AFFF
- Tanks, vehicles, equipment, and distribution systems used to store or apply AFFF that were not adequately rinsed and may have become a continuous source

Regulations pertaining to PFAS are evolving; monitor changes in regulations if the potential for PFAS exists at your airport.

Source: Thalheimer, A.H. et al. 2017. *ACRP Research Report 173: Use and Potential Impacts of AFFF Containing PFASs at Airports*. Transportation Research Board, Washington, DC. <https://doi.org/10.17226/24800>

# What Does this Mean to Your Airport?

## How does your airport ensure water quality is maintained?

- Does your airport have an NPDES permit?
- Does your airport have a current SPCC and SWPPP?
- When were they last updated?
- Whose responsibility is it to update the permit?

## What water resources are present on your airport?

- Are there obvious wetlands or surface waters?
- What about dry creek or groundwater sources?
- When was the last wetland and stream delineation completed at your airport?

## Is your airport at risk for PFAS contamination?

- Review historic use of AFFF at the airport, and map the locations of use

# Course Wrap-Up

## Some key takeaways include:

- Water runoff from airports can impact nearby water quality, potentially impacting animals, plants, and human populations
- Obtaining the proper permits, creating prevention plans, and using BMPs for construction projects can help prevent water quality impacts
- Understanding the water resources in proximity to the airport and the regulations that protect them is key to preventing water quality impacts

# References

EPA. n.d. Home page. <https://www.epa.gov/>

EPA. 2023. NPDES Permit Basics. <https://www.epa.gov/npdes/npdes-permit-basics>

FAA. 2023, October. 1050.1 Desk Reference (v3).

[https://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/environ\\_policy\\_guidance/policy/faa\\_nepa\\_order/desk\\_ref](https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref)

ICAO. n.d. Eco-Airport Toolkit E-collection. <https://www.icao.int/environmental-protection/pages/ecoairports.aspx>

Mericas, D., J. Longworth, and K. Shannon. 2016. *ACRP Research Report 169: Clean Water Act Requirements for Airports*. Transportation Research Board, Washington, DC. <https://doi.org/10.17226/24657>

Thalheimer, A.H. et al. 2017. *ACRP Research Report 173: Use and Potential Impacts of AFFF Containing PFASs at Airports*. Transportation Research Board, Washington, DC. <https://doi.org/10.17226/24800>

# ACRP Disclaimer and Publication Details

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