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Water Keeping a Vital Resource Flowing

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Water is a precious resource essential to human life, and its availability determines the quality of life of people the world over. Global economies depend on water to support food production, manufacturing and energy development.

Keeping a Vital Resource Flowing

Today, diminishing water supplies must support considerable increases in demand.

According to Global Water Intelligence, an international water industry consultancy, in the 20 years between 1995 and 2015, water withdrawals are expected to grow by nearly 50 percent.¹ Major forces driving this shift include continued population growth as well as increased energy production and consumption. Further, environmental factors such as pollution, drought, changing rainfall patterns and climate variability are also impacting the availability of quality water resources.

Addressing Challenges in the Water Industry with Standards

As pressure on the world's water resources intensifies, the need for industry standards that support good water management practices, advance innovation and facilitate knowledge transfer is becoming increasingly important.



A Single Resource

The ASTM water portal, www.astm.org/waterportal, collects all of ASTM International's resources onto one platform.

Helping to fulfill these goals are a broad range of ASTM International technical committees that are making a valuable contribution across the global water industry and its related sectors. ASTM water-related standards are developed in an open, consensus-based process that brings together the foremost experts across numerous related fields. ASTM standard specifications, guides, test methods, practices and terminology assist the industry's diverse stakeholders by providing scientifically proven best practices and technical tools for testing and maintaining water quality, improving water infrastructure, restoring wetlands and waterways, monitoring water conservation, implementing sustainable operations and more.

ASTM Water Portal: Holistic Solution for Industry Stakeholders

Recognizing that the challenges confronting the global water industry cut across a wide range of interrelated areas, ASTM International has created a comprehensive bank of knowledge to assist industry stakeholders. The ASTM Water Portal, online at www.astm.org/waterportal, is a single online information source that provides access to technically sound standards and expert resources on myriad water-related topics and areas of interest.

The portal brings together the latest information on newly published ASTM standards, proposed new standards and revisions to current standards, schedules of upcoming meetings and symposia, research reports and other resources from more than 25 ASTM International technical committees and dozens of subcommittees. It provides a convenient pathway to a compendium of technical information in five important water-related areas:

- Environmental preservation, stewardship and security of water sources;
- Testing and maintenance of water quality;
- Extraction, transportation and infrastructure for water;
- Water recapture, efficiency, reuse, recycling and sustainability; and
- Consumer and industry usage of water.

“The Water Portal represents a strategic approach by ASTM to provide easier access to a broader body of work pertaining to this critical environmental and societal issue,” says Katharine Morgan, vice president, Technical Committee Operations, ASTM International. “Numerous ASTM technical committees are addressing water-related challenges in their standards activities, and the portal provides a platform for sharing their efforts and contributions in a beneficial, holistic manner.”

Preservation and Stewardship of Water Sources

Through the Water Portal platform, ASTM International has brought together the standards and resources of several technical committees that address issues pertaining to the protection and long-term use of water resources; restoration and conservation of water sources; and crisis management and response actions for water-related incidents and disasters. Stakeholders will find valuable utility in solutions from ASTM Committee E60 on Sustainability, which provides standards that assist building developers and

ASTM Resources on Water

ASTM International offers a wide range of informational and other resources for stakeholders involved in various aspects of water management and water quality testing.

ASTM International and U.S. EPA Standards for Cyanide Analysis, Sampling and Mitigating Interferences

This unique collection features 12 of the latest ASTM standards for the analysis of cyanide in water, solids and air. Six of these test methods and one practice are being proposed by the U.S. EPA for compliance monitoring at 40 CFR Part 136 under the Clean Water Act. Available on CD, this is an invaluable resource for field sampling personnel, environmental laboratories, regulators, auditors and anyone required to collect and test water samples for the analysis of cyanide.

ASTM Standards on Erosion and Sediment Control Technology: 3rd Edition

This comprehensive new edition provides 76 of the latest ASTM specifications, test methods, practices and guides for minimizing soil erosion and controlling sediment delivery to lakes, streams and other receiving water bodies. This edition is a vital resource for designers, specifiers, landscape architects, developers, resource managers, excavation contractors, landscapers, site inspectors and permit enforcement personnel.

Purchasing ASTM Standards

More than 12,000 ASTM standards are used worldwide to improve product quality, enhance safety and facilitate trade. You can purchase individual standards, a volume that groups like standards together, a section comprising several volumes covering an industry segment or the entire collection. Print, CD-ROM and online subscriptions are available. To browse ASTM standards, adjuncts, collections and to learn more about purchasing options, visit www.astm.org/Standard/index.html.



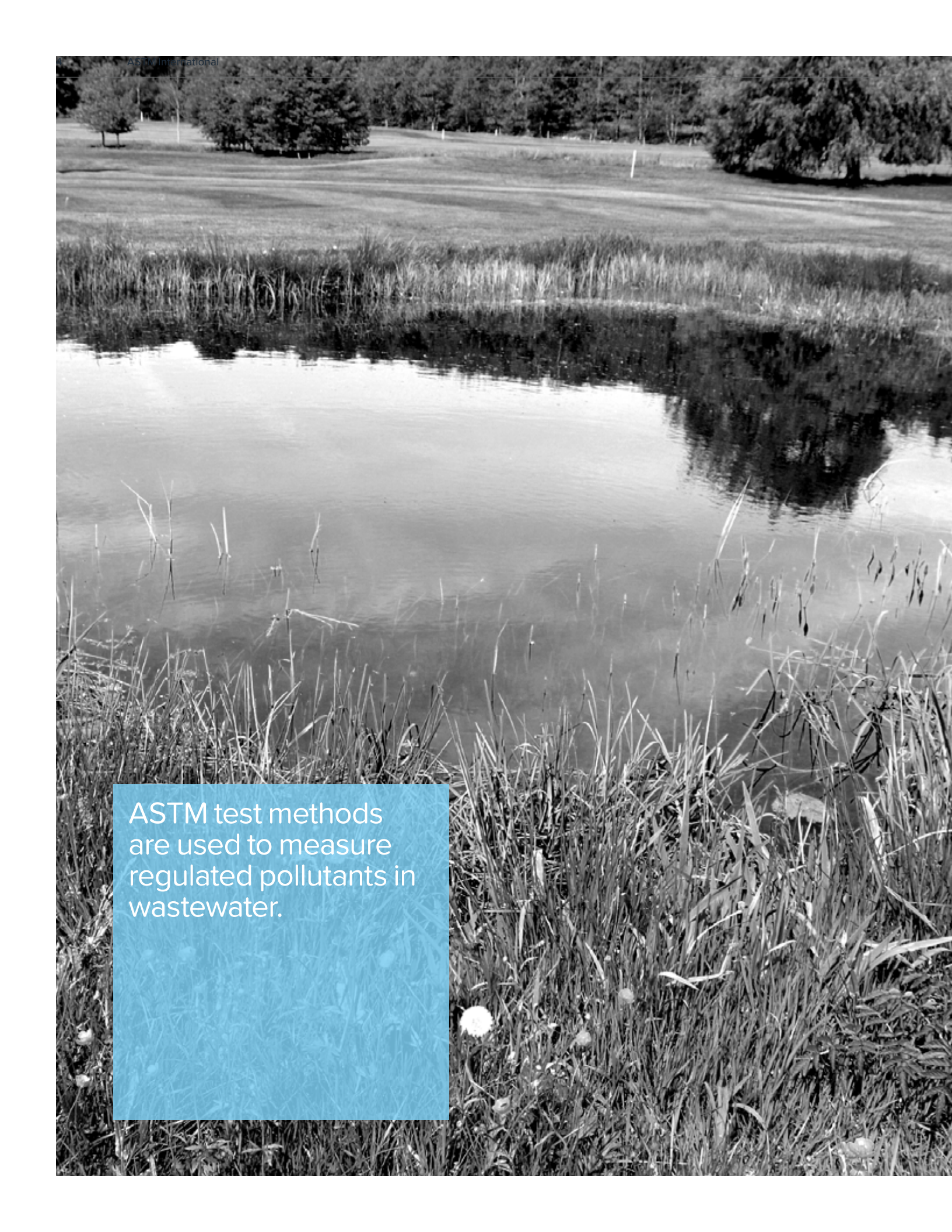
Case Study

ASTM International and the U.S. EPA: Partners in Progress

The development of ASTM International standards for water resources involves a multi-stakeholder approach with close collaboration and contributions from experts in industry, government agencies, research bodies, testing laboratories, academia and others. Under the ASTM umbrella, these experts come from all parts of the world to participate in the development of voluntary consensus standards.

One of ASTM International's most enduring partners in the development of water-related standards is the U.S. Environmental Protection Agency. Since the enactment of the Clean Water Act, ASTM International committees have been working closely with the EPA, as well as other agencies, on the development of standards. In 2012, 10 standards developed by Committee D19 on Water were included in a final rule published in the Code of Federal Regulations by the EPA as approved methods for measuring regulated pollutants in wastewater.

The EPA's use of voluntary standards helps reduce costs to the agency and also further enhances effective public-private partnerships. In February 1998, the revised Circular No. A-119, Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities, was published by the U.S. Office of Management and Budget, directing U.S. federal agencies to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with the law or otherwise impractical. This circular was developed due to the approval of the 1995 National Technology Transfer and Advancement Act, which emphasized federal agency use of standards developed by private, consensus organizations such as those developed by ASTM International. Mary McKiel, Ph.D., EPA standards executive from 1993 to 2013, says, "EPA's participation with ASTM provides incentives and opportunities to develop standards that serve our national needs in environmental, health, safety and other areas."



ASTM test methods are used to measure regulated pollutants in wastewater.

operators in the safe stewardship of water resources and guide conservation efforts that help meet the ever-growing demands for water in residential and commercial facilities.

Building developers, owners and occupants gain assistance from the standards of Committee E50 on Environmental Assessment, Risk Management and Corrective Action. E50 develops widely accepted standards to assess the risk from contaminants and other threats to surface water, groundwater and drinking water supplies.

Working to increase the protection of healthy waters and support the effective remediation of degraded



ASTM water standards address a broad range of relevant topics, from the analysis of organic substances and microbiology to radiochemical analysis and inorganic constituents.

water sources is a core focus of the efforts of ASTM Committee F20 on Hazardous Substances and Oil Spill Response. With subcommittees focused in areas such as oil spill control, removal and shoreline countermeasures, F20 standards address the performance, durability and strength of systems and techniques used for the control of oil and hazardous substance spills. First responders gain valuable guidance from F20 practices that help direct cleanup operations during emergencies and incidents

impacting coastal waterways. Subcommittee F12.10 on Systems Products and Services, which is part of Committee F12 on Security Systems and Equipment, further assists stakeholders in crisis planning through tools that define the performance of barriers deployed to protect water sources from vehicle penetration.

Applying Science to Improve Water Quality

According to the United States Environmental Protection Agency (U.S. EPA), nutrient pollution is one of the costliest, most difficult environmental problems confronting the water industry and the scientific community that is addressing it. The U.S. EPA reports that the amount of nitrogen and phosphorous pollution entering waterways has dramatically escalated over the past 50 years, and nutrients now pose significant water quality and public health concerns across the United States. As the U.S. population expands, nutrient pollution from urban stormwater runoff, municipal wastewater discharges, air deposition, agricultural livestock activities and row-crop runoff is expected to grow as well.²

The critical issue of water quality is a major focus area of the ASTM Water Portal, supported by a comprehensive set of standards from two of ASTM's flagship environmental committees: D19 on Water and D18 on Soil and Rock. Through a portfolio of more than 350 standards, Committee D19 provides tools and practices that cover the sampling and analysis of water, waterborne materials and wastes; measurements of surface and groundwater; performance of materials used to modify the characteristics of water; and measurement of corrosives or deposit-forming properties in water. D19 test methods guide scientists in identifying a wide range of potentially harmful contaminants in water, such as bacteria, nutrients such as nitrogen and phosphorus, and inorganic and organic elements.

Subcommittee D19.06 on Methods for Analysis for Organic Substances in Water is also an authoritative source of standards for the sampling and analysis of cyanide in water, supporting proper sample collection and testing activities. Many of these cyanide testing standards are part of the more than 60 standards from Committee D19 that are referenced by the U.S. EPA in the Code of Federal Regulations under the Clean Water Act (see sidebars, "ASTM International and the U.S. EPA: Partners in Progress" and "ASTM Resources on Water").

Many of the standards from Committee D18 on Soil and Rock also play a valuable role in helping to measure and monitor the quality of surface and subsurface water sources. Standards from Committee D18 assist scientists and environmental professionals in areas such as subsurface analysis of geologic conditions, helping them to understand how the hydrologic properties of soil help determine the movement of contaminants. D18 standards support the testing of these parameters in a variety of soil types.

Another major D18 focus area is groundwater monitoring and investigation. The success of groundwater monitoring programs often depends on the quality and reliability of sample collection. To assist these critical efforts in the field, Subcommittee D18.21 on Ground Water and Vadose Zone Investigations has developed a number of key guides and practices to provide technical and procedural direction to industry professionals in developing and implementing groundwater monitoring and sampling programs.

Extending the water quality agendas of Committees D18 and D19 are the standards development activities of ASTM Committee D34 on Waste Management. Standards from D34 address the generation, storage, transportation, treatment, recovery and disposal of wastes generated from industrial, commercial, residential and institutional sources. D34 is heavily engaged in the area of groundwater monitoring, providing several practical guides used to support field testing and sampling activities at groundwater sites.



The human body is almost two-thirds water. Consuming clean water helps our bodies function better.

Improving the Water Extraction and Transportation Infrastructure

Industry analysts and the regulatory community emphasize that an efficient, well-maintained water technology and utility system is critical to meeting rising water demand. The U.S. EPA highlights that wastewater and drinking water systems in the United States are stretched to serve an increasing population and suffer from inadequate, outdated and/or neglected infrastructure. In addition, thousands of sanitary sewer overflows each year discharge billions of gallons of untreated wastewater into the nation's water resources.³

As investment in the industry's water extraction and transportation areas grows in the years ahead, the standards of several ASTM technical committees will have an important supporting role in infrastructure projects. ASTM committees are delivering an array of solutions that assist stakeholders in the design and implementation of the core systems for drinking water supply, wastewater management and wet weather runoff control.

Integral to the delivery of clean and safe water is the underlying pipeline infrastructure that supports water distribution and treatment. Leading efforts in this area is ASTM Committee F17 on Plastic Piping Systems, which has long played a formative role in supporting quality water delivery and reliable sanitation operations. Subcommittee F17.61 on Water offers standards that assist in construction projects focused on improving drinking water transport and agricultural uses, including underground installation of water pipes and irrigation pipeline systems. Similarly, Subcommittee F17.62 on Sewer directs its

activities at improving the infrastructure of sewer systems to ensure sanitary conditions, including piping specifications and insertion guidelines for design engineers, contractors and utilities.

A rapidly growing area of infrastructure improvement throughout the water industry is trenchless pipe technology. Commonly referred to as "no-dig," trenchless technology focuses on methods for rehabilitating underground utility systems and installing new pipe without digging trenches, which can disrupt local communities. As a result, there is less impact to surface traffic, businesses and local homeowners during construction projects.

Lending a valuable assist in the advancement of this technology are the standards developed by ASTM Subcommittee F17.67 on Trenchless Plastic Pipe Technology. F17.67 specifications provide guidance for designers and specifiers, regulatory agencies, owners and inspection organizations that are involved in the rehabilitation of conduits with trenchless pipeline systems. Included are practices and test methods that support the rehabilitation efforts of plastic main lines, lateral piping and manholes for non-pressure and pressure conveyance of sanitary sewage, surface water, cooling water, drinking water, and electrical conduits and ventilation systems.

The activities of several other ASTM main committees and subcommittees that are contributing to the efficiency and expansion of water infrastructure are also highlighted in the ASTM Water Portal. Among these are ASTM Subcommittee C13.02 on Reinforced Sewer and Culvert Pipe, which provides standards used in the design, manufacture and structural testing of reinforced concrete pipe, and D20.23 on Reinforced Plastic Piping Systems and Chemical Equipment, which offers guides and test methods for glass fiber reinforced piping systems.

Advancing Innovation in Water Efficiency, Recycling and Sustainability

Rising rates of water withdrawal combined with constraints in developing new sources has also spurred increased development of water reuse, recycling and sustainability activities across the global water industry. To conserve water, some utilities, industrial users and communities have begun replacing fresh water with reclaimed or recycled water for non-potable uses, such as agricultural irrigation, urban landscaping, and industrial cooling and processing. Another area where the water industry is investing to address water scarcity and efficiency issues is desalination — creating fresh water by removing saline from seawater.

The ASTM Water Portal highlights how several ASTM technical committees and subcommittees are contributing to water recapture, efficiency, reuse, recycling and sustainability goals. In this area, ASTM standards guide the development of efficiencies in equipment and devices, recapture mechanisms, and irrigation and drainage for agricultural, commercial and private systems. Additionally, ASTM standards on ion permeable membranes are supporting technological innovation in water desalination methods.

Properly implemented non-potable water reuse projects can help communities meet water demand and supply challenges without any known significant health risks. Supporting these efforts are the standards of Subcommittee E60.01 on Buildings and Construction. E60.01 standards help define the parameters for substituting reclaimed water in place of potable water supplies and specify performance requirements for in-situ reclaimed water systems.

Also notable are the efforts of Subcommittee D19.08 on Membranes and Ion Exchange Materials, which is helping to increase the quality and reliability of new desalination technology used in the water industry. Test methods and practices developed by D19.08 help define the terminology used in microfiltration, ultrafiltration, nanofiltration and reverse osmosis membrane processes; enhance product performance and leak detection in reverse osmosis and nanofiltration devices; guide water analysis in desalination and electrodialysis applications; and much more.

Another important water treatment application is the use of activated carbon filtration. Primarily deployed in home water purification systems to remove taste and odor, activated carbon is also one of the most effective media for removing a wide range of contaminants from industrial and municipal wastewaters, landfills and contaminated groundwater. Subcommittee D28.02 on Liquid Phase Evaluation, part of ASTM Committee D28 on Activated Carbon, helps guide the use of activated carbon in water filtration applications through a comprehensive set of test methods and practices.

ASTM Water Portal: Knowledge Bank for Industry Stakeholders

To learn more about the ASTM International technical committees discussed in this overview, and others who are assisting the needs of the global water industry, please visit the ASTM Water Portal on the ASTM website at www.astm.org/waterportal.

Measuring the Impact of Consumer and Industry Water Usage

The importance of water resources to our social and economic well-being is given the greatest clarity through the interconnection between water supply, energy development and food production. Often referred to as the food-water-energy nexus, these areas are so closely linked that they account for the overwhelming majority of off-stream water use today.⁴

In energy production, water is critical to mining and resource extraction efforts, petroleum refining and the generation of electricity through hydropower or thermoelectric power. As noted earlier, water is also a fundamental resource throughout the agricultural sector for cropland irrigation and livestock watering; and in the manufacturing sector for the production of food and beverages.

Notable ASTM standards development activities focused on consumer and industry usage of water include those of Subcommittee D13.40 on Sustainability of Textiles, part of Committee D13 on Textiles, which recently released a new standard that defines sustainable laundry best practices for commercial laundry facilities. Included is water reuse technology within a laundry facility that reuses, reclaims or recycles water.

Two other subcommittees addressing issues related to consumer water usage include F15.03 on Safety Standards for Bathtub and Shower Structures and F15.49 on Pool Safety Standards, both part of Committee F15 on Consumer Products. F15.03 standards guide safe consumer use of bathing and shower systems and equipment while F15.49 offers similar utility for residential swimming pool safety. Also of note are the standards developed by Subcommittee E18.06 on Food and Beverage Evaluation, part of ASTM Committee E18 on Sensory Evaluation. E18.06 standards provide general guidelines for conducting sensory evaluation on a variety of foods and beverages.

Supporting environmentally safe water usage in the industrial sector are two new and developing standards initiatives in the hydraulic fracturing field. Subcommittee D18.26 on Hydraulic Fracturing and Subcommittee D19.09 on Water - Hydraulic Fracturing Fluids assist stakeholders in safeguarding water and land resources.

References

1. Global Water Intelligence, www.globalwaterintel.com.
2. U.S. Environmental Protection Agency, "An Urgent Call to Action - Report of the State-EPA Nutrient Innovations Task Group," August 2009, www.epa.gov/water.
3. U.S. Environmental Protection Agency, "Safe and Sustainable Water Resources; Strategic Research Action Plan 2012 – 2016," www.epa.gov/water.
4. U.S. Environmental Protection Agency, "The Importance of Water to the U.S. Economy, Synthesis Report," November 2013, www.epa.gov/water.

ASTM International technical committees highlighted in this piece include:

- C13 on Concrete Pipe
- D13 on Textiles
- D18 on Soil and Rock
- D19 on Water
- D20 on Plastics
- D28 on Activated Carbon
- D34 on Waste Management
- E18 on Sensory Evaluation
- E50 on Environmental Assessment, Risk Management and Corrective Action
- E60 on Sustainability
- F12 on Security Systems and Equipment
- F15 on Consumer Products
- F17 on Plastic Piping Systems
- F20 on Hazardous Substances and Oil Spill Response

ASTM INTERNATIONAL Helping our world work better

Over 12,000 ASTM standards operate globally. Defined and set by us, they improve the lives of millions every day.

Combined with our innovative business services, they enhance performance and help everyone have confidence in the things they buy and use – from the toy in a child’s hand to the aircraft overhead.

Working across borders, disciplines and industries we harness the expertise of over 30,000 members to create consensus and improve performance in manufacturing and materials, products and processes, systems and services.

Understanding commercial needs and consumer priorities, we touch every part of everyday life: helping our world work better.

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