



Responsible Water Management

Water is essential to both our communities and the future of energy development, making our commitment to water sourcing and water stewardship critical. We use water during drilling and completions activities and our water use varies according to the geology and specific engineering plans of each well.

Water Management Process

Demand	Sourcing	Logistics	Reporting	End of Life
Our team determines the completions design and water amounts needed to meet production forecasts (specific to each individual site).	Based on demand, our team determines sourcing (freshwater vs. non-freshwater) and obtains appropriate permits.	Water is metered and transported via pipeline or truck; water may move directly to operations or to a staging area prior to operational use.	Water volumes are entered into internal databases and reported to the local and state entities per individual requirements.	Produced water is either disposed, recycled or reused based on market capabilities and conditions.

In 2021, we used ~68.7 million barrels of water at a water efficiency rate of 0.16 bbl/EUR boe.

Because we are a multi-basin operator, we adjust our water management practices to meet the regulatory, sourcing and operational needs of each basin. Our high standards of water stewardship and conservation begin at the local level, protecting this valuable resource for the communities we serve. Our operations team oversees our local water management processes.

2021 Water Consumption by Basin

	Eagle Ford Shale	Haynesville Shale	Marcellus Shale	Powder River Basin ⁽¹⁾
Total freshwater consumed (bbl) ⁽²⁾	3,952,365	37,772,932	22,784,174	462,108
Total non-freshwater consumed (bbl)	–	3,378	3,736,461	1,688
Total water consumed (bbl)	3,952,365	37,776,310	26,520,635	463,796
Freshwater intensity rate (bbl/EUR boe)	0.32	0.25	0.09	0.22

Chesapeake works to responsibly manage and meter our water, both in sourcing and usage. Whenever possible, we use non-potable water sources for our drilling and completions needs, sourcing from private landowners, municipalities, regional water districts and river authorities. We work closely with federal, state and local agencies to evaluate and permit our freshwater usage.

Some of our operating areas, such as the Eagle Ford Shale, periodically experience varying levels of drought or water scarcity. We monitor drought level indications as published and updated quarterly by the U.S. Geological Survey (USGS) and through the World Resources Institute (WRI)'s Aqueduct Water Risk Atlas.

In 2021, none of our total freshwater used was sourced within regions classified as high or extremely high water-stress areas when studied annually according to the WRI water risk assessment tool.

Produced Water

We follow best practices regarding wastewater disposal, considering recycling or reuse according to the capabilities and conditions of each business unit. We do not directly discharge produced water or hydrocarbon volume to surface water.

2021 Produced Water Production/End of Life by Basin

	Eagle Ford Shale	Haynesville Shale	Marcellus Shale	Powder River Basin ⁽¹⁾
Volume of produced water generated (bbl)	8,185,782	18,454,433	2,049,321	5,993,952
Amount of produced water injected (bbl, %)	9,997,669 100%	21,191,239 99%	0 0%	5,992,264 99%
Amount of produced water recycled (bbl, %)	0 0%	3,378 0.15%	3,736,461 100%+ ⁽²⁾	1,688 0.03%

When injection is necessary for disposal, we carefully select and monitor our disposal contractors to help ensure their practices meet our robust internal standards for well-siting and the safe injection and disposal of produced water. We also adhere to all state and federal laws regarding underground injection control (UIC) well disposal.

Seismicity and its correlation in certain locations to injection wells is the topic of several ongoing scientific studies. Chesapeake supports science-based research on this subject, and we participate in industry organizations that analyze this issue.

Water Recycling Efforts

Chesapeake was one of the first of our peers to have a dedicated water recycling program and we continue to evolve our broader water recycling efforts. We use AXP's water recycling definition: water produced in the field and reused by field operations

Our innovative Marcellus operations team is helping us deliver on our commitment to recycle 100% of our produced water in Pennsylvania. Previously we had to store water or transfer it to another state for disposal — now we can reuse our produced water for completions activities. Not only does this remove the need for disposal, but it also reduces our local freshwater usage.

We have also developed a produced water sharing program with other operators in the Marcellus basin. Through this program, we enter into mutual sharing agreements with local E&P companies and accept their produced water for use in our completions jobs. Since forming this program in 2020, interest has quadrupled. This efficient reuse benefits the local operators as we provide them with alternatives to disposal and it also significantly reduces water hauling truck traffic.

In 2021, Chesapeake recycled 157 million gallons of produced water, including 100% of our produced water in the Marcellus Shale.

Water Management Best Practices

As part of our commitment to best practices, we collaborate with our peers to share our key learnings and innovations to improve lifecycle water use and management.

We're actively involved in the Energy Water Initiative (EWI), regional water committees and conversations with the Environmental Defense Fund to discuss emerging topics and promote best practices to improve water management as an industry.

<p>Well Planning and Construction</p> <ul style="list-style-type: none"> • Conduct thorough site assessment, including wetlands and floodplain delineations • Perform baseline water quality assessment in all operating areas • Install 3 – 5 layers of steel well casing and cement for well integrity • Incorporate secondary containment • Comply with local, state and federal regulations 	<p>Well Acquisition</p> <ul style="list-style-type: none"> • Seek to use non-potable water first • Permit withdrawals from freshwater sources • Certify the environmental and safety performance of all suppliers before work • Comply with local, state and federal regulations
<p>Storage and Transportation</p> <ul style="list-style-type: none"> • Store produced water in API-certified tanks made of either steel or fiberglass • Coat tanks and use sacrificial anodes to resist corrosion • Transport by pipeline when and where feasible • Comply with local, state and federal regulations 	<p>Recycle, Reduce or Dispose</p> <ul style="list-style-type: none"> • Recycle produced water and evaluate freshwater use alternatives • Transfer produced water via pipelines, when possible • Participate in peer committees and academic research to increase knowledge and improve water stewardship efforts • Comply with local, state and federal regulations

Using Pipelines Reduces Spills and Emissions

One example of a best practice is transferring water via pipelines instead of trucks. Using pipelines reduces operational costs, avoids spills and minimizes truck traffic (including the associated road wear and tailpipe emissions). Pipelines also encourage water reuse by allowing the transfer of produced water between sites.

In 2021, we transferred 8.21 million barrels of produced water through pipelines, removing the need for 68,384 truckloads to drive on local roads. This is the equivalent of more than 1 million vehicle miles.

Water Sampling

Chesapeake's robust approach to groundwater protection includes pre- and/or post-drill water quality sampling as appropriate. We comply with state regulations and lease obligations that require sampling, and we conduct risk-based sampling to further safeguard ground and surface water during operations.

Independent, third-party consultants collect landowner water samples near our production sites, which are then analyzed by a state or nationally accredited laboratory. We test water supplies for a predefined set of parameters, including general water quality indicators, biological parameters, metals, dissolved gases and petroleum constituents. Landowners receive an analytical data package that includes fact sheets, links to appropriate state environmental agency websites and the EPA Water Systems Council WellCare Hotline.

We use a risk-based approach to inform pre-drill water sampling (in addition to any regulatory requirements). Pre-drill water sampling is conducted at least three months before beginning drilling activities. Post-drill water sampling is not required by local regulatory agencies in the areas where we operate; however, we perform this analysis based on lease requirements or risk-based need.

Once sampling results are analyzed and shared with the landowner and regulatory bodies, where required, we store the results in an electronic data management system. This extensive water quality database, coupled with our operational knowledge, aids our decision-making on where and when to sample in the future.

In total, we've acquired more than 46,000 water samples to increase our understanding of the water quality in the areas where we operate.



(1) As of March 2022, Chesapeake has divested its interests in the Powder River Basin. We included the basin's data in this reporting due to our ownership in 2021.

(2) In accordance with the U.S. Geological Survey, freshwater is defined as water that has less than or equal to 1,000 mg/l total dissolved solids. We source freshwater from surface water and private groundwater partners in accordance with permitting and lease agreements.

(3) Total includes reused produced water provided by other operators through water sharing agreements.