Environmental Management Disposal Facility

Water Quality Protection for Bear Creek

U.S. DEPARTMENT OF ENERGY

The ability to dispose of cleanup waste onsite has been fundamental to the success of the U.S. Department of Energy's (DOE) environmental management mission on the Oak Ridge Reservation (ORR). With the current disposal facility nearing capacity and significant cleanup remaining, the need for a new onsite facility is imminent.

The proposed facility, known as the Environmental Management Disposal Facility (EMDF), will allow DOE to maintain its cleanup momentum on the ORR, enhancing safety and enabling science and national security missions.

DOE has worked collaboratively with the U.S. Environmental Protection Agency (EPA) and Tennessee Department of Environment and Conservation (TDEC) on a science-driven approach to identify a suitable location for the facility. The selected site presents the best location on the ORR for a safe and protective facility.

Setting Protective Limits for Bear Creek

Bear Creek is located within the Oak Ridge Reservation (ORR). It runs 7.5 miles through Bear Creek Valley from its headwaters within the Y-12 National Security Complex. It is fed by numerous streams along the length of the creek. Bear Creek joins with East Fork Poplar Creek, then flows into Poplar Creek, and eventually enters the Clinch River.

DOE will treat all contaminated wastewater and leachate from EMDF prior to discharge into Bear Creek. The treatment will include, at a minimum, chemical flocculation/precipitation and sediment removal. DOE will conduct secondary treatment as necessary to ensure compliance with all regulatory limits and full protection of human health and environment. Protective levels have been set for radionuclides that may potentially be in the landfill wastewater. Radionuclide levels will be directly measured in contaminated wastewater and leachate, fish, and surface waters. These measured values will be compared to regulatory limits and newly developed fish tissue and surface water values (preliminary remediation goals [PRG]) that ensure protection of public health. (For more information on these values, and how they are calculated visit ucor.com/EMDF.)

Fishing does not usually occur in Bear Creek due to its restricted location on the ORR and the low number and small size of fish in the stream. However, to ensure the highest protection, PRGs for radionuclides in EMDF wastewater to be discharged into Bear Creek are established at levels that will be safe for recreational fishing.

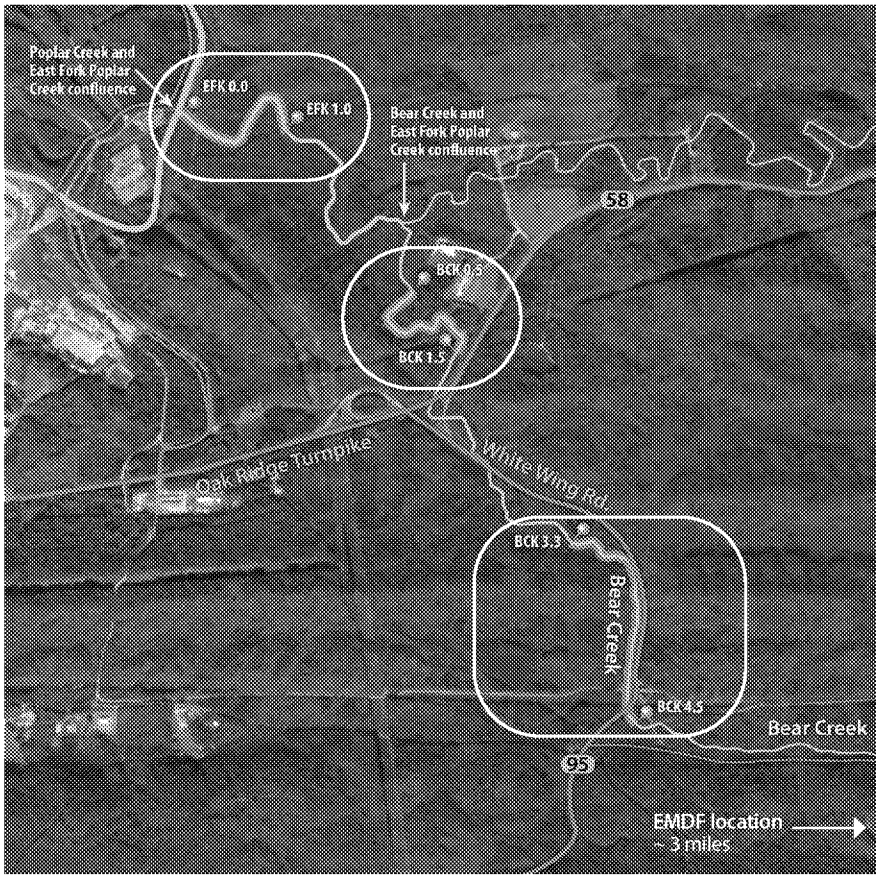
Conducting the Fish Study

While fishing is not permitted on the ORR, public access may be possible at a few locations. With that in mind, three locations were identified where a recreational fisher could potentially fish in Bear Creek.

The three locations included:

- Intersection of Bear Creek Road and Highway 95 (Bear Creek Kilometer [BCK] 3.3 - 4.5)
- Points where bridges cross Bear Creek along a greenway trail (BCK 0.5 - BCK 1.5)
- The confluence of East Fork Poplar Creek with Bear Creek (East Fork Kilometer [EFK] 0.0 to EFK 1.0)

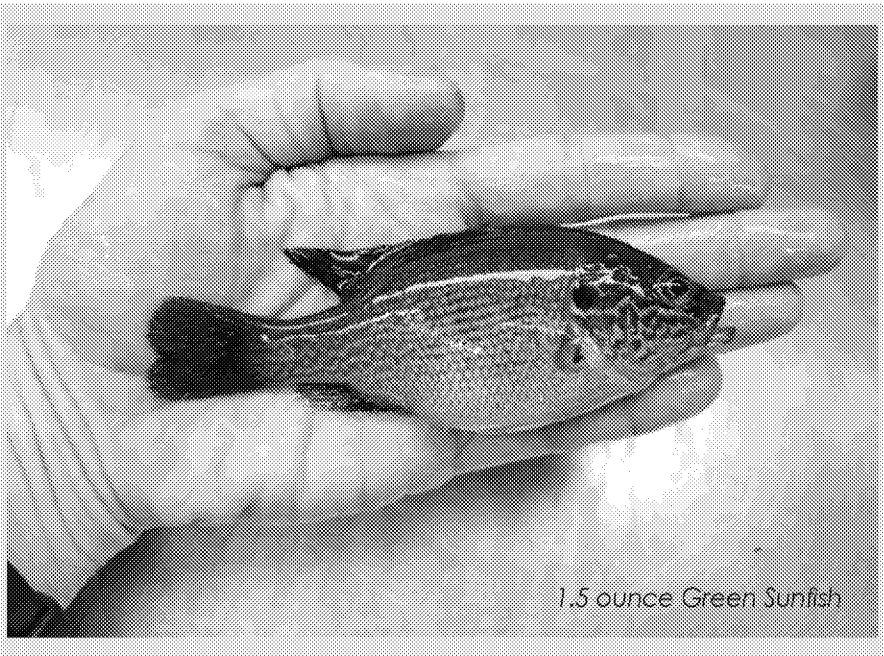
DOE performed fish community surveys at each of these locations to determine the number of fish larger than one ounce. The data assists in determining potential fish consumption rates specific to Bear Creek. As expected, the number of fish greater than one ounce are more numerous in the downstream locations.



EMDF fish tissue and surface water preliminary remediation goals are established at levels safe for recreational fishing.

Of the 130 fish obtained during initial sampling, 89% had an average weight of less than 1.5 ounces.

The largest fish captured weighed less than 7 ounces.



1.5 ounce Green Sunfish

Verifying Safe Operations through Sampling

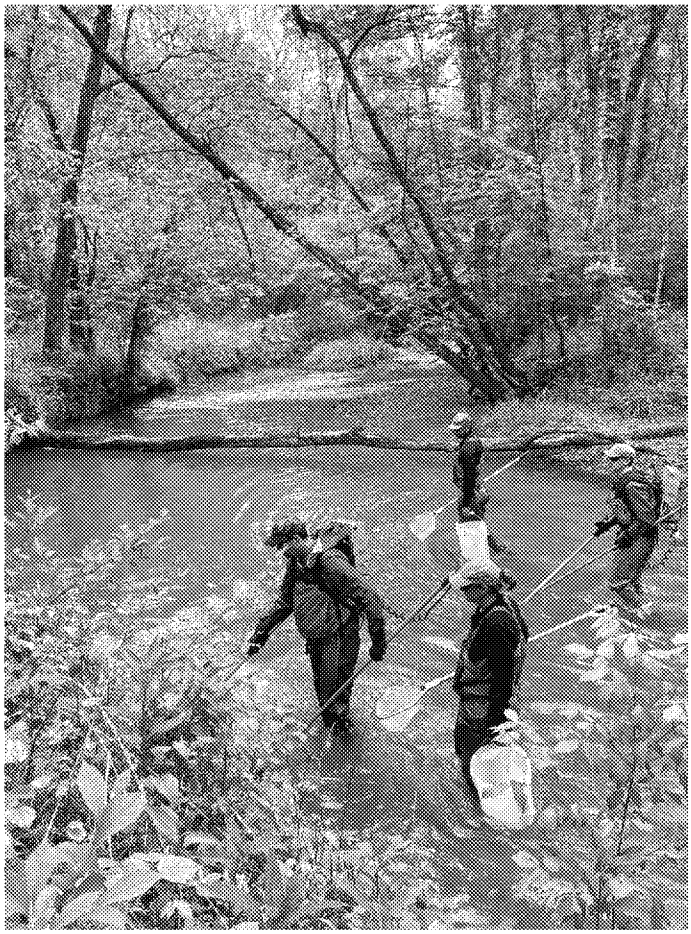
DOE collected fish to baseline and study environmental conditions in Bear Creek in Spring 2021. Laboratory analyses of the fish collected at the sample locations show little to no radiological contamination. The measured values are nearly identical to values found in local streams where no DOE discharges occur. The results indicate the detected isotopes are likely naturally occurring rather than due to legacy contamination in Bear Creek.

Fish tissue and surface water values for radionuclides have been calculated for the EMDF to be protective of recreational fishing, specifically fish consumption. These calculations assume that a single individual repetitively consumes 225 ounces of fish (approximately 28 meals) per year for 26 years.

Though not expected, if future fish monitoring identifies fish tissue levels approaching protective limits, DOE will implement additional protection measures. These could include enhanced water treatment prior to discharge and restricting waste streams bearing contaminants of concern to EMDF.

All data obtained from fish sampling will be available to the public, and information on any significant changes in landfill wastewater management will also be available for public review.

The measured radionuclide values are nearly identical to values found in local streams where no DOE discharges occur.



Team collecting samples in Bear Creek

Summary

Based on the results of fish tissue sampling, current discharges to Bear Creek do not pose a risk to the environment or recreational activities near the ORR. Analytical results found little impact to fish in the stream from operations at DOE's existing waste disposal facility. Fish community surveys indicate fish populations and fishing opportunities are much more limited upstream, near DOE's waste facility.

DOE, EPA, and TDEC have agreed to require that all contaminated wastewater and leachate will be will be treated prior to discharge to surface water to ensure state and federal requirements and preliminary remediation goals are met. Assurance of protectiveness will be provided by direct monitoring of fish tissue and water.

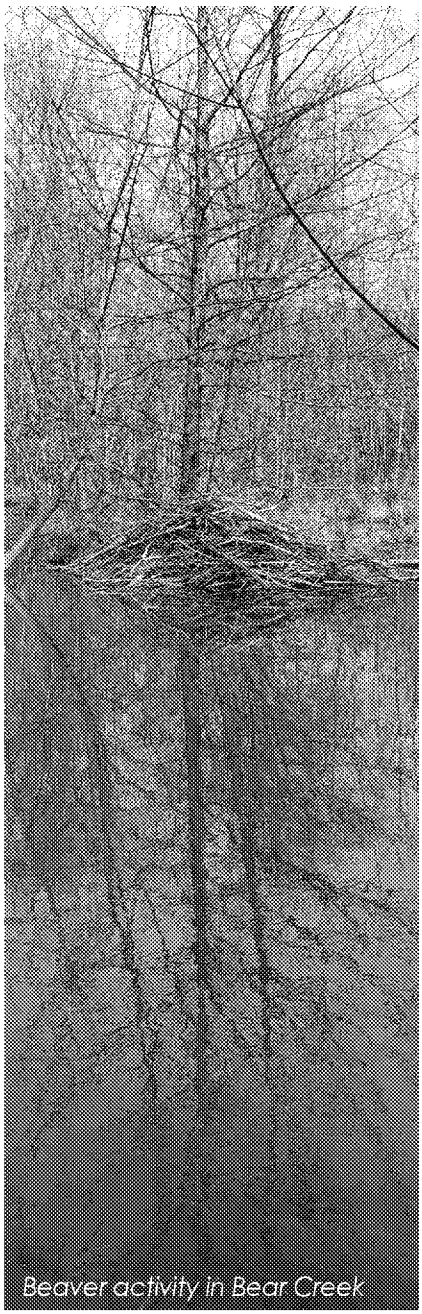
Mercury Discharge Limit

To ensure Bear Creek waters are protected from mercury, DOE is applying the following approaches:

1. Limit EMDF discharges to no more than 51 parts per trillion using the following approaches:
   - Minimize mercury content of waste to minimize mercury content in landfill wastewater. The proposed EMDF waste acceptance criteria limits the acceptance of mercury containing waste. DOE will send elemental mercury offsite and mercury containing waste receipts will be restricted to below Resource Conservation and Recovery Act hazardous mercury concentrations.
   - Treat landfill wastewater, as necessary, to meet the mercury 51 parts per trillion recreational ambient water quality criteria.
2. Due to Bear Creek's current conditions and listing as an impaired stream, the state's antidegradation rule applies. This rule prohibits additional loading of bioaccumulative pollutants into the stream such as methylmercury or PCBs.

   DOE, EPA, and TDEC agree to a comprehensive mercury strategy addressing the impairment of Bear Creek. Key elements include but are not limited to:

   - An evaluation to explore factors causing methylation and leading to further actions depending on the impairment.
   - Any subsequent course of action subject to a compliance schedule.
   - Inclusion of a requirement that does not merely reduce additional loading but also restores the stream to the designated recreational use. This could involve addressing non-point sources as opposed to only implementing more and more treatment technologies.



Beaver activity in Bear Creek

DOE will accept written comments on the EMDF fact sheets any time from May 2 to May 31, 2022. DOE considers and responds to every comment it receives in a responsiveness summary that details how it affected the final decision. You may submit your comments to:

Mr. Roger Petrie,
OREM Regulatory Affairs
DOE Oak Ridge Operations
P.O. Box 2001
Oak Ridge, TN 37831

OR

OakRidgeEM@orem.doe.gov

U.S. DEPARTMENT OF ENERGY | OAK RIDGE OFFICE OF ENVIRONMENTAL MANAGEMENT