Onondaga Lake, NY

Granular Activated Carbon Helps Restore One of America's Most Challenging Cleanup Sites

The Onondaga Lake cleanup is the result of more than two decades and millions of hours of intensive efforts. Today, the New York State Department of Environmental Conservation (DEC) and the U.S. Environmental Protection Agency (EPA) are overseeing a sophisticated remediation effort in cooperation with the site's responsible party. Thanks in part to the use of granular activated carbon (GAC) and reactivated carbon supplied by Calgon Carbon Corporation, the lake and its adjacent wetlands are springing back to life.

Project Profile

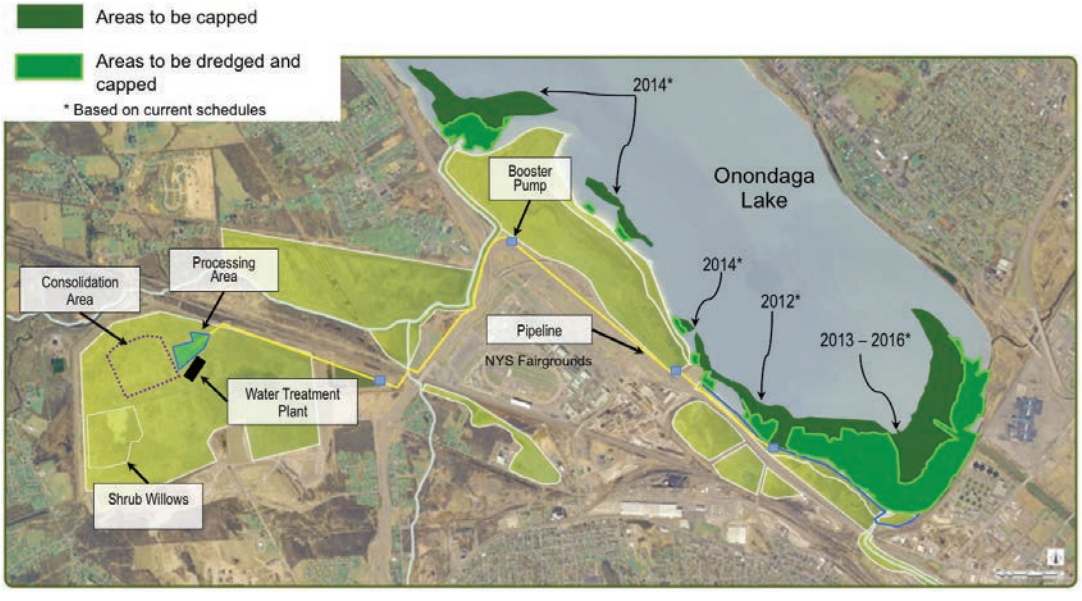
Located in central New York, along the northwest edge of Syracuse, Onondaga Lake covers about 4.6 square miles. The two largest tributaries are Nine Mile and Onondaga creeks. The lake also is fed by surrounding brooks and streams, as well as treated water from the Onondaga County Metropolitan Wastewater Treatment Plant.

For more than 125 years, Onondaga Lake had been diminished by population growth, urban development, industrial activity, and residential and municipal waste. A remedial investigation completed in 2002 determined that elevated levels of contaminated material were found in the water, fish and sediment.

Three years later, in 2005, the DEC and the EPA issued a comprehensive Onondaga Lake Cleanup Plan designed to restore the lake through the implementation of four major projects, including:

- Creation of a 1.5-mile barrier wall along the shoreline to prevent migration of contaminants from old industrial sites into the lake and to collect water for treatment
- Removal of up to 2 million cubic yards of sediment and installation of an isolation cap covering 450 acres of lake bottom to seal in remaining contaminants
- Creation of a sustainable habitat along the shoreline to encourage recreational opportunities and wildlife growth, including the addition of about 1.1 million new plants, trees and shrubs
- Implementation of an ongoing maintenance, monitoring and operation program to ensure the protectiveness of the remedy.

The cleanup plan now underway is considered one of the biggest projects of its kind in the country.



The lake cleanup project includes the creation of a barrier wall to prevent migration of contaminants, the removal of sediment from the lake, the creation of an isolation cap, and the encouragement of new wildlife growth along the shoreline.

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Water Treatment

Water treatment at Onondaga Lake is taking place in two separate operations. The first began in 2004 with the construction of the barrier wall and groundwater collection system that prevents contaminated groundwater from reaching the lake. Collected groundwater is pumped to a treatment facility for cleaning and sent to the lake after it has been tested to achieve DEC standards. This treatment facility, designed and built by Syracuse-based engineering firm O'Brien & Gere (OBG), is equipped with two Calgon Carbon Model 8 systems that consume 80,000 to 100,000 pounds of FILTRASORB® 300 high-activity GAC per year.

The second operation, which was initiated in 2012, treats water removed as part of the dredging operations from the bottom of Onondaga Lake. The system features three hydraulic dredges that will eventually vacuum more than 2 million cubic yards of contaminated sediment from the lake.

As water and sediment are removed, contaminated material is pumped via a double-walled pipe through non-residential areas to a sediment consolidation area (SCA) – a landfill located at one of the lake's former industrial properties – where it is processed to remove stones and debris, and thickened to separate the lake water from the sediment.

After that, the sediment is placed in geotextile tubes where it is dewatered at a flow rate of about 6,000 gallons per minute. It then goes through the following four-step treatment process at an on-site water treatment facility operated by OBG:

1. pH adjustment to remove heavy metals
2. Flocculation and clarification to remove solids
3. Multimedia filtration to capture remaining solids and metals
4. Circulation through eight pairs of carbon absorber vessels equipped with custom reactivated carbon to remove benzenes, hydrocarbons and other volatile and semi-volatile organic compounds.

Once on-site processing is complete, treated water is sent to a local municipal wastewater facility where it undergoes final polishing for ammonia before it is returned to the lake.

Brian White, vice president of environmental services for OBG, said GAC was specified as the adsorption media after extensive testing of contaminated sediment drawn from Onondaga Lake. "Calgon Carbon was selected as a carbon supplier for this project based on its ability to meet the project requirements, including quantity demands and reactivation capabilities," he explained.

Don Ivey, senior technical sales representative for Calgon Carbon, is responsible for meeting OBG's demands. He said OBG is currently renting four Calgon Carbon Model 10 GAC adsorption systems for supplementary water treatment, and purchasing increasing amounts of reactivated GAC. "In 2013, we custom-reactivated more than 1 million pounds of granular activated carbon for this operation. We expect that figure to increase as the dredging operation produces more material for treatment," he explained.

OBG reports that performance criteria for the treated effluent are being met.

Contaminated water from the lake is sent to a sediment consolidation area where it is processed to remove stones and debris.

Lake Bottom Capping

GAC also is integral to the isolation cap that is being placed along 425 acres of shallow lake bottom. Designed and currently being installed by Parsons Corp., the cap (illustrated below) includes a chemical isolation layer consisting of sand; granular, sand-sized siderite particles; and Calgon Carbon's virgin FILTRASORB 400 GAC.

David A. Smith, Syracuse, New York, capping operations manager for Parsons Corp., said GAC was selected for the isolation layer based on its ability to work effectively with the cap material and to adsorb contaminants within the sediment. "We conducted extensive isotherm testing to assess the adsorptive capacity (of the GAC)," he explained. "Based on testing, additional modeling, and construction considerations, activated carbon was selected as the most effective and appropriate means to produce a long-term solution."

The cap isolates remaining sediments, creating a new clean lake bottom and habitat layer to promote underwater vegetation growth and fish spawning. It also helps neutralize elevated pH levels and maintains conditions conducive to long-term biological decay of contaminants within the cap.

Ivey said that because the lake cap, which has a carbon design life of 1,000 years, is designed to be a permanent solution for protecting the health and habitat of Onondaga Lake, it demands "the highest quality, highest activity virgin activated carbon produced from a reliable domestic source." Calgon Carbon will supply approximately 11 million pounds of FILTRASORB 400 GAC over four years for lake-capping.

Don Ivey, senior technical sales representative for Calgon Carbon, visits Onondaga Lake two to three times per month. He works directly with OBG, Parsons and CH2M Hill to schedule production and logistics for delivering five to six million pounds of virgin and reactivated GAC to three individual engineering operations during the eight months of active lake cleanup each year.

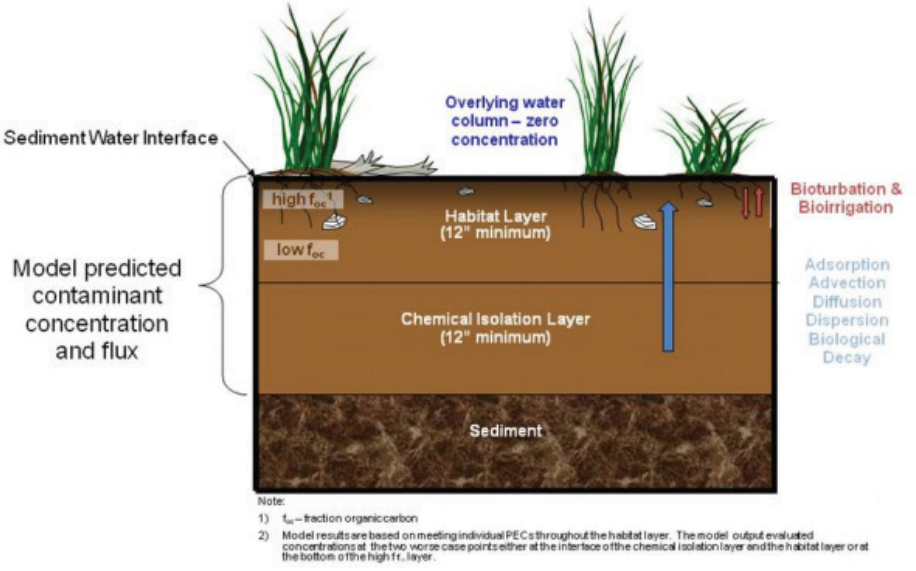
Progress Report

As of August 2014, about 1.1 million cubic yards of the cap material – 40 percent of the total – had been installed. In addition, nearly 2.7 billion gallons of lake water had been treated, and 1.8 million cubic yards of lake material — 90 percent of the project total — had been removed. Officials associated with cleanup also report that lake water quality is the best it has been in years.

"Quality control testing has indicated that the material is being installed according to design plans," said Smith of the lake capping project. "To date, production rates meet or exceed the anticipated rates."

Dredging work is expected to finish a year ahead of schedule in 2014, and the overall project is expected to be done in 2016.

Lake Bottom Isolation Capping



An isolation cap that includes a chemical isolation layer consisting of sand; granular, sand-sized siderite particles; and Calgon Carbon's virgin FILTRASORB 400 GAC is being installed along 425 acres of shallow lake bottom. The cap will seal in contaminants and create a new habitat layer.

Onondaga Lake, NY

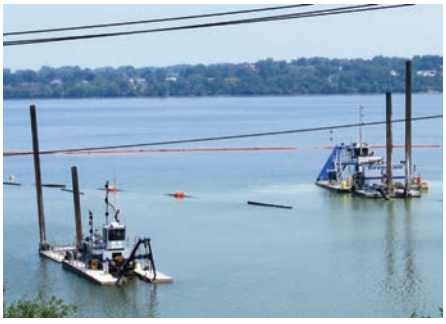
Advantages of FILTRASORB® GAC and Reactivated Carbon

Calgon Carbon is a global leader in the production of virgin and reactivated GAC as a media for air and water filtration. As a porous material, activated carbon removes organic compounds from liquids and gases through the adsorption process by attracting organic molecules, then binding and retaining them to the surface of its pores.

FILTRASORB granular activated carbon products by Calgon Carbon have been successfully applied for more than 40 years in applications such as wastewater treatment, water purification and industrial purification. They are 100-percent virgin GACs manufactured from select grades of bituminous coal through a process known as "reagglomeration" to produce a high-activity, durable, granular product capable of withstanding the abrasion associated with repeated backwashing, hydraulic transport, and reactivation for reuse.

Reactivated carbon offers the same advantages as virgin GAC for many applications while being more economical. Recycling by thermal reactivation meets environmental needs of minimizing waste, reducing carbon emissions and limiting the use of the world's resources, while reducing costs of activated carbon usage.

For more about the advantages of FILTRASORB GAC and reactivated carbon, or to learn more about Calgon Carbon's complete range of air and water filtration technologies, visit www.calgoncarbon.com or call 1-800-422-6713.



Hydraulic dredges, center, are expected to vacuum more than 2 million cubic yards of contaminated sediment from Onondaga Lake by the time that portion of the project is completed at the end of 2014. The overall work, including the addition of the lake bottom cap, is expected to end by 2016.

CalgonCarbon

3000 GSK Drive Moon
Twp, PA 15108 USA
Toll Free: 1-800-4CARBON
Phone: 412-787-6700
Fax: 412-787-6676
www.calgoncarbon.com
CCC-0000