



operation and maintenance

Carter Lake gate rehab project

By Mark Dowling

The final phase of a multi-year outlet gate rehabilitation project at Carter Lake was completed in November 2013. The two-phase project included removing and refurbishing two sets of gates.

Phase One: Operating gates refurbished

Carter Lake's original outlet – built in the early 1950s – was intended for large-volume water deliveries only during the irrigation season (April-October).

In 1995, Northern Water completed the Southern Water Supply Pipeline, which carries Carter Lake water year-round to cities and towns.

Year-round releases severely limited Northern Water's ability to repair the aging structure. A February 2004 inspection of the outlet revealed substantial erosion of the brass seals, and Northern Water and the U.S. Bureau of Reclamation began planning a new outlet designed for year-round use.

Completed in March 2008, the new \$12 million Carter Lake outlet provides operational flexibility and built-in redundancy, and it enabled work to begin on the original outlet. During spring 2011 crews removed, rehabilitated and reinstalled the twin operating gates.



An Associated Underwater Services (AUS) dive crew begins the inspection process to evaluate the condition of the gates.

Phase Two: Guard gates refurbished

In the project's second phase, the upstream twin outlet guard gates were removed and inspected. The gates were refurbished and installed in late 2013.

The gates had significant corrosion. They were sandblasted, welded and repainted. However, the brass seals on the gates and gate thimbles (steel framework housing the gates) were in perfect condition, and did not require replacement.



Corrosion on the left guard gate



Workers repair gate



Refurbished operating gate

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Headquarters dry run

To temporarily drain – or “de-water” – the tunnel leading from Carter Lake to the gates (enabling the gates to be removed), a bulkhead or plug was created for the intake to keep water out of the tunnel.

This part of the project required a dry run – literally.

In Northern Water’s Berthoud headquarters parking lot, crews from Northern Water and Associated Underwater Services (AUS) of Spokane, Washington simulated setting the 4,200-pound bulkhead in a wooden replica of the intake structure.

Once the dry run was completed, the real work began.

An AUS team dove to a depth of nearly 80 feet to install the bulkhead over the original outlet’s intake structure. The dry run paid off: when the bulkhead was placed over the intake, it sealed completely.

Crews then de-watered the outlet works and hoisted the upstream guard gates to the top of the dam via a 170-foot vertical shaft. Northern Water refurbished the gates, put them back in place, removed the bulkhead and refilled the tunnel with water.

Northern Water staff, including operations and maintenance, engineering, facilities, purchasing and management assisted with this \$322,000 project.



Carter Lake

Temporary Bulkhead
(placed for maintenance)

Inlet Structure

Guard Gates
(Always open unless maintenance is performed on the operating gates)

Valve House

Dam #1

Operating Gates
(Regulates flow)