



Spillway and Outlet Works Design

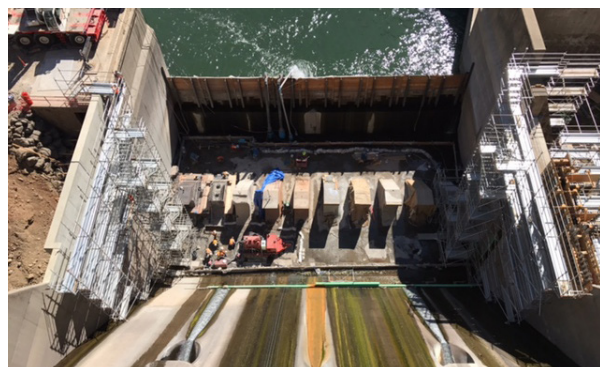
Dam spillways and outlet works are vital for the safety of dams. They pass flows that could otherwise result in unplanned overtopping and allow timely reservoir drawdown. Historically these “appurtenant structures” have not been fully assessed due to regulatory focus only on failure modes leading to dam breach. However, recent events are resulting in a change to this approach. It is no longer adequate to simply understand the condition of spillway radial gates.

Black & Veatch assesses other aspects of dam hydraulic structures, such as impacts of debris and sedimentation on capacity; spillway chutes; energy dissipation; aging of outlet valves and conduits; and downstream channel constraints. We understand that for a dam to safely serve its intended purposes, each component must operate reliably and in harmony with the entire reservoir and watershed system. This requires regular condition assessment, risk evaluation, regular assessment of operation and maintenance, and sometimes capital projects to mitigate unacceptable risks.



Spillway

Recent events have revealed that spillways must do more than simply pass a pre-determined flood flow past a control structure. Each element must be as designed to ensure the safety of those downstream including the chute and energy dissipation structure.



PG&E Pit 6 Stilling Basin Repair

Outlet Works

Maintaining outlet capacity is vital to downstream use, such as water supply, power generation and environmental management. Because most outlet features are typically submerged, evaluating their condition is often deferred. Black & Veatch has the experience to help evaluate the condition of outlet works from intakes through discharge pools to identify if required operational scenarios can be met under both normal and extreme hydraulic conditions.



HHWP Cherry Outlet Works Rehabilitation

Recent Projects

- Lower Occoquan Dam Rehabilitation, Fairfax Water, VA
- Summit Lake Holiday Spillway Rehabilitation, Lake Holiday Country Club, VA
- Pit 3 Crest Gate Replacement, PG&E, CA
- Pit 7 Flip Bucket Repairs, PG&E, CA
- Fall River Weir Spillway Section Replacement, PG&E, CA
- Pit 6 Stilling Basin Repair, PG&E, CA
- Twin Falls Hydropower Redevelopment, WE Energies, WI
- New Bullards Bar Radial Gate Access, Yuba Water Agency, CA
- Lake Wohlford Dam Replacement, City of Escondido, CA
- McCloud Dam Chute Repairs, PG&E, CA
- Hell Hole Seasonal Storage, Placer County Water Agency, CA
- Tiger Creek Regulator Dam, PG&E, CA

Recent Projects

- Pit 5 Open Channel LLO Abandonment, PG&E, CA
- McCloud LLO Outlet Gate Actuator Replacement, PG&E, CA
- Lyons LLO Modifications and Automation, PG&E, CA
- Cherry Outlet Works Rehabilitation, Hetch Hetchy Water and Power, CA
- Kerckhoff LLO Outlet Gate Actuator Replacement, PG&E, CA
- Chili Bar LLO Hydraulic System Replacement & Gate Remediation, PG&E, CA
- LL Anderson LLO Modification, PCWA, CA
- Bucks/Grizzly Outlet Flow Modifications, PG&E, CA
- Tiger Creek Afterbay LLO Gate Remediation, PG&E, CA
- Lake Wohlford Dam Replacement, City of Escondido, CA
- O'Shaughnessy Outlet Modifications, Hetch Hetchy Water and Power, CA