

John Day Lift Gate Evaluation

John Day Lock and Dam, Oregon

Owner: USACE, Portland District

Description: The John Day Navigation Lock utilized a steel navigation lock lift gate which is 90 feet wide by 113 feet high, with a maximum heat of 125 feet. The gate is constructed of a series of horizontal bowstring trusses with a skin plate on the upstream side, and the trusses are spaced so that each truss receives approximately the same load. There has been many problems with welds and members cracking since 1963, when the lift gate was put into service. The gate was originally not accepted as constructed and required significant weld testing and repairs.

INCA Engineers, Inc., A Tetra Tech Company (INCA) prepared an investigative report for the evaluation of cracking in the downstream John Day Navigation Lock lift gate. Cracks were located in the tension ties at the vee joint connections to the arch ribs and at the welded intersection of bracing members and diaphragm edge stiffeners. INCA evaluated the condition of the gate and provided recommendations for immediate and long-term repairs.

INCA reviewed historical data (hydrostatic and hydrodynamic as well as lifting forces), compared Ice Harbor and John Day Dams design and cracking problem similarities, and developed a reliability assessment to determine the existing gate's remaining life. INCA provided an assessment of the existing gate condition and provided recommendations for any required emergency repairs. A 3D finite element model was developed to assess the level of stress in the members. INCA developed cost estimates for maintaining the existing gate, modifying the existing gate, and constructing a new gate.

INCA's investigative report detailed:

- ▶ Future monitoring methods
- ▶ Procedures to arrest existing member cracking
- ▶ Repair procedures
- ▶ The existing gate's estimated remaining life
- ▶ An estimate of the remaining gate life with gate modifications

