Tracy Research Technical Report Abstract

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A 1:3 Froude-scale model study of the primary bypass transitions at Tracy Fish Collection Facility (TFCF) was conducted to identify and develop design improvements that sustain or improve existing hydraulic performance. The TFCF is located at the southern end of the Sacramento-San Joaquin Delta. Replacement of the primary bypasses has been scheduled for 2004 and was recognized as an opportunity to improve primary bypass performance and consequently the overall salvage efficiency of TFCF. Computational Fluid Dynamics (CFD) modeling was used to pre-evaluate alternatives for physical modeling and proved to be a valuable method in efficiently selecting, developing and demonstrating the final modification selected for field implementation. The results of this study allowed for identification and proof-of-concept for a bypass transition modification that eliminates the need for turning vanes to generate near-uniform velocity profiles at the bypass entrance. The selected concept includes modified cross-sectional geometry for the existing bypass transition using a choke or tapered-vertical constriction within the bypass transition that effectively increases the flow resistance near the bottom of the bypass to redistribute sink potential and produce improved uniformity of velocity distributions at the bypass entrances. The minimum cross-section width was maintained at the existing primary bypass entrance width of 6 inches. The advantages of such a modification include minimizing debris fouling within the bypasses by excluding the need for turning vanes and hence eliminating the need for extensive cleaning while at the same time ensuring adequate uniformity of entrance velocity profiles over the full range of hydraulic operating conditions at TFCF.