

RECLAMATION

Managing Water in the West

Plant Condition Monitoring

Research and Development Office
Science and Technology Program
Final Report ST-2016-2879-01



U.S. Department of the Interior
Bureau of Reclamation
Research and Development Office

9/26/2016

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188		
T1. REPORT DATE Oct. 2016		T2. REPORT TYPE Research		T3. DATES COVERED FY14-16	
T4. TITLE AND SUBTITLE Plant Condition Monitoring			5a. CONTRACT NUMBER 16XR0680A1-RY1541RE201422879		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER 1541 (S&T)		
6. AUTHOR(S) James DeHaan, 303-445-2305, jdehaan@usbr.gov Bryan Hampson, 303-445-2259, bhampson@usbr.gov			5d. PROJECT NUMBER 2879		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER 86-68450		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) James DeHaan Hydropower Diagnostics and SCADA Group U.S. Department of the Interior, Bureau of Reclamation, PO Box 25007, Denver CO 80225-0007			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Research and Development Office U.S. Department of the Interior, Bureau of Reclamation, PO Box 25007, Denver CO 80225-0007			10. SPONSOR/MONITOR'S ACRONYM(S) R&D: Research and Development Office BOR/USBR: Bureau of Reclamation DOI: Department of the Interior		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S) ST-2016-2879-01		
12. DISTRIBUTION / AVAILABILITY STATEMENT Final report can be downloaded from Reclamation's website: https://www.usbr.gov/research/					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Previous research in plant condition monitoring produced a system which quantifies generator operation characteristics. This system has helped Reclamation facilities better predict maintenance requirements; avoiding several million dollars of unnecessary, unscheduled outage costs. This research effort focused on making the system more reliable and easier to use by reworking the system software and creating a standardized operations and maintenance manual.					
15. SUBJECT TERMS Condition Monitoring, Vibration, Predictive Maintenance					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT U	18. NUMBER OF PAGES 1	19a. NAME OF RESPONSIBLE PERSON –James DeHaan
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER 303-445-2125

PEER REVIEW DOCUMENTATION

Project and Document Information

Project Name Plant Condition Monitoring WOID Z2879

Document Plant Condition Monitoring

Document Author(s) James DeHaan Document date 10/31/2016

Peer Reviewer Nathan Myers

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Reviewer _____ Date reviewed _____
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Executive Summary

Excessive hydro-turbine generator shaft runout, also called vibration, is an indicator for multiple conditions which can damage or destroy the generator, turbine or facility. Consequently, monitoring shaft runout has become a standard practice in the hydropower industry.

While multiple commercial monitoring platforms exist, the Bureau of Reclamation's (Reclamation) facilities have experienced unsatisfactory results with these systems due to hardware and software restraints as well as long-term engineering support issues. Reclamation's Technical Service Center (TSC) created its own platform by developing custom software and using commercially available sensors and hardware. The pilot program for this system proved it to be immediately useful and cost-effective, it also highlighted the need to improve the system's reliability and ease-of-use.

The system's original software structure was determined to be the root of its instability. Running data collection and data viewing processes in the same application caused the system to cease recording data whenever the application crashed; which occurred intermittently every few months. The new version of the software, finalized and released to pilot facilities this year, has separated the data collection process as a self-monitoring service while the viewer runs as an application. This configuration has already demonstrated improved reliability with the added benefit that multiple data viewer applications can run simultaneously on local and remote workstations.

Another key advancement this year is a set of user manuals developed alongside the new software. These manuals were combined with a system introduction document to create a generic Operation and Maintenance (O&M) Manual for use by the facilities. This manual, which will serve as the main body of this report, has been released in draft form to specific facilities for feedback before finalization.

The advancements accomplished in this year's research lay the groundwork for expanding this system from a pilot program to a Reclamation wide asset. Future research will focus on improving system security for North American Electric Reliability Corporation (NERC) – Critical Infrastructure Protection Committee (CIP) compliance and releasing system software to the wider hydro-power industry. Creating a self-sustaining support base for the program in the industry will help reduce burden on Reclamation.