



MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

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TO: Commissioners Simpson, Brown, Helgeson, Manning and Mital
FROM: Roger Kline, Generation Manager, and Mike McCann, Carmen-Smith Project Manager
DATE: May 21, 2013
SUBJECT: Carmen-Smith Substation Relocation Project
OBJECTIVE: Information Only

Issue

At the March 5, 2013 EWEB Board Meeting, staff were asked to prepare an analysis of the process and timing for moving the transformers associated with the Carmen substation off of the powerhouse roof deck and away from the McKenzie River (Trail Bridge Reservoir).

Background

The Carmen substation is located on the river side of the roof deck of the Carmen powerhouse. It has been there since facility construction. The substation contains two step-up transformers, each of which contains roughly 7,000 gallons of mineral oil, and four potential transformers, each of which contains roughly 23 gallons of mineral oil, among other electrical devices. The roof deck was originally constructed in the early 1960s to drain rainwater directly to the river. In the late 1970s, the roof drainage system was modified in response to new EPA regulations to capture all runoff from the roof and direct it through an 8,000-gallon underground storage tank modified to function as an oil/water separator. A thirty-inch high concrete wall surrounds the substation on three sides and a six-inch high aluminum plate is present on the fourth side, facing the roadway and generator air housings. The substation containment system meets current EPA regulations for spill prevention and containment, and is further specified in EWEB's Oil Spill Prevention, Containment and Countermeasures (OSPCC) Plan for the Carmen-Smith facility.

As part of the Carmen-Smith relicensing process, EWEB staff evaluated the condition of the Carmen substation and determined that the components, including the step-up transformers, were at or near the end of their useful life and should be replaced. Staff subsequently included the replacement of the transformers in EWEB's 2006 Final License Application (FLA) to FERC.

EWEB staff began the planning process for replacing or relocating the Carmen substation in 2010 by completing an assessment of the current substation equipment and an evaluation of potential alternatives. Current code requirements for new construction require larger clearances (spacing) than were required for the original (existing) design, as well as rupture and blast protection for the transformers from each other in the event of a failure. In situations where it is not possible to achieve these clearances, the code allows engineered "blast wall" to be installed in between two

transformers. As part of the preliminary design analysis, staff determined that neither configuration is possible within the current substation footprint.

In 2011, the substation analysis was further developed with the completion of an in-house substation alternative evaluation report that used a triple bottom line (TBL) analysis. This report considered three alternatives including replacement on an expanded footprint on the powerhouse roof deck and replacement at a location up the hill and away from the river (two alternatives with differing equipment configurations). The TBL analysis involved investigation of social, economic and environmental impacts and benefits. Additionally, technical feasibility of each option was investigated. The options were scored using a weighted scale for each category. The expected cost for the three options ranged from \$7.59M to \$8.65M, using the information available at the time. The evaluation team concluded that the most economic, most reliable and most environmentally friendly option was to construct a remote substation approximately 500 feet away from the Carmen Powerhouse. Staff subsequently began working on the design of the new substation in that location, and that design work remains underway.

Discussion

Staff looked at several options for replacement of the Carmen substation and reached unanimous agreement on the project team that moving the substation from its current location to new location off of the powerhouse roof deck and away from the river is the preferred alternative. It provides additional spatial area for a substation designed to today's standards and it moves a substantial amount of transformer mineral oil off of and away from the McKenzie River. Staff then began the process of finding the best location and layout for the new substation given site constraints and power distribution and transmission requirements.

Because the proposed location of the new substation is within the existing FERC project boundary but in an area that is currently undeveloped, the project requires an environmental assessment (EA) for evaluation under the National Environmental Policy Act (NEPA). NEPA assessments are required for most federal actions that affect or have the potential to affect the environment. For the Carmen-Smith Project, the FERC completed an EA in 2009 for the issuance of the new project license. This EA covers all actions contained in EWEB's 2006 FLA and the 2008 Settlement Agreement, including replacement of the Carmen transformers. Unfortunately, coverage (protection) under the FERC EA does not apply until after the FERC license for Carmen-Smith is issued. Consequently, EWEB is prohibited from initiating construction on the new substation until the FERC issues the new Carmen-Smith license.

Without FERC NEPA coverage, EWEB would be required to complete a separate NEPA EA under USDA Forest Service jurisdiction, including the funding or completion of separate environmental studies in support of the EA. A separate EA addressing the substation move, as currently envisioned, would take approximately two years to complete and cost EWEB between \$50,000 to \$75,000. EWEB approached the Forest Service regarding the completion of a separate EWEB-funded EA covering just the substation move and was told that Federal agencies can not undertake competing NEPA analyses for the same action in order to prevent inconsistencies in analysis and interpretation. Therefore, because the FERC EA covers the substation relocation, the Forest Service will not entertain a separate EA from EWEB.

This leaves EWEB with several options regarding the existing substation during the ongoing delay in the Carmen-Smith license proceeding. With the unit transformers and other substation equipment close to their end of life, increased monitoring and condition-based maintenance of the equipment will be needed in the coming years. EWEB staff is in the process of identifying additional monitoring and maintenance measures that can be used to extend the life of the equipment. One indicator of transformer condition is dissolved gas analysis (DGA) of the insulating oil. This analysis can be trended and trigger points for action identified based on IEEE standards. Staff has increased monitoring of the mineral oil in the two Carmen step-up transformers from annually to quarterly in order to provide a more frequent indicator of potential failure of the transformers. Additionally, online monitoring of this gas level is used at the plant for analysis. This will enable staff to take appropriate action to place operational constraints on a transformer or remove a transformer from service before failure, should an indication of future problems be detected. As an additional measure, in the event the end of life is imminent as shown through condition monitoring, the transformers can be reconditioned with an extended outage.

Staff looked at the potential for adding containment walls adjacent to or a structure over the transformers as additional protection against a catastrophic environmental release, and determined that the additional heat trapped by any structure would cause operational issues and further constraints on the units that do not appear to be warranted based on the current condition assessment.

Summary

EWEB staff has begun the process to relocate the Carmen substation off of the powerhouse roof deck and away from the river. This move will enable EWEB to construct a new substation to existing code and design standards that will serve the project for the next 50 years. The substation move is covered by FERC's EA for the new operating license and, consequently, construction cannot be initiated until after the new license is issued. The Forest Service has indicated that they cannot entertain a separate NEPA analysis on the substation relocation since FERC has previously filed their EA. This limits EWEB's options to monitoring and maintenance of the existing substation and to evaluating options that can be executed without a FERC license.

Staff do not believe that the current transformers are at immediate risk of catastrophic failure, but based on the age and environmental risk of failure of the units, have increased the frequency of monitoring of the transformers from annually to quarterly. This will enable staff to track performance issues should they develop. Staff can and will take measures necessary to repair or replace the transformers in-kind, as necessary, in order to keep the system operating safely prior to license issuance and subsequent substation replacement.

Recommendation

This memorandum is being provided for the Board's information only.

Requested Board Action

None.