

Process Control System (PCS) Upgrade - Phase 2



Project Purpose:

This project is summarized in the 2016 Liquid Processing Facilities Plan (LPFP) and was developed as part of the 2012 PCS Facilities Plan developed by CDM, which is referenced herein. The purpose of the project is to complete the upgrades recommended in the 2012 Facilities Plan.

Project History and Status:

Phase I of the PCS implementation schedule has recently been completed, and Phase II was originally planned to coincide with the upgrades to the east and west blowers, blower controls, and aeration system controls. At the time of the 2012 PCS Facilities Plan development, it was believed that these improvements would be implemented within the next 5-7 years. However, the Liquid Processing Facilities Plan indicates that the systems automated by these controllers will not be addressed by construction until 2020-2025.

The project will replace the remaining 10 Bristol Babcock DCU controllers that were left in place during the Process Control System Upgrade - Phase I. These are controllers that provide automation for secondary treatment systems. Bristol Babcock, the manufacturer of the Distributed Control Units declared these controllers obsolete as of 2011. Replacement parts for the controllers are no longer available. Configuring the controllers also relies on an operating system that has been obsolete since 2004 (Windows NT).

Therefore, the Phase II PCS upgrades are recommended to be completed as part of the “near term” LPFP upgrade project.

Main PCS Alternatives

CDM compared four main scenarios when identifying potential PCS upgrades for the entire plant:

- Scenario 1 - End Vision. This scenario identifies the desired system architecture for each process area and the Operations Building without consideration of existing installed hardware or monetary limitations.
- Scenario 2 - Replace in Kind with Upgrades. Scenario 2 provides for replacement of the obsolete Bristol DCON and DCUs with Allen-Bradley ControlLogix or Bristol ControlWave hardware.
- Scenario 3 - Focused Replacement in coordination with Established Capital Improvement Program (CIP). This scenario includes one approach for replacing/upgrading the PCS in process areas that will not see major capital improvements over the next 10 years and another approach for process areas that will undergo major capital improvements over the next 10 years.
- Scenario 4 - Continue Existing Maintenance Strategy and Purchase Spares (Do Nothing). Often called the Do Nothing scenario, Scenario 4 requires that MMSD's current strategies for maintaining the PCS continue and/or escalate.

The District selected Scenario 3, and developed a two-phase approach to full implementation of the PCS Facilities Plan.

Key Risks and Issues

The major risk associated with not doing the project in the near future is that a significant control failure could result with respect to the aeration systems, which could result in the potential of not meeting effluent limits or in losing treatment process efficiencies. Some of the equipment is obsolete already.

The original plan was to implement Phase II PCS upgrades prior to the year 2020 and at the same time as the related blower and aeration controls were upgraded at the plant. Since the activated sludge upgrades are likely not going to be completed for another 7-10 years (possibly longer), the risks of not completing the Phase II PCS upgrades in the near future will only become more likely over time.

Economic Analysis

Costs were developed as part of the PCS Facilities Planning effort. Phase 1 was completed in 2016 at a cost of about \$4.3 million, and remaining work for Phase II has an opinion of project cost of approximately \$1.5 million. This budget assumes that programming will not be performed by District staff but will be part of the OCS construction cost. This budget was developed using actual construction costs for Phase I Upgrades, escalated to 2017 dollars, and adjusted for a higher "contingency and technical services factor" (a 39% factor was used in the PCS Facilities Plan, whereas a 50% factor is used in the LPFP). In addition, District staff identified the work remaining in Phase II based on the total outlay of work anticipated in the PCS Facilities Plan compared to the work that has been completed to-date. Strand Associates used this information to develop the \$1.5 million budget for the Phase II PCS Upgrades.

Project Recommendations

The recommended plan is to proceed with Phase II PCS upgrades as part of the near-term LPFP project upgrades at the plant. The risks of not completing this work become more severe each year as the equipment becomes more obsolete.

Project Schedule:

	Start Date	Completion Date
Planning	2012	2017
Design	2018	2019
Construction	2019	2020

Financial Summary (2019\$):

Total Project Cost	
District Staff & Engineering	\$265,000
Contractor	\$1,326,000
Total	\$1,591,000

Fiscal Year Allocation (2019\$):

	2017	2018	2019	2020
Engineering	\$3,000	\$72,000	\$75,000	\$115,000
Construction	\$0	\$0	\$133,000	\$1,193,000
Total	\$3,000	\$72,000	\$208,000	\$1,308,000