

East Blower Controls



Project Purpose:

The purpose of this project is to replace the east blower control system.

Project History and Status:

Controls for the west blowers were upgraded by the District engineering staff about 16 years ago with PLC control panels. However, the east blower control system, which controls Blower Nos. 2, 3, 4, and 5, incorporates a common control panel using hardwired relay logic and legacy panel-mounted digital controllers. Blower No. 1 is an engine-driven blower that has a separate control panel. The east blowers control panel has been in use since the original blowers were installed in the 1960s, and several undocumented modifications and adjustments have been performed over the years to keep the blowers in operation. As a result, the control panel wiring is unorganized and no reliable documentation exists to help District maintenance staff troubleshoot and correct problems that occasionally arise. The east blower controls are unreliable, undocumented, and use legacy parts that are difficult to replace.

This project was included in the 2016 Liquid Processing Facilities Plan.

Alternatives:

The following alternatives were evaluated in detail in the 2016 Liquid Processing Facilities Plan:

Alternative EBC No. 0—No Change (Null Alternative)

This alternative would leave the existing hardwired control panel for Blower Nos. 2, 3, 4, and 5 in the East Blower Building in operation. The control panel would be replaced during future blower equipment upgrades. The control panel is currently located in the center of the blower room, which is a relatively noisy and dirty environment.

Alternative EBC No. 1—Replace East Blower Control Panel

This alternative would replace the existing hardwired control panel for Blower Nos. 2, 3, 4, and 5 in the East Blower Building with new dedicated PLC-based control panels for each of these blowers located in Aeration Control Building No. 2. These PLC-based controls include a new remote input/output (I/O) enclosure in the East Blower Building that communicates with the new blower control panel in Aeration Control Building No. 2 using the plant’s recently upgraded fiber optic cabling and would allow most of the existing field wiring to be reused.

The District is currently considering blower equipment upgrades including a change from blowers powered by medium-voltage motors to blowers powered by 480-volt motors. While upgrading the control system prior to the blower equipment upgrades would require the new control panels to be modified slightly to accommodate the new equipment, new PLC-based control panels would easily be able to adapt and interface with any type of upgraded blower equipment.

Key Risks and Issues

The key social, environmental, and other nonmonetary considerations of each alternative are summarized in Table 1.

Economic Analysis

The opinion of capital cost developed for the Liquid Processing Facilities Plan is presented below. There are no upfront costs associated with Alternative EBC No. 0. However, there will likely be future costs associated with the time and materials required for NSWWTP maintenance staff to troubleshoot and repair blower control panel problems, which are not able to be reliably estimated. The budgetary opinion of probable construction cost for Alternative EBC No.1 assume that the District would perform all programmable logic controller (PLC) and Human-Machine Interface (HMI) programming updates.

	Alternative EBC No. 0—No Change (Null Alternative)	Alternative EBC No. 1—Replace East Blower Control Panel
Total Opinion of Capital Cost	\$-	\$390,000

Project Recommendation

The recommended alternative for the east blower controls replacement is Alternative EBC No. 1. The east blower control panel is very old and replacement parts are hard to locate. In addition, the control panel wiring is undocumented and requires several days to troubleshoot and correct control system problems. Replacing the control system would greatly improve the east blower system reliability and use control equipment consistent with recent NSWWTP control system upgrades.

Table 1 – East Blower Controls Nonmonetary Considerations

Alternative	Benefits	Limitations
Alternative EBC No. 0– No Change (Null Alternative)	<ul style="list-style-type: none"> ▪ None 	<ul style="list-style-type: none"> ▪ The existing control panel components are very old, difficult to troubleshoot, and some replacement parts are difficult to find. ▪ Future control panel problems due to aging equipment will likely require several days to troubleshoot and repair. ▪ The existing control panel location in the blower building is not ideal for control equipment because it is a somewhat dirty environment, which can lead to premature equipment failure. The loud noise levels in the East Blower Building also require occupants to wear hearing protection, which complicates maintenance and troubleshooting efforts.
Alternative EBC No. 1– Replace East Blower Control Panel	<ul style="list-style-type: none"> ▪ Replacing aging equipment would reduce the likelihood of control system problems that affect blower operation. ▪ New and well-documented control panels would simplify maintenance and reduce the time required to diagnose and correct problems. ▪ Relocating controls to Aeration Building No. 2 would provide a cleaner and less noisy environment, which would improve equipment longevity and provide a worker-friendly environment for control system maintenance and upgrades. ▪ The new remote I/O enclosure in the East Blower Building would provide a point of local control via a touchscreen OIT and access to all I/O signal wiring. ▪ The new control equipment would match current NSWWTP standards and maintenance staff would have easy access to replacement parts. 	<ul style="list-style-type: none"> ▪ Maintenance staff would lose the convenience of having the control panel, blower equipment, and motor starters in the same room. ▪ Control system modifications, while not a significant effort or expense, would be required to interface the new control panel with future blower equipment upgrades.

Project Schedule:

	Start Date	Completion Date
Planning	2016	2017
Design	2018	2019
Construction	2019	2020

Financial Summary (2019\$):

Total Project Cost	
District Staff & Engineering	\$70,000
Contractor	\$345,000
Total	\$415,000

Fiscal Allocation (2019\$):

	2017	2018	2019	2020
Engineering	\$1,000	\$19,000	\$20,000	\$30,000
Construction	\$0	\$0	\$34,000	\$311,000
Total	\$1,000	\$19,000	\$54,000	\$341,000