

Final Clarifier 4, 5, and 6 Effluent Launder Trough Replacement



Project Proposers/Champions: Alan Grooms

Project Purpose:

The purpose of the project is to address failing effluent launder troughs on final clarifiers 4, 5, and 6 of the Nine Springs Wastewater Treatment Facility.

Project History and Status:

The clarified treated liquid (effluent) is collected and conveyed to the exit point of a secondary clarifier by a trough, also sometimes referred to as a launder. The Nine Springs treatment facility has nineteen final (secondary) clarifiers, which employ a variety of configurations. The specific troughs referred to in this business case were fabricated of galvanized steel and installed in approximately 1984 as part of the 7th Addition to Nine Springs. The launders have been in continuous service for around 35 years since installation, exposed to the full range of temperatures, partially immersed in water.

In late fall of 2017 plant maintenance staff identified several holes developing in the launder trough of final clarifier 5. It was planned to inspect, evaluate, and make minor repairs to these troughs to plug the holes in spring 2018. When assessing the clarifiers in spring 2018 it was found that the holes were more extensive than realized, and were also present on final clarifier 6. A contractor was asked for an estimate on patching these holes, but the determination was that these launder troughs has exceeded their expected useful life and that effective repair was unlikely to work, and would be expensive. The recommendation was to replace the old troughs with new fiberglass units.

No holes have as yet been identified in the final clarifier 4 launder trough. However, the steel is visually observed to be in similar condition and this trough was installed during the same period. Therefore, planning for imminent replacement should be undertaken.

Quotations were obtained for replacing the launder troughs. The cost was much higher than expected, at which time the decision was made to break this out as a separate business case.

Preliminary Path:

It is believed by staff that this project can be quoted and handled within the operations department for bid, with execution and completion of the work by a mechanical contractor.

Alternatives

The alternatives are to try and patch the existing units, or to defer the work and accept the deficiency.

Key Risks and Issues

The key risk associated with this project is failure of the launder trough assembly. As the holes enlarge short circuiting of mixed liquor (high in solids) into the effluent will result, degrading plant treatment performance and capacity (ie: higher effluent solids and possible solids permit violations, less clarity in the effluent leading to less effective UV disinfection requiring more energy and leading to possible permit violations). Ultimately, another risk is possible failure of a section of the trough which could then result in a section sinking to the bottom of the clarifier, which could lead to possible damage to the collector mechanism and result in a more major (costly) repair.

There is also a safety risk to personnel, who typically would step into the trough for certain maintenance activities and could suffer injury by breakthrough (the troughs are normally stepped on to perform cleaning in summer, and to allow access to chip and melt ice in winter).

Economic Analysis

The cost to defer or not perform the work is zero.

It is estimated that for budgeting purposes performing the work will cost an estimated \$63,000 per clarifier for the materials, and an estimated \$12,000 for installation. Total estimated cost per clarifier in 2019 dollars is \$75,000, or \$225,000 to correct the developing deficiencies on all three units.

Recommended Option:

It is recommended that launder troughs for clarifiers 4, 5 and 6 be replaced in 2020. This is appealing to ensure the work is performed before failure occurs. Because these clarifiers are all in one plant (plant 1) the work cannot be performed simultaneously without risk of process upset, so the work would be performed in succession in a single construction season provided weather permits. The other advantages of this approach is that some savings are likely to be realized in provision and installation in a single larger job.

Staggering all the work and replacing the troughs in three successive years is an option. It has an advantage of spreading cost out over more time. However, the rate of material degradation observed and the age of the units does not make this an appealing option, as it carries an additional risk of failure of the treatment units.

The other option is to do two clarifiers as soon as possible (2020), and do the third clarifier in the following year (2021). This may be easier to schedule and phase from an operations standpoint, but it increases the risk of failure before replacement and almost certainly would result in increased costs from multiple bids.

Project schedule:

Project	Total Recommended Option Est. Cost	2019 Est Cost	2020 Est Cost	2021 Est Cost
Replace Final Clarifier 5 and 6 launder troughs	\$155,000	\$150,000	\$155,000	
Replace Final Clarifier 4 launder trough	\$77,500	\$75,000	\$77,500	\$80,000
Replace final clarifier launder troughs on 4, 5, and 6	\$232,500	\$225,000	\$232,500	