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ATR Firewater Pump Replacement

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Changing the World's Energy Future

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ATR Firewater Pump Replacement

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Mentors: Donald Ashcraft, Paul Nielsen, G400

Objective

The objective of this project is to replace faulty firewater pumps 619-10 and 633-1 at INL's Advanced Test Reactor (ATR). The current 633-1 pump case and impeller are eroded, due to a manufacturing error, reducing its performance. The 619-10 fire pump's shaft sleeve is worn, and needs replaced. However, since the pump was made in 1983 and the cost of replacing the sleeve alone is so high, it is worthwhile to replace the whole pump to provide for extended wear.

Typical firewater pump similar to 633-1
Aurora® 900 Series Split Case Fire Pump, AF-02-1033 © 2017 Pentair

ATR Fire Pump Functions

Around the Advanced Test Reactor, firewater pumps supply firewater, which is raw water from the aquifer stored in a supply tank, to serve the following functions to support ATR systems in the case of emergency. The firewater pumps around site can serve from one to all three of these functions.

Emergency Core Injection: Inject water directly to the reactor core to cool it and maintain coverage in the unlikely occurrence of a pipe breakage, or loss of coolant accident from an event such as an earthquake.

1

ATR Core
US Department of Energy

2

ATR Canal
US Department of Energy

Emergency Canal Makeup: Maintain minimum canal height to cool spent fuel elements and experiments before disposal in the case of an accident, such that an experiment was dropped or water from the canal is spilled.

Firefighting: Pump firewater through the fire main system connected to sprinkler systems and fire hydrants around the complex to be used in a fire emergency

3

Typical fire sprinkler
Eduardo Villafuerte, *Why Fire Sprinklers Fail*, 2019

How will they be replaced?

Emergency core injection as well as emergency canal makeup are nuclear safety functions, meaning they are crucial to maintaining the safe operation of the Advanced Test Reactor. Firewater pump 619-10 just performs firefighting functions. Firewater pump 633-1, however performs nuclear safety Emergency Canal Makeup functions. Since it is originally manufactured by a commercial supplier instead of nuclear, it needs to go through testing to become dedicated for nuclear use, a process called Commercial Grade Dedication. Both pumps are currently in the process of being procured before they go through their required testing and installation.

My role in this process was to assist project engineers Don Ashcraft and Paul Nielsen in the correspondence between the pump vendors, project planner, quality engineers, procurement engineers, and supply operations professionals to complete all the steps of purchasing the two pumps, including creating Catalog Identification numbers, managing the documentation on Asset Suite, and the sizing and research of supplementary parts like gaskets and nuts.

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