

1 Q. **Reference: Application Rev. 1, Volume 1, Section D: Projects Over \$200,000 but less than**
2 **\$500,000, Overhaul Unit 3 Boiler Feed 1 Pump East - Holyrood, pages D-2 to D-8**

3 It is stated "*Following the overhaul, the pump will be returned to service and the volute impeller*
4 *cartridge will be refurbished and placed into inventory as a critical spare.*" Please provide
5 examples of situations where the impeller cartridge might be used as a "*critical spare*".

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8 A. The refurbished volute impeller cartridge is stored at site and would be available as a critical
9 spare to refurbish either of the two Unit 3 boiler feed pumps with a quick turn around should
10 there be a sudden failure leading to damage to the volute impeller components. Such damage
11 could result from a bearing failure, motor failure, introduction of foreign material into the
12 pump, or liberation of any rotating components within the volute cartridge. These failures are
13 considered unlikely to occur but without the spare volute impeller cartridge the impact of such a
14 failure could be a 50% derate of Unit 3 for a period of several weeks.

15 A bearing failure could occur at any time due to a breakdown of the lubrication system. Since
16 both the inboard and outboard end radial bearing journals are integral to the volute cartridge
17 shaft, a bearing failure involving damage to the journal surfaces would require a replacement of
18 the cartridge. Passage of a foreign object from upstream piping through the pump could cause
19 internal damage that would require the replacement of the cartridge. An extreme operational
20 event, such as a severe motor failure, could lead to a liberation or contact of rotating
21 components within the volute cartridge which would require replacement of the cartridge.

22 Additionally, although failures such as wear of the rotating sealing surfaces between stages and
23 formation of leaks between the lapped split faces of the cartridge halves are unlikely as they
24 normally develop over many operating seasons and are addressed in completion of the six-year
25 overhauls of the pumps, such failures would impact the performance of the pump and could
26 also require replacement of the cartridge.