Summary of Unit 1
Steam Generator Layup Chemistry
From
January 1, 1998
To
February 18, 1999

Prepared by: M.J. O'Keefe

T.E. Andert for M.J. O'Keefe 3/2/99

Reviewed by: T.E. Andert

Thomas E. Andert 3/2/99

Approved by: T. J. O'Leary

T J O'L 13-2-99.

Summary of Unit 1 Steam Generator Layup Chemistry from January 1, 1998 to February 18, 1999

Using data in the Chemistry Data Management System, CDMS, the unit 1 steam generator layup chemistry control was reviewed for the period of January 1, 1998 to February 18, 1999. During January 1998, the steam generators were prepared for startup. When startup did not occur, the steam generators were returned to layup on February 8, 1998. The data shows that chemistry control was good with only minor out of specification occurrences during the entire period. The occurrences were infrequent. Corrective actions were taken to restore chemistry to within specifications. There was not an adverse impact on steam generator corrosion as a result of these excursions. The layup chemistry is summarized below.

- Chloride, sodium and sulfate were maintained low and well within specification during the entire period.

- The steam generators remained deoxygenated during the entire period.

- Boron was out of specification high, > 1ppm, during January 1998. As discussed in the technical position covering the time period from September 24, 1997, to December 31, 1997, the reported values may have been biased high due to interference with the analysis method. Boron values were within specification for the remainder of the period.

  There is no corrosion concern with the levels of boron reported. The upper limit is based on minimizing the amount of ethanolamine that is needed to raise the pH.

- There was one occurrence of ethanolamine being above the limit of 100 ppm in steam generators 12, 13 and 14. It occurred at different times and lasted only for one sample period.

  Ethanolamine is not a corrosion concern. The upper limit is based on environmental discharge limits for Cook Nuclear Plant.

- Carbohydrazide was used until the end of May 1998. During this time it was used in conjunction with hydrazine. Hydrazine has been used exclusively since the end of May 1998. During January 1998, there were times when hydrazine was low out of specification, < 75 ppm, but remained above 50 ppm. After it was determined the unit was not going to startup, the condition was corrected by a chemical add on February 8. Carbohydrazide was also out of specification low, < 10 ppm, during January 1998. The condition was corrected with the chemical add on February 8, 1998. Since it was decided to discontinue use of carbohydrazide and hydrazine was within specification, no action was taken when carbohydrazide drifted out of specification low in April and May 1998.

Some samples taken during chemical additions over the period indicate low hydrazine levels. Once the chemical adds were completed, the hydrazine levels were shown to be within specification.

Hydrazine was out of specification low in steam generator 11 during December 1998 and the first half of January 1999. During this time, the minimum hydrazine level was 48 ppm. A chemical add to correct the condition was delayed until January 24, due to auxiliary feed pump work. Hydrazine was out of specification low in steam generator 12 for approximately 4 weeks in January 1999. During this time, the minimum hydrazine level was 28 ppm. Two chemical additions were used to correct the condition. Hydrazine was out of specification low in steam generator 13 from mid November 1998 to mid January 1999. The chemical add was delayed due to maintenance activities. Chemicals that were added during the initial refill did not make it to the steam generator causing hydrazine to drop below 1 ppm. The chemical addition was repeated and hydrazine was returned to within specification. Hydrazine was out of specification low in steam generator 14 for one week in January 1999. The condition was corrected with a chemical addition.

During the excursions described above, the environment in the steam generators was deoxygenated, contaminant levels were low and pH was elevated. Therefore, adequate corrosion protection was provided.

- From the beginning of February to mid April 1998, the pH ranged from 9.35 to 9.81. This is within the Cook Nuclear Plant limit but below the EPRI guidelines of 9.8. It was discovered that the reported values were biased low due to analytical error. The calculated pH during this time was greater than 9.8. When the analytical error was corrected the pH was above 9.8. The pH was maintained at 9.8 or greater, for the rest of the period, in steam generators 11, 12 and 14 except for one data point at 9.76 in 11 and 14. During the chemical additions to steam generator 13 the second week of January 1999, the pH dropped to a low of 9.68.

  During the excursions described above, the environment in the steam generators was deoxygenated, contaminant levels were low and residual hydrazine was present. Therefore, adequate corrosion protection was provided.