

SUPPLEMENTAL INFORMATION

FOR

LICENSEE EVENT REPORT 79-26

1. Cause Description and Analysis:

On May 24, 1979, during a refueling outage, a Blaw Knox snubber shaft failed during functional testing. The Blaw Knox snubber exhibited proper piston movement, but when lockup was attempted in the compression mode, its shaft failed. The snubber was believed to be properly installed in the tester (Grinnell Model 5434-3) with the compression drive mechanism set at the proper pressure in accordance with the test procedure (CPL-PT-31.0).

Following the failure, the front end of the shaft was slightly bent; thus indicating that the snubber may have been exposed to some amount of side loading. The failure occurred when the shaft was near full extension. In this position, the snubber is least rigid, thus making it more susceptible to side loadings.

The failed shaft was sent to the CP&L metallurgical laboratory in order to determine the failure's cause. During the analysis, it was determined that the shaft was manufactured from SAB type 1144 carbon steel. According to the shaft manufacturer, Tomkins-Johnson¹, the material should have been type 1050 carbon steel. The type 1144 is a resulfurized steel which contains nonmetallic (manganese sulfite) inclusions in its microstructure which allow the steel to be more easily machined. However, these inclusions make the material more brittle than type 1050. Since the shaft failure had traveled along a line heavily concentrated by the inclusions, the shaft probably failed in a brittle manner. Therefore, the incorrect material could have contributed to the failure².

On August 2, 1979, having obtained all of the above information, it was determined that the failure could possibly have occurred while the snubber was in service. This failure would have resulted in operation in a degraded mode permitted by Technical Specification 3.13.1.a, which is reportable in accordance with Technical Specification 6.9.2.b.2.

Four additional Blaw Knox snubbers of the same type and vintage as the one which failed are installed on safety-related piping. The shafts incorporated in these snubbers are to be analyzed in order to determine if a possible generic problem exists with the Blaw Knox snubbers. Should this information indicate a potential generic problem, an appropriate report will be submitted.

2. Corrective Actions:

Immediately following the shaft failure, all similar safety-related snubbers (four total) were functionally tested to verify their operability. All of the snubbers passed the test. In addition, the suspected portion of their shafts was liquid penetrant tested in an effort to identify surface defects. No indications were found during this inspection.

The failed snubber was replaced by a spare of the same size and rating. This spare was functionally tested satisfactorily prior to its installation.

3. Corrective Action to Prevent Further Occurrence

Following the metallurgical analysis on the failed part, it was determined that a problem might exist with the shaft material. Since the shaft material of the other safety-related Blaw Knox snubbers is unknown, all the shafts will be replaced with the appropriate type 1050 shafts as a precautionary measure. All the removed shafts will be analyzed to determine the material used. This analysis should determine if a generic problem with these snubbers exists.

The test procedure will be reviewed to determine if it might have contributed to the side loading resulting in side loading the snubbers during the functional test.

¹ Tomkins-Johnson manufactures snubbers and associated snubber parts of the Blaw Knox and Power Piping brands for Power Piping Company.

² On August 2, 1979, Tomkins-Johnson stated that type 1144 carbon steel should not be used as a shaft material. Tomkins-Johnson was unable to identify why a type 1144 carbon steel shaft was incorporated in that particular snubber.