

GLS Enterprises, Inc.

Supplement to Evaluation of EQ Impact of Wisconsin Electric Power Company Technical Specification Change Request 192

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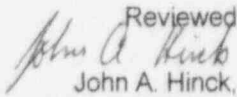
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Date : 4-12-97

Reviewed

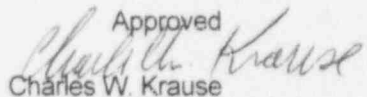


John A. Hinck,

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Date : 4-14-97

Approved



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Date : 4-14-97

Background

Wisconsin Electric Power Company has identified changes to the Design Basis Accident conditions that are postulated based on information provided in support of Technical Specification Change Request (TSCR) 192. The changes in the DBA conditions required revisions to the DBA temperature and pressure profiles utilized in the Point Beach Nuclear Plant (PBNP), Units 1 and 2 Environmental Qualification (EQ) Program, which is required to meet 10CFR50.49. It was determined that these changes could impact EQ equipment and an evaluation was performed. A Condition Report, CR 97-0242, was initiated. The condition report documents the operability determination and establishes actions for final resolution. A more detailed evaluation, Evaluation of EQ Impact of Wisconsin Electric Power Company Technical Specification Change Request 192, dated February 24, 1997, was prepared to document environmental qualification status of affected equipment. It was discussed with the Nuclear Regulatory Commission on February 24, 1997. Comments at this meeting were documented in meeting minutes from the NRC dated March 3, 1997. Evaluation of EQ Impact of Wisconsin Electric Power Company Technical Specification Change Request 192, dated February 24, 1997, is being revised based on the comments from the NRC. The revision has been assigned report #97318-1. Supplemental Report #97318-2 (this report) was prepared to discuss equipment for which the NRC requested additional information. The components, for which additional information was requested, are:

1. Transamerica Delaval Gems Level Transmitter (Item 15)
2. Rome Cable (Item 28)
3. Containment Accident Fan **Motor** Bearing Lubricant (Item 37)
4. Containment Accident *Fan* Lubricant (Item 38).

Note: Item numbers for equipment in this report have been carried through from the original evaluation to maintain consistency when referring to equipment. Because of the similarity in the equipment titles for Item 37 and 38, the word motor is in a bold font and the word fan is in an italicized font to help make a distinction between the items.

Conclusion

The conclusions of this supplement are that :

1. The EQ testing of the Transamerica Delaval Gems Level Transmitter (Item 15) envelopes the new postulated PBNP DBA, except for a 5.8 hour period. This is judged to be acceptable because aging test data in the EQ test program envelopes the points not met in the new postulated PBNP DBA.
2. The Rome Cable (Item 28) is not required to be qualified to TSCR 192 because it performs no safety related function and has no failure mode affecting safety for this DBA.
3. The EQ testing of the Containment Accident Fan **Motor** Bearing Lubricant (Item 37) envelopes the new postulated PBNP DBA, except for a 5.25 and a 8.5 hour period. This

is judged to be acceptable because another EQ test report envelopes the points not met in the new postulated PBNP DBA.

4. The Containment Accident *Fan* has two Lubricants. The EQ testing of the Containment Accident *Fan* Lubricants (Item 38) envelopes the new postulated PBNP DBA, except for a 5.25 and a 8.5 hour period. This is judged to be acceptable because another EQ test report envelopes the points not met in the new postulated PBNP DBA for one lubricant and the other lubricant has a continuous use temperature rating enveloping the points not met in the new postulated PBNP DBA.

Supplemental Information

1. Transamerica Delaval Gems Level Transmitter (Item 15)

Transamerica Delaval Gems Level Transmitter (Item 15) EQ Test Data is below the new postulated PBNP DBA temperature profile beginning at the 2.1 hour point (242°F) and ending at the 7.9 hour point (225°F). Figure 1 shows the new postulated PBNP DBA temperature profile and the EQ test data for the transmitter. Figure 2 expands the view of the area that was not enveloped by the original EQ test. The thermal aging temperature used during qualification testing of the transmitter is also included on these plots.

The Transamerica Delaval Gems Level Transmitter has been tested to DBA conditions significantly harsher than those anticipated at PBNP except for a 5.8 hour period described above. Prior to LOCA testing the transmitters were thermally aged at 248°F for 2,161.3 hours. The demonstrated ability of the transmitter to survive extended periods at 248°F during thermal aging provides assurance that the transmitter will not fail during the 5.8 hour post-LOCA period when maximum temperatures of 242°F (17°F above the EQ test data for the transmitter) may occur.

2. Rome Cable (Item 28)

In the evaluation of the impact on environmental qualifications of equipment subject to the revised accident conditions resulting from the FSAR Section 14.3.4 Containment Integrity Analysis submitted with Technical Specification Change Request (TSCR) 192, PBNP initially identified that the qualifications of all EQ equipment located in containment at PBNP Unit 1 and Unit 2 should be evaluated to the revised post accident temperature and pressure profiles. It has subsequently been determined that the Rome PVC insulated and PVC jacketed cable in containment is used in only one application and that application is not required subsequent to the LOCA accident evaluated in the containment integrity analysis.

Rome cable is presently used to provide control signals (operator power is provided via a different cable type) to the Limitorque operators on the motor operated valves which provide a blocking function for the pressurizer power operated relief valves (PORVs). These blocking valves are provided to mitigate the coolant loss resulting from a stuck open PORV or the failure of a PORV to fully close. Operation of the block valves is not required following the design basis LOCA conditions evaluated in the containment integrity analysis.

Thus, the Rome cable provides no safety related function during this design basis event LOCA and its failure in any manner will not prevent any other safety related equipment from functioning nor will it fail in any manner which could provide misleading information to the plant operators. Accordingly, evaluation of the Rome cable to the design basis event LOCA conditions is not required based on the criteria specified in NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," Revision 1. (Note Point Beach has evaluated the cable for conditions anticipated if a PORV is stuck open.)

3. Containment Accident Fan Motor Bearing Lubricant (Item 37)

3.1 Tests of Lubricant for Containment Accident Fan Motor Bearings

WCAP 7722 is a final report on several test programs conducted by Westinghouse, one of which is testing of the containment accident fan **motor** bearings and associated lubricants in a long term post accident test. As summarized in Table 1, the lubricant qualified in the **motor** bearing test reported in WCAP 7722 was Chevron BRB #2, a mineral oil with Polyurea thickener, Westinghouse designation 773A773.

WCAP 7829 reports on testing of the containment accident fan motor with **motor** bearings and Chevron BRB #2 lubricant.

3.2 New Postulated PBNP DBA Temperature Profile Comparison to EQ Tests

The Point Beach EQ program identified that for Containment Accident Fan **Motor** Bearing Lubricant (Item 37), the EQ Test Data from WCAP 7722 is below the new postulated PBNP DBA temperature profile at the 4 hour point (242°F) until the 9.25 hour point (220°F) and at the 20 hour point (188°F) through the 28.5 hour point (170°F).

WCAP 7829 EQ test data envelopes the new postulated PBNP DBA temperature profile.

3.3 Analysis of Points Below New Postulated PBNP DBA

Review of the above EQ test data from the PBNP EQ files shows that the Containment Accident Fan **Motor** Bearing Lubricant is qualified to the new PBNP DBA requirements.

Figure 3 shows the new postulated PBNP DBA profile, the EQ test data for Containment Accident Fan **Motor** Bearing Lubricant from WCAP 7722, and the EQ test data for containment accident fan **motor** testing from WCAP 7829. Figure 4 expands the view of the area at the four hour point that was not enveloped by the **motor** bearing test reported in WCAP 7722. Figure 5 expands the view of the area at the twenty hour point that was not enveloped by the **motor** bearing test reported in WCAP 7722.

During WCAP 7829 the Chevron BRB #2 Lubricant was tested at temperatures above 270°F for over 100 hours. This envelopes the DBA requirement areas of 5.25 hours from 241 to 220°F and 8.5 hours from 188 to 170°F. This testing proves that the Containment Accident Fan **Motor** bearing lubricant will not fail during the time when the EQ test data from WCAP 7722 does not envelope the new postulated DBA temperature profile.

3.4 New Westinghouse Lubricant

Since the original qualification by Westinghouse in 1971 and 1972, Westinghouse has substituted Chevron SRI lubricant for Chevron BRB # 2. Westinghouse has performed an evaluation of Chevron SRI lubricant and Chevron BRB # 2. In addition to Westinghouse's evaluation of this substitution, additional information concerning the substitution located in the PBNP EQ Files was reviewed.

The substitution of Chevron SRI for Chevron BRB #2 included an evaluation of the composition and performance of the lubricants. Chevron SRI and BRB #2 lubricants are both highly refined mineral oil based lubricants with Polyurea thickener. Chevron SRI has a bearing life at 300°F and 10,000 rpm on the order of 6,000 hours as compared to the original BRB # 2 lubricant which had a bearing life at 300°F and 10,000 rpm on the order of 3,000 hours. Therefore, it is concluded that the substitution of Chevron SRI lubricant does not impact the qualification.

See Table 1 for a summary of lubricant testing, uses, and properties.

4. Containment Accident *Fan* Lubricants (Item 38)

4.1 Lubricants used in Containment Accident *Fan* Bearings

The Containment Accident *Fan* bearing assemblies use two lubricants. Chevron BRB#2 (the same grease qualified for use in the **motor** bearings in section 3 above) was used to lubricate the roller bearings in the pillow block assemblies which support the containment accident fan shaft. Chevron BRB #2 has been replaced by Chevron SRI. Westinghouse Material M53701TT (E.I. DuPont deNemours & Co. Inc.'s Krytox 240 AC Fluorinated Lubricating Grease) is used in the pillow block's labyrinth seal to help prevent chemical spray from reaching the roller bearing lubricant following initiation of containment spray.

4.2 Tests of Lubricant for Containment Accident *Fan* Bearings

WCAP 7722, the final report on several test programs conducted by Westinghouse which reported testing of the containment accident fan **motor** bearings, also tested containment accident *fan* bearings in a very similar long term post accident test. As summarized in Table 1, the lubricants qualified in the *fan* bearing test reported in WCAP 7722 were Chevron BRB #2 and the labyrinth seal grease, Krytox 240 AC.

4.3 New Postulated PBNP DBA Temperature Profile Comparison to EQ Test

The Point Beach EQ program identified that for Containment Accident *Fan* Lubricants (Item 38), the EQ Test Data from WCAP 7722 is below the new postulated PBNP DBA temperature profile at the 4 hour point (242°F) until the 9.25 hour point (220°F) and at the 20 hour point (188°F) through the 28.5 hour point (170°F).

4.4 Analysis of Points Below New Postulated PBNP DBA

Data is provided from the PBNP EQ files which shows that this is not a concern and that the Containment Accident *Fan* Bearing Lubricants are qualified to the new postulated PBNP DBA requirements.

Figure 6 shows the new postulated PBNP DBA temperature profile, the EQ test data (WCAP 7722) for Containment Accident *Fan* Lubricant (Item 38), and the EQ test data for

containment accident fan **motor** testing from WCAP 7829. Figure 7 expands the view of the area at the four hour point that was not enveloped by the fan bearing test reported in WCAP 7722. Figure 8 expands the view of the area at the twenty hour point that was not enveloped by the fan bearing test reported in WCAP 7722.

During WCAP 7829 the Chevron BRB #2 Lubricant was tested at temperatures above 270°F for over 100 hours. This envelopes the DBA requirement areas of 5.25 hours from 241 to 220°F and 8.5 hours from 188 to 170°F. This testing proves that the Containment Accident Fan bearing lubricant Chevron BRB #2, will not fail during the time when the EQ test data from WCAP 7722 for containment accident fan bearings does not envelope the new postulated DBA temperature profile.

During Containment Accident Fan Bearing testing (WCAP 7722), a sealing grease, Krytox 240 AC, was added to the normally un-lubricated labyrinth seals on the fan shaft pillow block bearing assemblies. Westinghouse added Krytox 240 AC during the qualification testing as a sealing grease to resist boric acid spray intrusion into the pillow block labyrinth seals.

Information from DuPont contained in the PBNP EQ files states Krytox 240 lubricant is a carbon, oxygen, fluorine compound, which is chemically inert to virtually all chemicals used in a variety of industries and has no adverse effect on metals when the temperature is below 550 °F. It is rated for long periods at continuous temperatures up to 550°F and intermittent temperatures of 800°F. Therefore performance of the Krytox Lubricant is assured, based on information in the PBNP EQ program, during periods when the EQ test data in WCAP 7722 does not envelope PBNP's new postulated temperature profile.

See Table 1 for a summary of lubricant testing, uses, and properties.

4.5 New Westinghouse Lubricant

Since the original qualification by Westinghouse in 1971 and 1972, Westinghouse has substituted Chevron SRI lubricant for Chevron BRB # 2. Westinghouse has performed an evaluation of Chevron SRI lubricant and Chevron BRB # 2. In addition to Westinghouse's evaluation of this substitution, additional information concerning the substitution located in the PBNP EQ Files was reviewed.

The substitution of Chevron SRI for Chevron BRB #2 included an evaluation of the composition and performance of the lubricants. Chevron SRI and BRB #2 lubricants are both highly refined mineral oil based lubricants with Polyurea thickener. Chevron SRI has a bearing life at 300°F and 10,000 rpm on the order of 6,000 hours as compared to the original BRB # 2 lubricant which had a bearing life at 300°F and 10,000 rpm on the order of 3,000 hours. Therefore, it is concluded that the substitution of Chevron SRI lubricant does not impact the qualification.

Attachments

Figure 1. Transamerica Delaval GEMS Level Transmitter DBA Comparison

Figure 2. GEMS - Expanded DBA Comparison View

Figure 3. Westinghouse **Motor** Lubricant DBA Comparison

Figure 4. **Motor** Lubricant Expanded Scale at 4 Hours

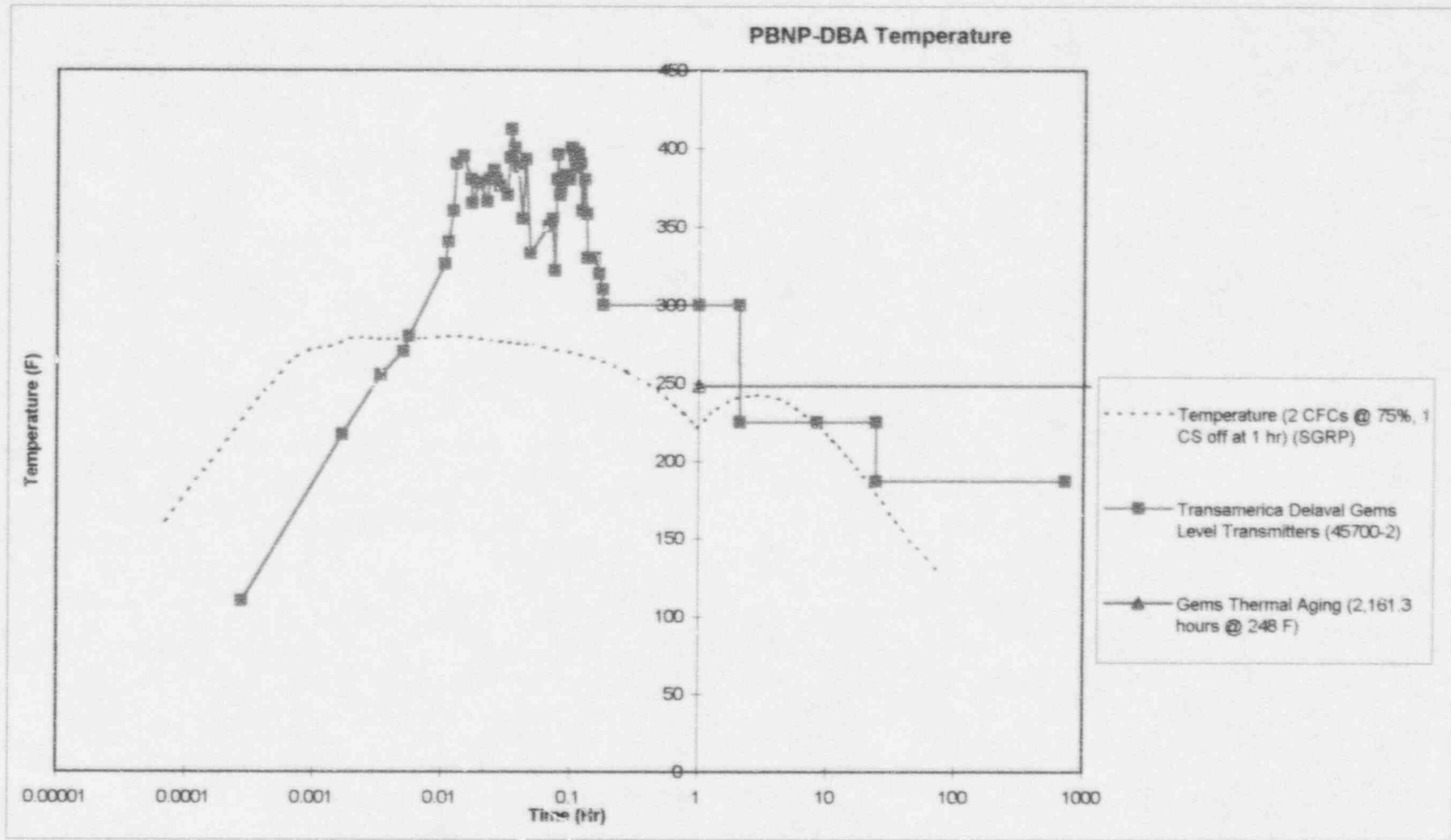
Figure 5. **Motor** Lubricant Expanded Scale at 20 Hours

Figure 6. Westinghouse *Fan* Lubricant DBA Comparison

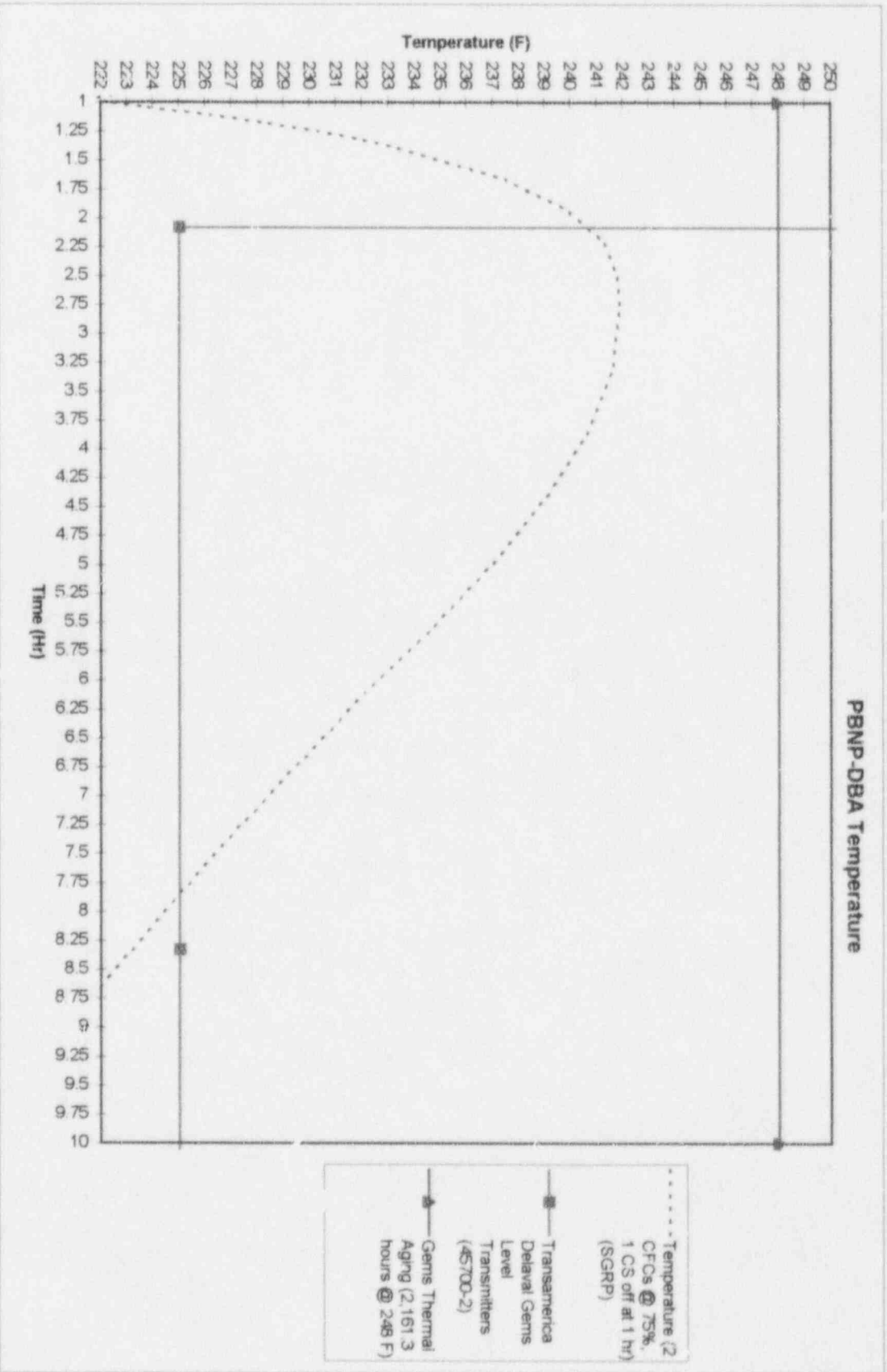
Figure 7. *Fan* Lubricant Expanded Scale at 4 Hours

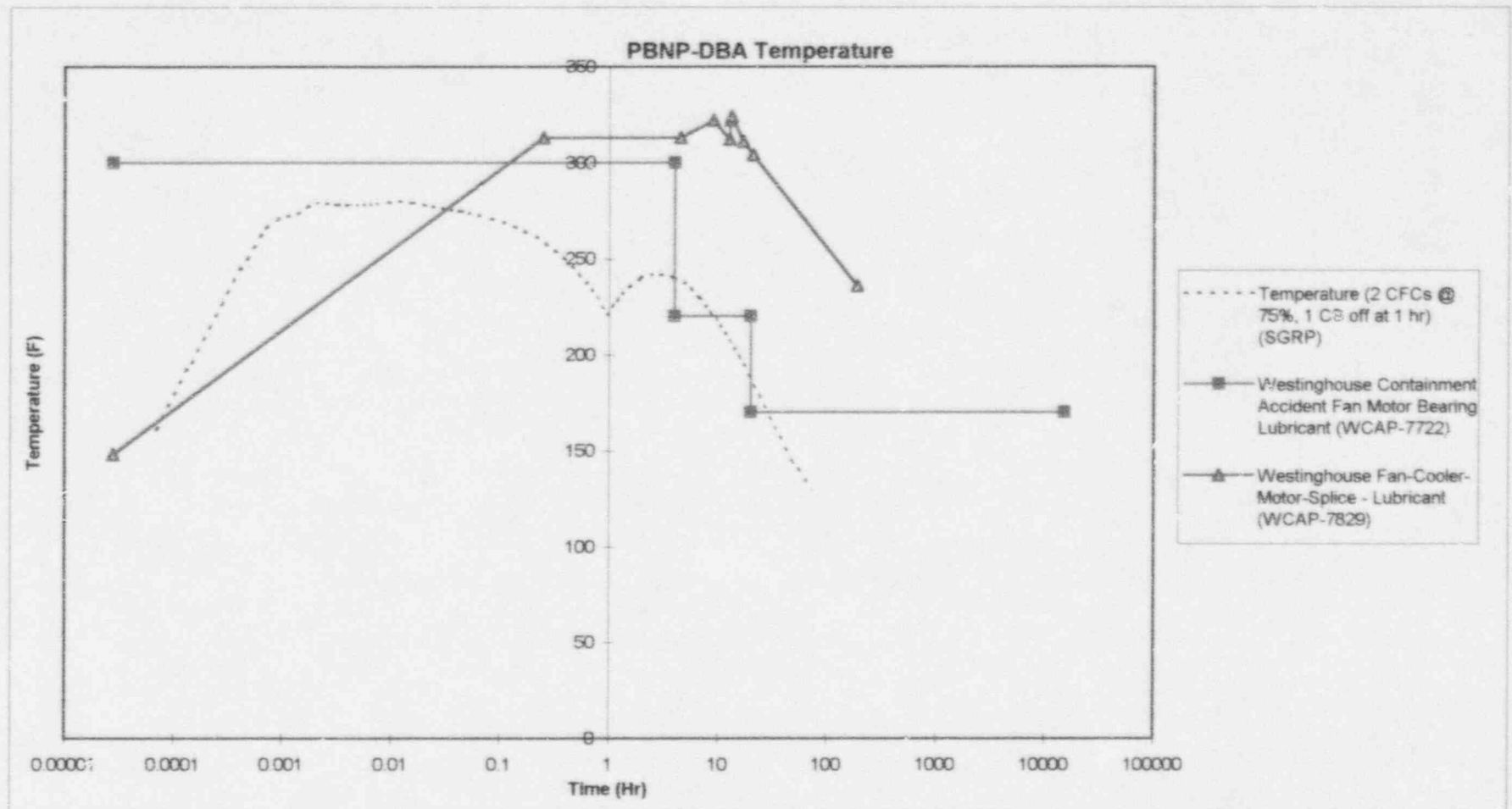
Figure 8. *Fan* Lubricant Expanded Scale at 20 Hours

Table 1. Properties and Applications of Westinghouse Fan **Motor** Bearing and *Fan* Bearing Lubricants

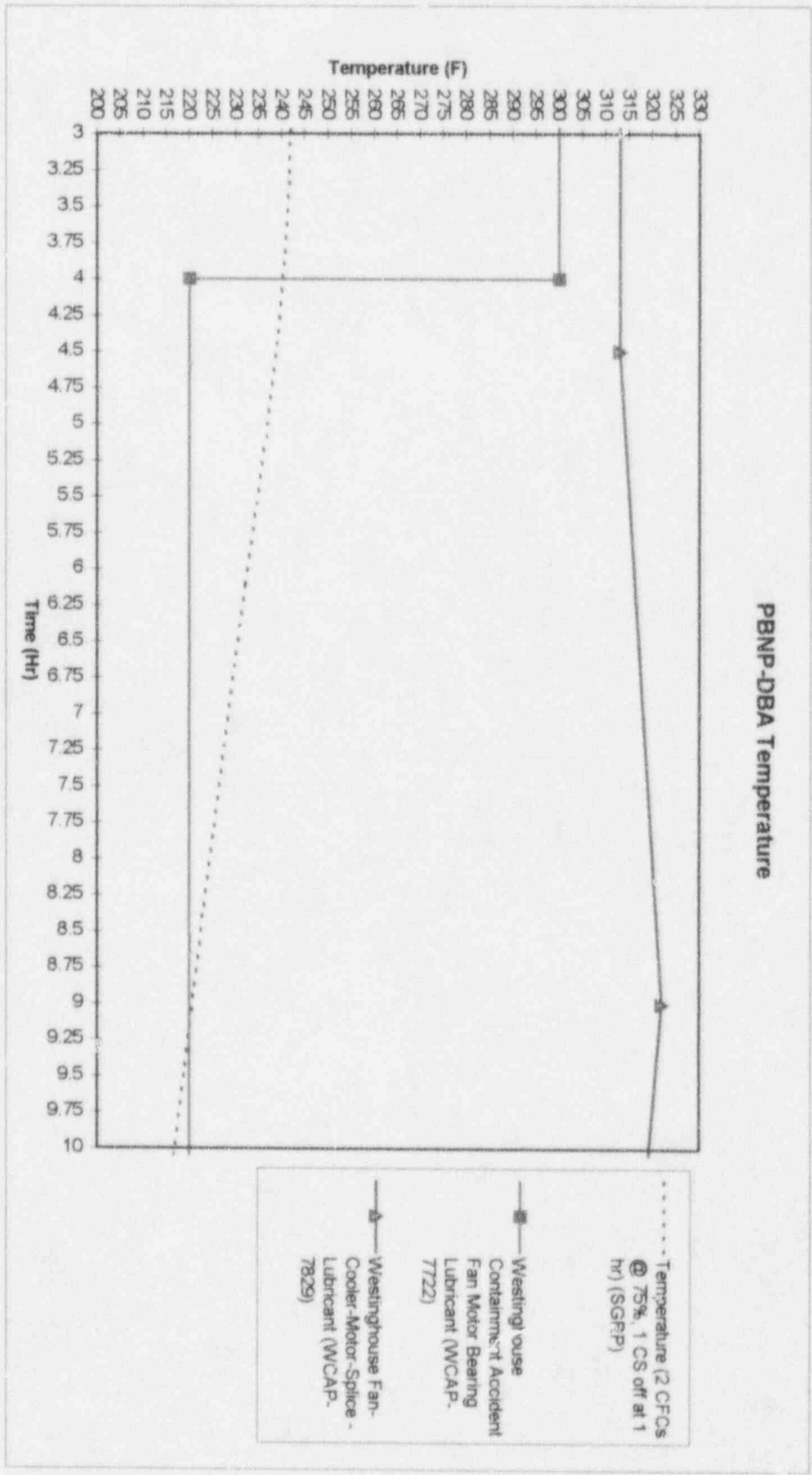


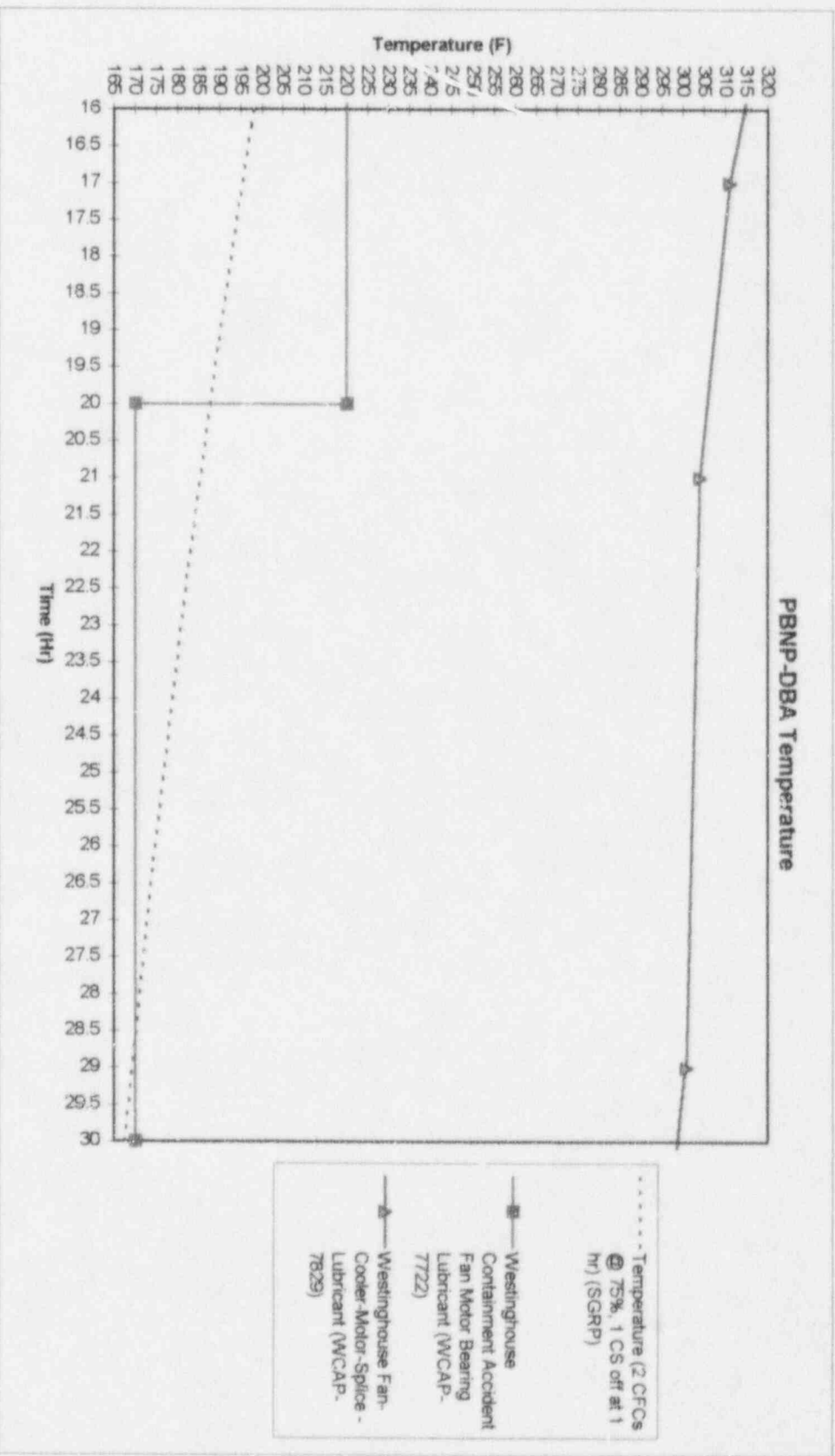
PBNP Temperature Requirement (F) :	250
Qualified Temperature (F)	412
Met	Yes
Margin	47.1%

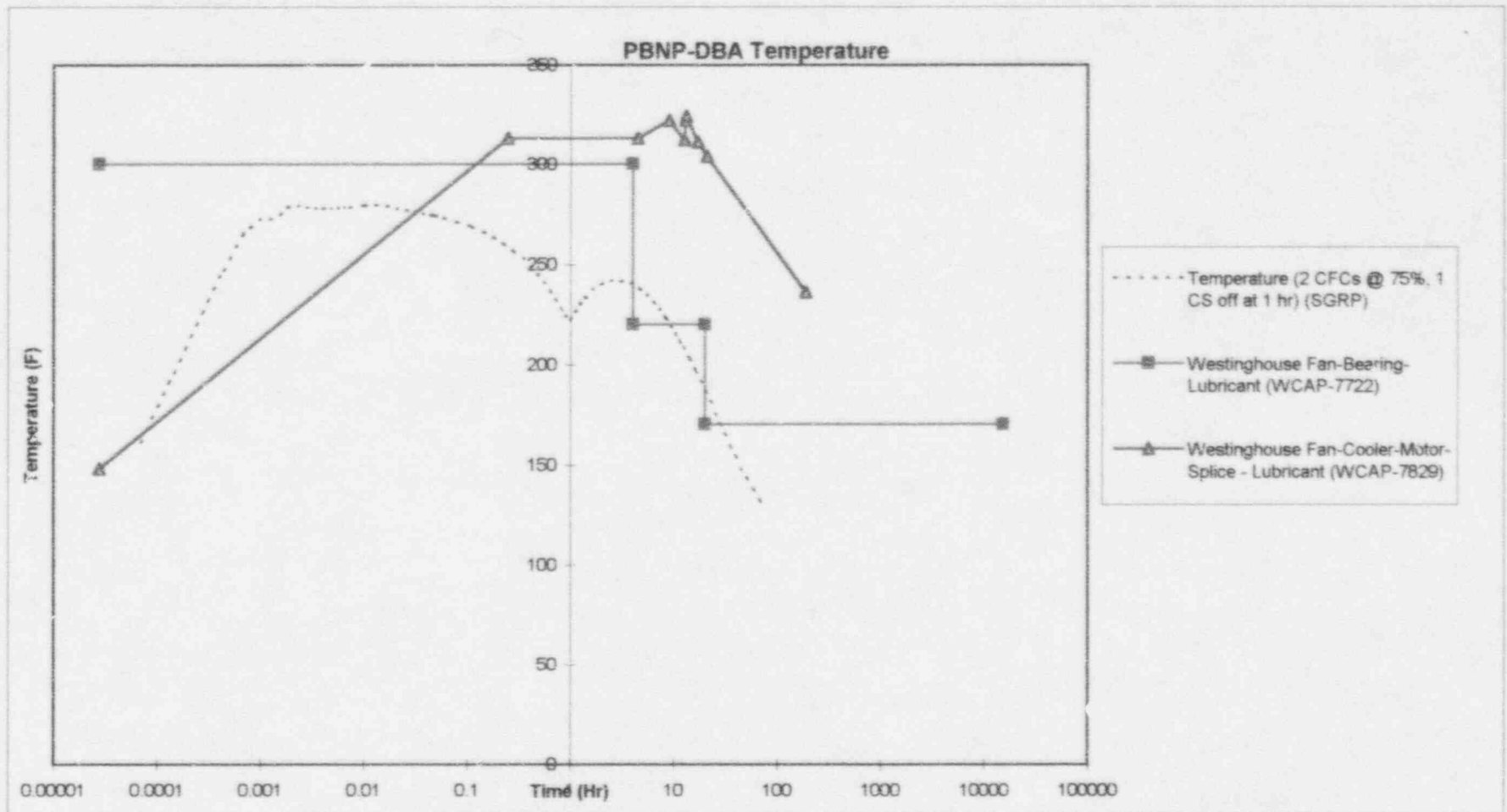




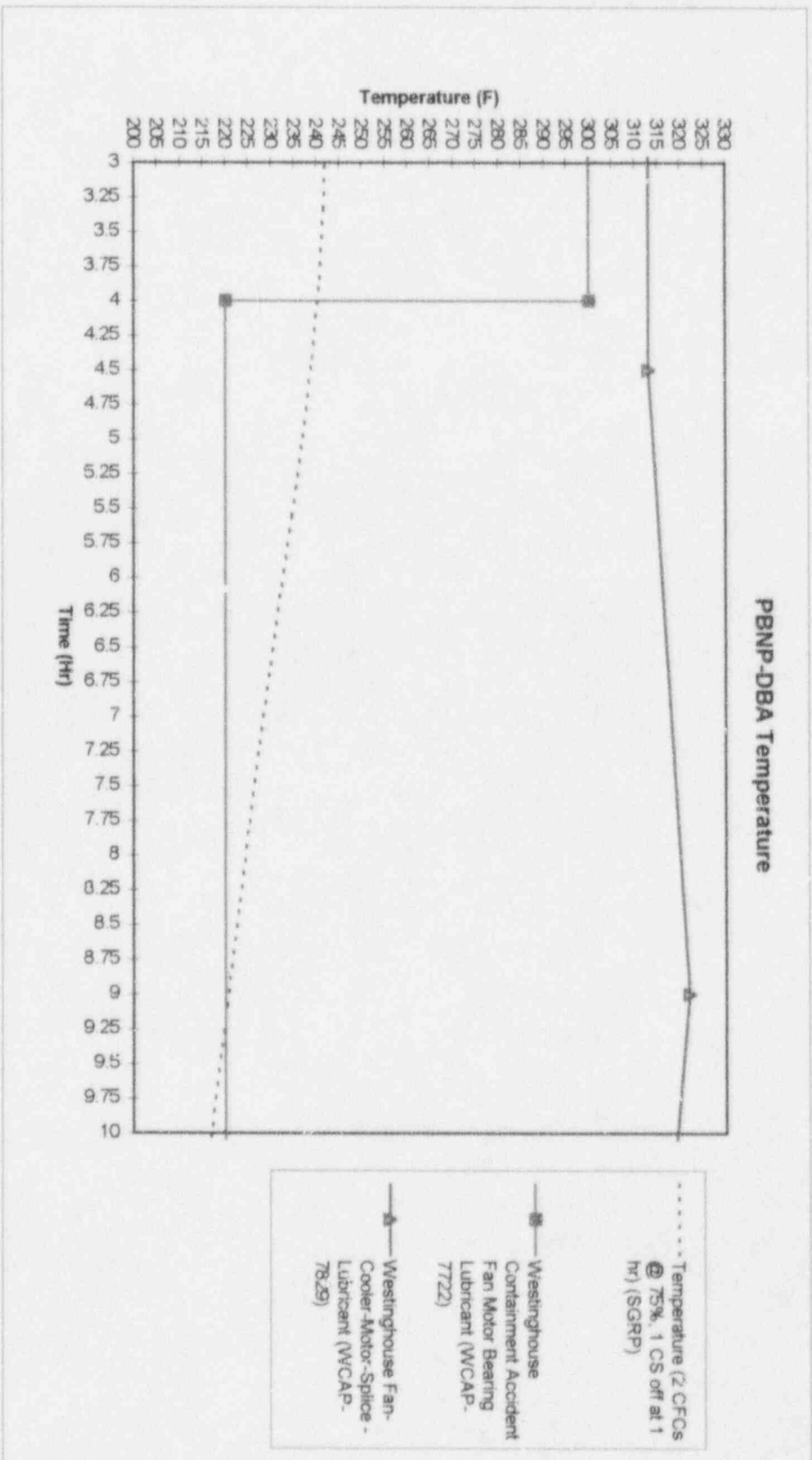
PBNP Temperature Requirement (F) :	280
Qualified Temperature (F)	324
Met	Yes
Margin	15.7%







PBNP Temperature Requirement (F) :	280
Qualified Temperature (F)	324
Met	Yes
Margin	15.7%



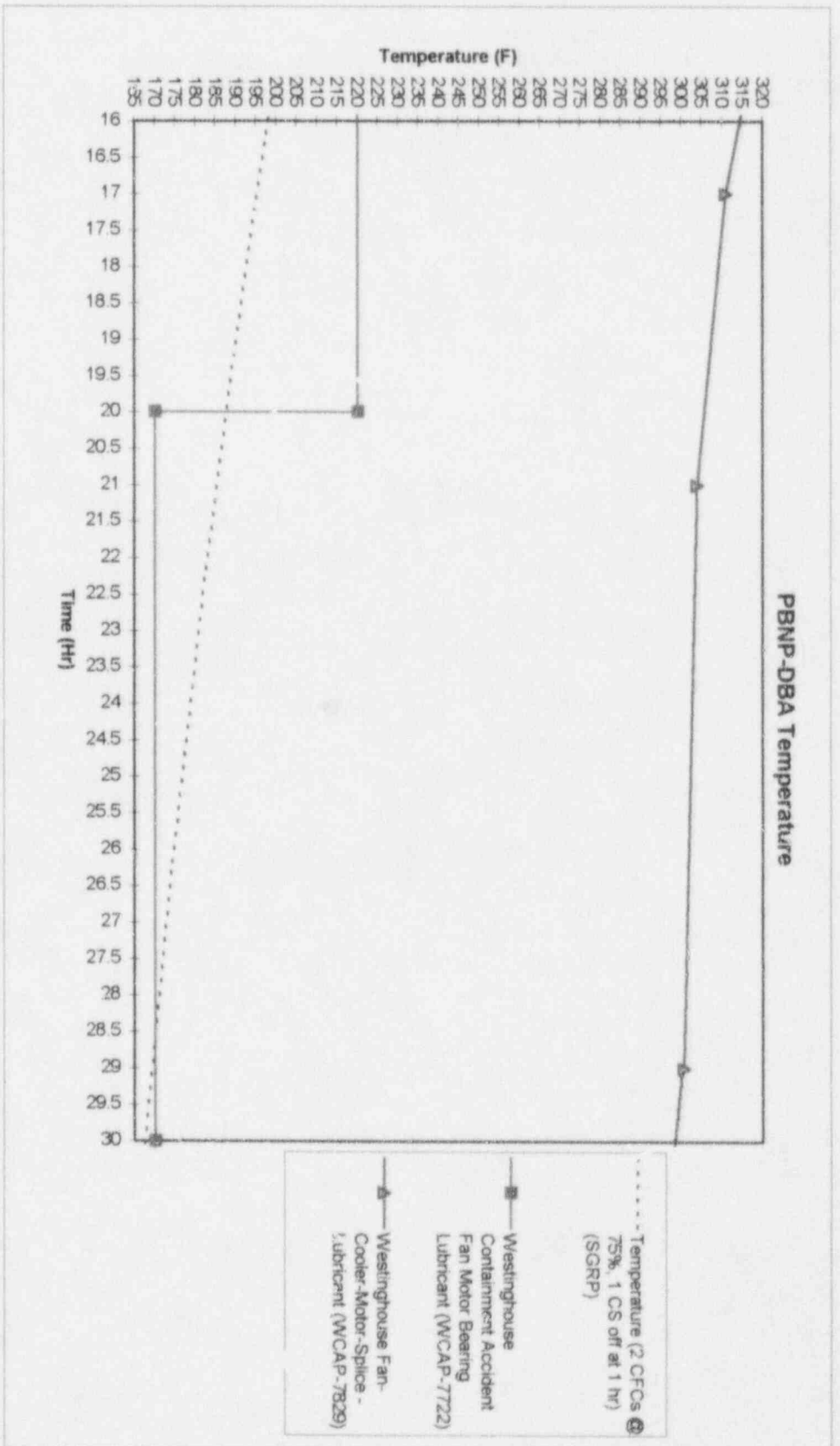


Table 1. Properties and Applications of Westinghouse Fan Motor Bearing and Fan Bearing Lubricants

	Mineral Oil with Polyurea Thickener		Krytox 240AC Fluorinated Grease
	Chevron SR1	Chevron BRB #2	
Fan Motor Bearing	Currently used	Tested (WCAP 7722 - Motor Bearing Tests & WCAP 7829) and originally used	Not Applicable
Fan Bearing	Currently used to lubricate the roller bearings in the pillow block bearing assemblies on the fan shaft.	Tested (WCAP 7722 - Fan Bearing Tests) and originally used to lubricate the roller bearings in the pillow block bearing assemblies on the fan shaft.	Tested (WCAP 7722 - Fan Bearing Tests) and currently used as a sealing grease in the labyrinth seals on the fan shaft pillow block bearing assemblies.
WCAP 7722	Not Applicable	Two tests of interest were: 1. Tested of motor bearings 2. Test of fan bearings (Pillow block bearing assemblies).	Tested in fan bearing (Pillow block bearing assemblies) labyrinth seals.
WCAP 7829	Not Applicable	Tested in motor bearings. The same motor and lubricants were tested twice, once with and once without a heat exchanger attached to the motor.	Not Applicable
Material Characteristics	<p>NLGI Grade - No.2</p> <p>Thickener - Polyurea, an ashless organic compound</p> <p>Thickener, percent - 10</p> <p>Oil - A highly refined mineral oil (600 SUS at 100°F, Viscosity index 88)</p> <p>Additives - Effective oxidation and rust inhibitors at a level to provide superior rust protection in severe applications</p> <p>Temperature range - -20°F to 350°F</p> <p>Texture - Smooth, buttery</p> <p>Color - Blue-green</p> <p>Compatibility - Laboratory data show this grease is compatible with sodium and lithium greases</p> <p>Bearing life (FTM 331) 300°F and 10,000 rpm -5800 hours 350°F and 10,000 rpm (heat treated bearing) - 500 hours</p> <p>Dropping point (ASTM D 2265) 465°F</p>	<p>NLGI Grade - No.2</p> <p>Thickener - Polyurea, an ashless organic compound</p> <p>Thickener, percent - 9</p> <p>Oil - A highly refined mineral oil (600 SUS at 100°F, Viscosity index 88)</p> <p>Additives - Effective oxidation and rust inhibitors</p> <p>Temperature range - -20°F to 350°F</p> <p>Texture - Smooth, buttery</p> <p>Color - Blue-green</p> <p>Compatibility - Laboratory data show this grease is compatible with sodium and lithium greases</p> <p>Bearing life (FTM 331) 300°F and 10,000 rpm -3000 hours 350°F and 10,000 rpm (heat treated bearing) - 500 hours</p> <p>Dropping point (ASTM D 2265) 480°F</p>	<p>Krytox grease has no drop point but the thickener begins to melt at 325°C (617°F). It is rated for long periods at continuous temperatures up to 550°F and intermittent temperatures of 800°F.</p>

Mineral Oil with Polyurea Thickener		Krytox 240AC Fluorinated Grease
Chevron SRI	Chevron BRB #2	
<p>Rust protection and water resistance (ASTM D 1743) Rust test - Pass</p> <p>Oil separation 24 hours at 77°F (ASTM D1742) - 1.5 30 hours at 212°F (FTM 321) - 1</p> <p>Work stability (FTM 313) Penetration after 100,000 strokes - 380</p> <p>Storage stability, 6 months at 100°F Worked penetration (ASTM D 217) - 285</p> <p>Penetration (ASTM D 217) Unworked - 240 Worked - 280</p> <p>Copper corrosion (FTM 5309) - Pass</p> <p>Dirt count, particles/CC (FTM 3005) 10 Microns + - 560 25 Microns + - 140 50 Microns + - 35 75 Microns + - 0</p> <p>Rubber swell (FTM 3603) - 9</p>	<p>Rust protection and water resistance (ASTM D 1743) Rust test - Pass</p> <p>Oil separation 24 hours at 77°F (ASTM D1742) - 3 30 hours at 212°F (FTM 321) - 1.5</p> <p>Work stability (FTM 313) Penetration after 100,000 strokes - 430</p> <p>Storage stability, 6 months at 100°F Worked penetration (ASTM D 217) - 280</p> <p>Penetration (ASTM D 217) Unworked - 250 Worked - 280</p> <p>Copper corrosion (FTM 5309) - Pass</p> <p>Dirt count, particles/CC (FTM 3005) 25 Microns + - 200 75 Microns + - 50 125 Microns + - 0</p> <p>Rubber swell (FTM 3603) - 9</p>	
Equivalency	Similar to Chevron BRB II per Westinghouse evaluation and information in PBNP EQ files	Not Applicable