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November 12, 1984  
ANPP-31096-TDS/TRB

U. S. Nuclear Regulatory Commission  
Region V  
1450 Maria Lane - Suite 210  
Walnut Creek, California 94596-5368

Attention: Mr. T. W. Bishop, Director  
Division of Reactor Safety and Projects

Subject: Final Report - DER 84-60  
A 50.55(e) Reportable Condition Relating To Unqualified  
Lubricant In Limitorque Operators.  
File: 84-019-026; D.4.33.2

Reference: A) Telephone Conversation between D. Hollenbach and T. Bradish  
on August 27, 1984  
B) ANPP-30645, dated September 25, 1984 (Interim Report)  
C) ANPP-30997, dated October 29, 1984 (Time Extension)

Dear Sir:

Attached is our final written report of the Reportable Deficiency under  
10CFR50.55(e), referenced above.

Very truly yours,

*E E Van Brunt*

E. E. Van Brunt, Jr.  
APS Vice President  
Nuclear Production  
ANPP Project Director

EEVB/TRB/nj  
Attachment

cc: See Page Two

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Mr. T. W. Bishop  
DER 84-60  
Page Two

cc: Richard DeYoung, Director  
Office of Inspection and Enforcement  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

T. G. Woods, Jr.  
D. B. Karner  
W. E. Ide  
D. B. Fasnacht  
A. C. Rogers  
L. A. Souza  
D. E. Fowler  
T. D. Shriver  
C. N. Russo  
B. S. Kaplan  
J. Vorees  
J. R. Bynum  
J. M. Allen  
A. C. Gehr  
W. J. Stubblefield  
W. G. Bingham  
R. L. Patterson  
R. W. Welcher  
H. D. Foster  
D. R. Hawkinson  
R. P. Zimmerman  
L. Clyde  
M. Woods  
T. J. Bloom  
D. N. Stover  
J. D. Houchen  
J. E. Kirby  
D. Canady

Records Center  
Institute of Nuclear Power Operations  
1100 Circle 75 Parkway, Suite 1500  
Atlanta, GA 30339

FINAL REPORT - DER 84-60  
DEFICIENCY EVALUATION 50.55(e)  
ARIZONA PUBLIC SERVICE COMPANY (APS)  
PVNGS UNIT 1

I. Description of Deficiency

During the development of the Limitorque type SMB operator preventive maintenance program, by APS Maintenance, a review of the Limitorque instruction and maintenance manual was conducted. This review revealed that for SMB/SB/SBD 000 and 00 models, the standard lubricant, provided by Limitorque, was Sun Oil Co. 50-EP for serial numbers below 295809. Exxon Nebula EP-1 is the only qualified lubricant approved for use in nuclear containment operators at the PVNGS. In addition, Sun 50-EP cannot be mixed with Nebula EP-1. Since the PVNGS uses only Nebula EP-1 for lubrication in all Limitorque valve operators, the possibility existed that the lubricants may have inadvertently been mixed.

A computer search was performed by APS Maintenance which identified a total of 50 type SMB 000 and 00 Limitorque operators at PVNGS Unit 1 as having serial numbers below 295809. Ten of the operators identified are located in the containment, with the remaining 40 located outside containment. NCR SM-4645 was initiated by APS Maintenance to identify these operators, stating that: (1) the 10 operators located in the containment have unqualified lubricant; and (2) all 50 operators have mixed Nebula EP-1 and Sun 50-EP lubricants.

The first condition stated in NCR SM-4645, concerning unqualified lubricant in the containment, was based upon the assumption that Limitorque used their standard lubricant (Sun 50-EP) in nuclear containment operators instead of a containment qualified lubricant (Exxon Nebula EP-0 or EP-1). Limitorque has confirmed, however, that Nebula EP-1 was supplied in nuclear containment units regardless of serial number (Reference 2). Sun 50-EP was supplied in outside containment and commercial SMB-000 and SMB-00 units up to serial number 295809. Limitorque further states (Reference 3) that "nuclear containment units" refers only to those actuators that are required to meet Limitorque's qualification requirements for the containment and not to "commercial" units, even though commercial units may be located in the containment. Based on the following, no unqualified lubricant deficiency exists:

1. Nuclear containment units were shipped with qualified Nebula EP-1.
2. Sun 50-EP is an acceptable lubricant for commercial non-safety-related operators, containment or otherwise.
3. There has been no evidence of qualified containment operators containing Sun 50-EP lubricant.

Addressing the second condition in NCR SM-4645, it should be noted again that Exxon Nebula EP-1 is the only lubricant used at PVNGS for Limitorque operators. In addition, Nebula EP-0 and EP-1 are nearly identical and interchangeable (i.e. Nebula EP-1 likewise cannot be mixed with Sun 50-EP lubricant). The second condition, therefore, is assumed to exist in the non-nuclear containment operators because these operators have had lubrication tags attached. The presence of a lubrication tag does not necessarily mean an operator was lubricated; however, it does indicate that the operator was inspected and, if required was lubricated. (It is assumed here that operators with lubrication tags attached were, in fact, lubricated). Since these operators were initially lubricated with Sun 50-EP, a mixture of lubricants would have resulted in the non-nuclear containment operators with serial numbers below 295809.

The operator serial numbers identified in NCR SM-4645 are listed below:

261461	269224	284387	287063	288893	292726
261975	269225	284496	287351	288894	292943
261976	269232	285055	287352	289831	292944
262005	269239	285056	287502	291113	292945
262008	269240	286976	288134	291119	294946
263394	273406	286977	288136	291131	294947
263395	283104	287007	288137	291132	295461
267729	283105	287062	288892	291763	295462
					295463
					295465

#### Evaluation

Limitorque's experience with mixing lubricants of different soap bases, i.e., Sun 50-EP (lithium base) and Nebula EP-0 or EP-1 (calcium complex base), is a result of hardening and caking which diminishes the lubricating ability. The effects on the operability of the actuators under these conditions is indeterminate (Reference 4).



The root cause of this deficiency (mixture of lubricants) may be partially attributed to the Limitorque instruction manual and partially to oversight. All of the maintenance manuals for the valves that use the identified Limitorque operators contain an old revision of the Limitorque instruction manual (SMBI-170). This manual contains no information as to which lubricant was originally used nor does it contain a warning about mixing Nebula EP-0 and Sun 50-EP. Limitorque had provided the PVNGS with the updated manual (SMBI-82), however, and it was used by Startup as the source document for the recommended lubricant. As indicated in INPO Significant Event Report 7-84 (Reference 5), users who received the updated manual may not have noticed the information on grease mixtures because it was not highlighted and it was not emphasized that the mixing of the two types of grease could degrade the lubricating qualities of the greases.

The resolution to this problem is to change the lubricant in all SMB 000 and 00 Limitorque operators with serial numbers up to 295809, including nuclear containment units. This will ensure that all of the Sun 50-EP lubricant will be removed and thus eliminate the possibility of greases being mixed in any limitorque operator at PVNGS.

## II. Analysis of Safety Implications

The majority of the operators listed in Condition Description are Class 1E and are required to operate under accident conditions. Should a mixture of greases exist in any of these operators and not be changed, the long term effects of this deficiency on the ability of the operators to perform their required function is uncertain.

Based on the above, this condition is evaluated as reportable under the requirements of 10CFR50.55(e), since if this condition were to remain uncorrected it could represent a significant safety condition.

This project evaluates this condition as not reportable under the requirements of 10CFR21. Although the operators are basic, safety-related components, they were not defective at the time of delivery or installation. In addition, the Institute of Nuclear Power Operations (INPO) has already published Significant Event Report 7-84 (Reference 5) identifying the problem of mixing lubricants in Limitorque operators.

### III. Corrective Action

- A. All safety-related Limitorque SMB 00C and 00 valve operators in Unit 1 with serial numbers below 295809 will be flushed and relubricated prior to fuel load.
- B. To preclude recurrence, Investigation Request IR-30 has been initiated to inspect Unit 1 for any additional operators not identified by NCR SM-4645 and to investigate Units 2 and 3 for the subject operators. All identified operators will have their lubricants changed to Nebula EP-1 as required.
- C. During the operational phase of Units 1, 2, and 3, lubrication of valve operators are to be performed in accordance with the preventive maintenance program developed per PVNGS Station Manual Procedure 30PR-9ZZ01. For each Limitorque valve operator, the preventive maintenance task for inspection and lubrication specifically requires Exxon Nebula EP-0 or EP-1 to be the lubricant used.
- D. Limitorque's standard lubricant is currently Exxon Nebula EP-0/EP-1. The lubricant in Limitorque operators delivered in the future will thus be consistent with the lubricant supply maintained at PVNGS.

### IV. References

- 1) Limitorque Bulletin SMBI-82 "Limitorque Type SMB Instruction and Maintenance Manual"
- 2) Telex, Limitorque to Bechtel, August 21, 1984
- 3) Telephone Notes, TN-E-3881, October 2, 1984
- 4) Letter, Limitorque to Bechtel, September 21, 1984
- 5) INPO Significant Event Report 7/84