

Providing Tribological Solutions

NEWS RELEASE – A SINGLE GREASE MOV LONG LIFE NOW HEAT AND RADIATION TESTED FOR LIMITORQUE GEARBOXES & LIMITSWITCHES AND THE STEMS

1. Introduction

Given problems with the previously used calcium complex thickened grease, work had been undertaken to find alternatives. It was given in a 1996 Lube Notes that calcium sulfonate thickened greases, like MOV Long Life, were good candidates to be a single grease for all three applications on Limitorque SMB actuators. MOV Long Life has now been extensively evaluated and/or tested by Limitorque, EPRI (Electric Power Research Institute), MUG (Motor Operated Valve Users' Group), COG (Candu Owners Group) and a number of utilities. This included irradiation testing for the main gearboxes, the limit switch gearboxes and now the stems. MOV Long Life has been qualified.

2. Basis

2.1 Main Gearbox: 2002 EPRI Report #1003483, MOV Long Life had been subjected to a series of tests, including aging and irradiation. It was found to be an acceptable replacement for Nebula EP. Nebula was "Marginal" in three key areas; "Suitable for LOCA temperatures", "Must withstand service and LOCA radiation doses" and "Water and heat resistant and nonseparating". MOV Long Life passed.

Similarly in COG Report WP-4019, it was stated that "Nebula EP-1 grease losses functionality due to extreme thickening at the equivalent of no more than 3.8 years of up to 80°C operation". Their EQ requirement was aging for 5 years and then testing. It was recommended that MOV Long Life be used.

Other Testing; Exelon also irradiated samples of MOV Long Life to over 200 Mrad as part of their evaluations and issued the qualification report in August 2000. This was before the phaseout of Nebula EP. MOV Long Life was said to show improvements over their then current greases in its ability to maintain consistency at elevated temperatures, oil retention, better EP stability lower scuffing and better tolerance of moisture.

2.2 Limitorque Limit Switches: MOV Long Life has been fully tested by EPRI, including EQ, for use in Limitorque limit switches and qualified. It was stated that there was little to choose between the two but that MOV Long Life Grade 1 is superior to Mobilgrease 28 in remaining soft after thermal exposures. Mobilgrease 28 is more oxidative stable than MOV Long Life while dropping points, separation, wear resistance and resistance to copper/brass corrosion were a "push". The qualification for MOV Long Life to replace Mobilgrease 28 was said to be complete. See the 2005 EPRI report and Lube Notes.

2.3 Stems: MOV Long Life has been tested by EPRI, AECL, INEEL and Flowserve for use on stems. This was given in reports dating back to 2002 with the most recent by AECL and COG including irradiation. MOV Long Life did well with a consistent coefficient of friction and low wear rates. COG recommended it as an improvement over their current grease.

2.4 Other: Nebula EP grease is obsolete for a number of reasons including an inherent problem with age hardening that can cause tunneling (called cavitation by some) and/or severe stiffening in service. This is not reversible. MOV Long Life has not suffered from this problem and is providing outstanding performance. In at least one case MOV Long Life Grade 1 has performed in some high speed actuators that would tunnel with Nebula EP0. It has been in use for over four years without problems.

3. Compatibility

Mixing should not be an issue because adding MOV Long Life to Nebula EP was studied by EPRI and COG. EPRI testing showed nothing to suggest that mixing would be an issue and in fact the contrary is true because adding MOV Long Life improved the remaining Nebula EP. Kinectrics did testing for COG at 100% NEB, 90/10, 50/50, 10/90 and 100% MOV LL. They also ran new Nebula EP and MOV Long Life, new MOV Long Life with aged and irradiated Nebula EP as well as aged and irradiated MOV Long Life. They concluded that "MOV Long Life is compatible with aged Nebula EP-1 in all proportions". This is in the 2002 reports. EPRI evaluated MOV Long Life and Mobilgrease 28 in the 2005 reports and COG with Unirex EP1 in their 2007/08 work.

Limitorque approved mixing MOV Long Life and Nebula EP in Tech Update 04-01.

4. Discussion

MOV Long Life has been in service since 1999 and the Grade 1 is also being used on all three applications on Limitorque SMB actuators. Plus, it passed EQ testing while Nebula EP was reportedly "marginal" in several categories.

MOV Long Life has been the factory fill at Limitorque since August 2002.

When it was first reported that Nebula EP grease was being discontinued, it was prudent to ensure that sufficient stocks were on hand until a replacement was proven. This was completed in less than a year. In fact Limitorque had ordered MOV Long Life in December 2001. However, there is apparently no technical basis to continue to use an obsolete, stale dated product that is considered marginal. In addition, MOV Long Life is reportedly providing 2-3 times longer service lives with less oil bleed.

5. CONCLUSIONS

- 1. MOV Long Life is fully approved and has many performance advantages over the obsolete Nebula EP grease and other products.**
- 2. All Nebula EP in stock is stale dated by at least five years.**
- 3. Nebula EP was "marginal" in EQ testing by EPRI.**
- 4. There is no known technical reason not to use MOV Long Life.**

Notes: Contact us for any other references. Nebula EP, Unirex EP and Mobilgrease 28 are trademarks of Exxon/Mobil.

Bibliography

- 'Age Hardening of Nebula EP Type Greases in Use', Note Number 2, EPRI/NMAC Lube Notes June 1992
- 'Limitorque MOV Actuator Lubrication: A Single Lubricant', Note Number 3, EPRI/NMAC Lube Notes July 1996
- 'Evaluation of Cor-Tek MOV Long Life and MOV Plus Grease Following Radiation Exposure, COMED Technical Support Laboratory Report, A2000-178S, Aug 24, 2000
- Limitorque Technical Update, TU 02-01, Subject: Exxon Nebula EP Replacement, Reference: Crompton MOV Long Life.
- 'Evaluation of Limitorque Main Gearbox Greases', J. Janis, Kinectrics, COG WP-4019, August 2, 2002
- 'Comparative Analysis of Nebula and MOV Long Life for Limitorque Main Gearbox Applications, EPRI Report #1003483, December 2002
- 'Equivalent Replacement Evaluation for MOV Gearbox Lubricant', E. Cavey, Position Paper, Motor Operated Valve Users' Group, MUG File 02G-J01, May 2002
- 'MOV Stem Lubricant Aging Research', K. Dewall & J. Watkins, INEEL/Ext – 02-00975, Sep 02. Also MUG File 03J-P21, Handouts Jan 03
- 'Rate of Loading', Bensinger, F., (Flowserve), 2003 Motor Operated Valve Users' Group Conference, MUG File 03J-P07, Handouts Jan 03
- 'All-In-One, An Update on MOV Long Life', Brown, K., Mackwood, W., and Austin, T., 2003 Motor Operated Valve Users' Group Conference, MUG File 03J-P04
- 'MOV Long Life Limitswitch Applications', Brown, K., Mackwood, W. and Austin, T., '2004 Motor Operated Valve Users' Group Conference, MUG File 04J-P07 & P11, 2004
- Limitorque Technical Update, TU 04-01, Subject: Crompton MOV Long Life/Exxon Nebula EP Compatibility, Reference: EPRI Report 1003483 & Limitorque Technical Update 02-01, 2004
- EPRI MOV Projects Update, Hosler, J., 2004 Motor Operated Valve Users' Group Conference. {Rate of Loading (ROL) and stem coefficient of friction (COF) comparisons including MOV Long Life and Nebula EP.}
- 'Motor-operated Valve Lubricant Performance and Condition Assessment', by Hosler, J., Teachey, T. and Johnson, J., EPRI Report 1009609, 2005
- 'MOV Long Life Grease – Evaluation for Limitorque Limit Switch Gearboxes: Used in Nuclear Safety Related Applications', EPRI Report 1010058, July 2005
- 'Substitution of MOV Long Life for Mobilgrease 28 in MOV Limit Switch Gearboxes', Note #4, EPRI/NMAC Lube Notes December 2005
- 'MOV Stem/Stem Nut Lubrication: Assessment of MOV Long Life Grease, Guérout, F., 2008 Motor Operated Valve Users' Group Conference