'Providing Tribological Solutions'

'VSG' VANE SPINDLE GREASE
WICKET GATE LUBRICATION

INTRODUCTION

To ensure that units are available when required, operating efficiently and not incurring unnecessary maintenance costs, it is important that the wicket gate bearings and the regulating mechanisms receive sufficient lubrication. Too much can be wasteful and too little can lead to failures or at the least, wear, corrosion and/or higher forces to move the gates. The latter can result in overloading of other components. The grease also seals out dirt and water as well as prevent helps prevent corrosion of the bearings and journals.

The first step is to refer to the turbine manufacture's original instructions and/or any subsequent notices on the lubricants and lubrication. Station experience, company procedures or input from company technical units can also be very useful in cases where the manufacturer's advice is not available or is very dated. The following material based on old information from Hydro-Québec can be used as a guide. It is expected that with modern formulations such as VSG grease that much less is required. This can be confirmed by monitoring wicket gates forces. Strain gauges and digital pressure gauges have been used. A greasing frequency of every week or two appears is common.

FREQUENCY

The pump for the lubrication system is to be operated as follows;
a) Every 6 hours for turbines with a water head of <50 m (160 ft).
b) Every 4 hours for heads between 50 m (160 ft) & 145 m (480 ft).
c) Every 3 hours for heads >145 m (480 ft).

QUANTITY

The total grease volume in one bearing can be estimated as follows;
Q (mm^3) = 0.025 x Bearing dia. (mm) x Bearing length (mm) x 3.14, or
Q (in^3) = 0.001 x Bearing dia. (in) x Bearing length (in) x 3.14

This is not replenished every cycle because it should reportedly take three cycles to replace all the grease. Each greasing cycle will replace one third of the total amount.

EXAMPLE

For a turbine having a greasing interval of every six hours, 15 wicket gates with upper and lower bearings, 25 cm (10 in) in diameter and 46 cm (18 in) in length, this would be about 2 kegs of grease. This is just the wicket gate bearings so slightly more is required for all surfaces.

Calculation - Grease volume: 15 gates x 2 bearings x 0.001 x 10 x 18 x 3.14 ÷ 3 regrease amount = 5.7 in^3
X 4 intervals per day x 365 = 8,322 in^3 ÷ 231 = 36 US gallons. Note that less is likely required with VSG.