Q. Acres says without repairs in "the near future" they expect that the leakage problems would worsen causing operational difficulties and increasing maintenance costs. Detail the operational difficulties and projected maintenance cost increases and the likelihood that this may happen.

A. **1.0 General**

The SGE Acres report recommends that the woodstave penstock be replaced in the near future based on an engineering assessment that the leakage problems in the penstock would worsen and that maintenance costs and operational difficulties would increase. Newfoundland Power's recent experiences with leakage in the Rattling Brook penstock appear to bear out the prediction in the SGE Acres report.

2.0 Operational Difficulties

To date, the condition of the penstock has been managed appropriately. However, recent experience indicates that the Rattling Brook penstock is increasingly unable to withstand de-watering without significant leakage. As a result, every effort is made to avoid de-watering the penstock.

In November 2005, for example, a section of expansion joint material blew out in the steel penstock adjacent to the surge tank, causing water to shoot 40 feet into the air. With winter approaching, such a large leak presented a danger of a large build-up of ice, which could damage the penstock. However, to avoid de-watering the penstock to repair the leak, a metal plate was installed to deflect the escaping water downwards and prevent ice build up until de-watering is required for a more critical reason or until the penstock is replaced.

With the deteriorated condition of the penstock, including rot (especially at butt plates), stresses due to settlement, crushed woodstaves, and deteriorating supports there is a concern that the need to de-water the penstock to address major leaks will increase in the next year.

Because of the extent of deterioration, however, the penstock is beyond the point where it can safely be de-watered for the purpose of preventive maintenance. Based on recent experience, as described above, the penstock may not be capable of being returned to service if the duration of de-watering is long enough. Consequently, leaks that cannot be plugged without de-watering may remain unrepaired, as long as the escaping water does not imperil safety or the plant infrastructure itself.

Further, the condition of the penstock is such that, if de-watering were to become necessary during the winter months, the extent of leakage and the resultant ice build-up could make it impossible to return the penstock to service.

The inability to routinely de-water the penstock for operational reasons constitutes a serious operating limitation on the penstock. Due to the engineering interdependence of the penstock and power plant associated with Rattling Brook, continuing to operate the penstock with such limitation into the future is not, in Newfoundland Power's view, an acceptable engineering option.

3.0 Maintenance Costs

The de-watering of the penstock for 6 days in 2003 to accommodate SGE Acres' inspection of the penstock and surge tank resulted in leakage that took a six-person crew approximately 4 weeks to fix. The cost of repairs was approximately $50,000. The total maintenance cost of the penstock in 2003 is estimated at $60,000.

In 2004 and 2005, plugging was carried out on the penstock as required to seal leaks as they were encountered. It is estimated that, for each of those years, the work totalled approximately 3 weeks for a two-person crew. Total maintenance cost for each of 2004 and 2005 is estimated at $20,000 and $13,000 respectively. Maintenance costs for 2002 were similar to 2005 costs of $13,000.

Following the de-watering in 2003, the penstock was not de-watered again until May 9, 2006. At that time only the uppermost 450 metres was de-watered to repair a significant leak. After being de-watered for less than 6 hours, the affected section of penstock had significant leakage, which took a six-person crew approximately one week to repair.

As of this writing, repairs are ongoing in an area about 50 metres long where the bedding material has washed out along the east side of the penstock. Repairs in this area are estimated at $20,000. Total penstock maintenance cost for 2006 is currently at about $40,000. The cost to year end is estimated at about $60,000, assuming that the penstock does not need to be de-watered again. It is estimated that each full penstock de-watering will add about $50,000 in repair costs.

4.0 Further Information

Please see the Response to PUB-11.0 NP for further information on the operations and maintenance of the Rattling Brook penstock.