B-17, Replace Diesel Units, Norman Bay, Postville and Paradise River, 2009 - $169,700, 2010 - $1,699,900

Q. Please illustrate, showing forecast load and including information on the age and maintenance history of the other two units, why it is necessary to replace the 150 kW unit at Postville with a 365 kW unit.

A. It should be noted that the 365 kW replacement unit was reported in error. The correct proposed replacement size is 350 kW which is shown in Table 1 on page 3 of the report.

As illustrated in Table 10 on page 17 of the report, the forecast gross peak in Postville will increase to 403 kW by 2012 and 407 by 2013. The current firm generation in this plant is 402 kW. The firm generation requirement is to be able to meet the peak with the largest unit out of service. In the case of Postville, the unit sizes are 150 kW, 252 kW and 275 kW, resulting in firm generation of 402 kW. Therefore, an increase in firm generation is required by 2012, which means a unit replacement no later than 2011.

The unit being proposed for replacement is the 150 kW unit, Unit 557. This unit is 21 years old and is nearing the end of its useful life. Spare parts are difficult to obtain and, in some cases, are no longer available. As a result, the unit's reliability is questionable. In addition, this unit is undersized and cannot be fully utilized. This is illustrated by the limited use this unit has had in the last two years with operating hours in 2006 and 2007 of 809 and 688, respectively. This has resulted in increased use of the remaining two units in the plant, with operating hours in 2007 of 6,970 for Unit 577 and 6,834 for

Unit 573. Typical target operating hours for a unit is 4,000 to 5,000 hours per year.

Unit 577, a 252 kW unit and Unit 573, a 275 kW unit are 7 and 8 years old, respectively. Both units have had two overhauls to date. As of March 31, 2008, Unit 577 had 33,634 total operating hours while Unit 573 had 41,649. While this gives an annual average operating hours of 4,800 and 5,200 respectively, these units have operated significantly more than that in recent years. The maintenance history for these units is provided in Tables 1, 2 and 3 below.

To increase the firm generating capacity of the plant, a unit capacity of at least 200 kW is required to replace the 150 kW unit. However, with the current load profile for the system, the load would be better served by a 350 kW unit added to the existing units. This unit configuration in the plant allows for better overall plant efficiency, an opportunity to achieve a balance of operating hours on the units, and an opportunity for greater stability in generating unit maintenance planning and execution. The main reason for this is the way the units can be loaded during various levels of plant demand.

Diesel units run most reliably and efficiently if they are loaded at about 80% or 85% of their maximum rated (nameplate) output. They can run at lower or higher levels, however, prolonged operation at levels near peak capacity can lead to reliability problems and operating at levels below 50% of their nameplate output can cause inefficient operation, reliability problems, and poor environmental performance.

As stated above, the capacities of the two units that are not being replaced are 252 and 275 kW. If a 250 kW unit was added, when the plant load is

220-240 kW, there will often be a need to put a second unit online to ensure that increases in load that occur can be met by a unit that is already operating. That means that two units will be put online to meet that load but the loading of those units in those circumstances will be about 40-45%. If a larger unit is available, that unit can be used when the total plant load is over 220 kW. The next unit would not need to be run until the plant load approached the nameplate for that 350 kW unit. This reduces the number of hours during which the units will be operated at loads below 50%.

Table 1 - Five-Year Maintenance History - Postville Unit 577

Year	Preventive Maintenance ($)	Corrective Maintenance ($)	Total Maintenance ($)
2007	3,610	3,800	7,410
2006	7,630	2,300	9.930
2005	2405	145	2550
2004	1,825	3,300	5,125
2003	2,050	100	2,150

Table 2 - Five-Year Maintenance History - Postville Unit 573

Year	Preventive Maintenance ($)	Corrective Maintenance ($)	Total Maintenance ($)
2007	6,100	3,250	9,350
2006	2,700	2,750	5,450
2005	2160	4540	6700
2004	2,395	2,235	4,630
2003	390	995	1,385

Table 3 - Overhaul History Units 573 and 577 Postville

Year	Unit Overhauled	Comments
2008	Unit 577	Block replaced due to failure – August 2008 investigation ongoing
2008	Unit 577	33,516 operating hours
2006	Unit 573	30,516 operating hours
2005	Unit 577	20,195 operating hours
2004	Unit 573	17,897 operating hours