1	Q.	Please describe the software used for calculating LOLH. Is it commercially
2		available software or one developed in-house? Does it use analytical
3		methods, Monte Carlo simulation, or other methods? Please provide a
4		description of the analytical or Monte Carlo methods and parameters, to the
5		extent relevant to the model. How were planned maintenance outages
6		accounted for in the software?
7		
8		
9	Α.	Hydro uses Strategist, a commercially available software package produced
10		by NewEnergy Associates, to carry out its long-term generation planning
11		studies, including calculating LOLH. A major component of this model is
12		PROVIEW [™] , an automatic expansion planning optimization tool which can
13		determine the least-cost resource plan for a utility system under a prescribed
14		set of constraints and assumptions.
15		
16		PROVIEW uses dynamic programming logic. Dynamic programming, the
17		state-of-the-art in utility expansion planning analysis, evaluates all feasible
18		combinations of expansion alternatives throughout the planning horizon. It
19		selects the best expansion plan as that which results in the lowest cumulative
20		present worth of utility costs which reflects the incremental system revenue
21		requirements.
22		
23		The dynamic programming algorithm used by PROVIEW to analyze the
24		generation expansion problem is described as follows. In each year of the
25		study all numeric combinations of the available alternatives are considered.
26		Each combination is evaluated subject to timing and reliability constraints set
27		by the planner. Only those plans that meet all of these constraints are
28		retained for consideration in future years. Once all possible combinations

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1 have been evaluated for all years during the planning period, the plan with 2 the combination of resources that results in the lowest cumulative present 3 worth of utility costs is considered the optimal plan. The model also produces 4 a specified number of suboptimal plans allowing the comparison of plans that 5 contain different types of resources. 6 7 For thermal units, planned maintenance outages are accounted for by 8 indicating the number of weeks required for annual maintenance and the 9 period of the year during which maintenance is allowed to be carried out. The 10 program then automatically schedules the maintenance, taking into account 11 the available generation and load requirements of the system. 12 13 For hydro units, typical annual planned maintenance outages are much 14 shorter than for thermal units, and are accounted for in the seasonal 15 distribution of energy.