Q. **Asset Management**

Further to the response to PUB-NLH-084 (terminal station backlogs). This response reported the terminal station equipment inspections, preventive maintenance (PM), and corrective maintenance (CM) work order backlogs, and the terminal station relay maintenance work order backlogs together and not separately. Provide, in tabular form, the number of terminal station equipment preventive maintenance (PM) work orders scheduled for completion during each year, the number of PM work orders completed during each year, and the number of PM work orders scheduled to be completed during each year, but not completed by year's end (overdue/backlogged) for year's end 2011, 2012, and 2013. Do not include relay preventive maintenance work or terminal station inspections.

A. Hydro actively manages its terminal station maintenance through a work order and backlog management process using its computerized maintenance management system (CMMS) (JD Edwards). There are two categories of work managed in this system:

a. Preventive maintenance (PM): PM tactics and frequencies are established by the Long-Term Asset Planning (LTAP) group taking into account such things as asset criticality for safe reliable service, best practices of other utilities and manufacturers' recommendations. The PM program is set up and maintained in the CMMS by the Short-Term Planning and Scheduling (STPS) group; and
b. Corrective maintenance (CM): CM work orders are generated from multiple sources (e.g. System Operations, field employees, supervisors, etc.), and are created to formally record and schedule additional maintenance work that has been identified during regular inspections, general observations of qualified staff and planned maintenance activities. CM's, when identified, are reviewed,

prioritized and approved by the Work Execution group. Once approved the work is planned for execution in accordance with its priority and placed in the backlog for scheduling when the equipment can be removed from service with careful consideration of the impact of the equipment outage on customer service reliability.

As the focus is on ensuring that critical service reliability and safety work orders are carried out on a priority basis, the Short-Term Planning and Scheduling group continually reviews work orders in the backlog to ensure items of critical importance to system reliability and safety are included in the weekly work schedules in addition to those planned to coincide with infrequent equipment outages. Lower priority items are carried over until such time as they can be completed. In addition to the regular reviews, prior to the start of each year, work orders from the back log are reviewed by LTAP, Work Execution, Operations and STPS to ensure work that is critical to safety, environment and reliability are included in the annual work plan. Some CM work can be addressed while keeping production and delivery assets on line and operating, some cannot and require outages. The design of Hydro's asset systems provide redundancy in critical applications which enable associated CM work to be packaged and held in backlog for the next upcoming annual maintenance outage. Different assets have different lead times or warning intervals from when the onset of degradation is detected until when the asset can no longer perform its required function and has failed. When assessing priority on a CM work order and establishing a due date for completion, the potential impact to safety, production and delivery are the main considerations, along with the anticipated lead time to failure, as well as the potential to avoid cost escalation through excessive asset degradation and damage. In this context, some CM work orders must be actioned in the near term to avoid functional failure, while other CM work orders can remain in backlog for extended

periods of time before the asset degrades to the point where maintenance attention is required to avoid functional failure.

The response to PUB-NLH-084 provided the preventative maintenance (PM) and CM work orders for all work (i.e. work orders both directly related to equipment required for delivery of electricity and not directly related to equipment required for delivery of electricity) associated with Hydro's terminal stations on the Island Interconnected System completed in each of 2011, 2012 and 2013. It also provided the cumulative number of work orders created and ready for completion[1] up to the end of each of those years and which remained in the backlog in March when the response was prepared. The PM work orders in backlog are past their preferred completion date.

Hydro recognized in 2009 that the rate of PM completion in terminal stations was beginning to lag, and implemented a five year recovery plan from 2010 to 2015. Furthermore, during 2014, Hydro is reducing the backlog. Since Hydro's response to PUB-NLH-084, in addition to executing and completing some of the work orders in the backlog, a review has been completed of the backlog resulting in the closing of any work orders that were duplicate, related to obsolete equipment or the work order is going to be addressed by a capital program.

The following table restates the table of PM work orders provided in response to PUB-NLH-084 by providing: the number of PM work orders generated in the year; the number of those completed in the year and the number of work orders completed in that year from the work orders in backlog from prior years; the

[1] Ready for completion means the work order had all up front planning completed with required parts available and it was either waiting to be scheduled, was scheduled for a future point in time, or is in progress. CM work orders are only planned and made ready to complete once they have received the required approvals.

number of cumulative work orders in backlog as of March 2014; and for this update, those in backlog as of September 28, 2014.

PM Work Orders

Year	Work Orders Generated	Current Year Work Orders Completed	Work Orders Completed from Backlog	Total Work Orders Completed in Year
2011	896	674	145	819
2012	781	578	206	784
2013	937	704	198	902

Created Up to Year Ending	Backlog as of March 2014	Backlog as of September 2014
2011	38	17
2012	62	29
2013	194	78

As of October 22, 2014 the cumulative total PM backlog for these terminal stations PM work orders have been further reduced to 57 work orders.

Hydro's objective is to, as much as practical, complete all PM work orders in the year they are identified to complete. Unforeseen events can impact completion due to unexpected equipment failures and emergency repairs which may reduce windows of opportunity to remove equipment from service without impacting on customer service reliability. As previously described Hydro had identified in 2009 the need to address a backlog of PM work for its terminal station equipment and established a five-year plan (2010-2015) to have the PM work back on its preferred schedule by 2015. During the period of 2011 to 2013, Hydro deferred some of this station maintenance either (a) where it was necessary to address unplanned corrective maintenance work due to equipment breakdown or issues identified

from equipment testing and inspections; or (b) addressing unplanned capital work (arising from earlier than expected equipment failure or a requirement for greater resourcing than originally anticipated and estimated for a capital project). In 2014 Hydro has made significant progress in reducing the backlog of terminal station PM work through the use of contract and temporary resources and plans to further reduce the outstanding terminal station work orders in 2015 through the continued use of additional temporary, and where necessary, contract resources.

The table below provides the information requested which is a summary of the terminal station PM work orders for 2011, 2012 and 2013 focused on safe and reliable delivery of electricity. Work orders related to inspections, P&C equipment and those not directly related to reliability such as fire extinguisher and eyewash station PM work orders are not included. The work orders in the backlog as of September 28, 2014 have been provided.

PM Work Orders				
Year	Terminal Station Equipment			
	Scheduled	Completed including Backlogs	Change in Cumulative Backlog[2]	Cumulative Backlog of current & prior years as of September 2014
2011	540	479	61	15
2012	471	459	12	27
2013	583	538	45	72[3]

[2]The cumulative backlog as it existed at the end of each year is not readily available as the CMMS records are not defined by the asset group requested (i.e. electrical supply related equipment.) In order to provide the annual work orders completed a manual search of each work order was undertaken to determine the type of work. The work orders ready to complete are all work orders identified in the manual search of the correct type of asset that were created in the requested year and have either been completed or are currently in the backlog. The change in cumulative backlog was provided to indicate the growth in the number of work orders in the back log in each year.

[3] 72 represents the cumulative total of all work orders in the backlog for work orders created in 2013 and earlier.