

Lower Churchill Management Corporation



Component Construction Progress and Performance Management Procedure



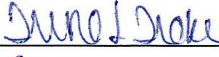

Nalcor Doc. No. LCP-PT-MD-0000-PC-PR-0019-01

Comments:	Total # of Pages (Including Cover): 11
-----------	--

Status/ Revision	Date	Reason For Issue	Prepared By	Functional Manager Approval	Quality Manager Approval	General Project Manager Approval
B1	27-Jul-2016	Issued for Use	<i>T. Power</i> T. Power	<i>P. Harrington</i> P. Harrington	<i>Paul Green FOR</i> D. Green	<i>R. Power</i> R. Power
CONFIDENTIALITY NOTE:			This document contains intellectual property of the Nalcor Energy – Lower Churchill Project and shall not be copied, used or distributed in whole or in part without the prior written consent from the Nalcor Energy – Lower Churchill Project.			

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	2

Inter-Departmental / Discipline Approval (where required)

Department	Department Manager Approval	Date
Deputy General Project Manager		21-JUN-2016
	J. Kean	
Muskrat Falls Generation Project Manager		23-JUN-2016
	S. O'Brien	
HVdc Specialties Project Manager		24-JUN-2016
	D. Debourke	
Overland Transmission Lines Project Manager		22-JUL-2016
	K. Kandaswamy	

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	3

TABLE OF CONTENTS

1.0 PURPOSE..... 4

2.0 SCOPE..... 4

3.0 REFERENCE DOCUMENTS..... 4

4.0 RESPONSIBILITIES..... 4

5.0 PROGRESS MEASUREMENT 5

5.1 General 5

5.2 Contractor Post Award Submission Requirements 5

5.3 Progress Measurement Definitions..... 7

5.4 Establishing the Baseline 8

5.5 Updating Requirements..... 8

5.6 Performance Evaluation and Variance Analysis 9

5.7 Forecasting 9

5.8 Reporting..... 10

6.0 INPUT INTO THE IPS 10

6.1 Purpose..... 10

6.2 Responsibilities 10

6.3 Method 11

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	4

1.0 PURPOSE

The purpose of this procedure is to establish guidelines for the measurement and reporting of Component Construction Progress on the Lower Churchill Project.

2.0 SCOPE

This procedure applies to Components C1 (Muskrat Falls Generation), C3 (HVdc Specialties) and C4 (Overland Transmission Lines) of the Lower Churchill Project. It excludes SOBI and the Maritime Link.

3.0 REFERENCE DOCUMENTS

- Integrated Project Schedule (IPS) – LCP-PT-MD-0000-PC-SH-0001-01
- Procedure for Key Quantity Monthly Progress Report – LCP-PT-MD-0000-PC-PR-0018-01

4.0 RESPONSIBILITIES

The Component Project Controls Leads are responsible for:

- Establishing and maintaining this procedure.
- Implementing this procedure within their Component.
- Reviewing the Contractor’s Progress Measurement Plan (part of their Schedule Development and Control Plan issued after the contract award) to ensure it meets the requirements of the Contract’s Coordination Procedure (Exhibit 3), and is aligned with the intent of this procedure and the needs of the Component Project Team.
- Providing guidance in the setup of all contract construction progress tracking methodologies to be used.
- Selecting the most effective methodology and integrating with other methodologies when these methodologies vary between Components and between individual contracts as the contract structures (i.e. EPC, T&M, Lump Sum, Unit Price, etc.) differ.
- Providing monthly construction progress, by contract and by IPS site code, to the IPS Planner.

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	5

5.0 PROGRESS MEASUREMENT

5.1 General

The purpose of Construction Progress and Performance Monitoring is to keep the Project Team and key stakeholders informed on a timely basis of the project performance including the status of completions, milestones achieved, and performance as measured against the project baselines. Progress and Performance Monitoring will describe the planned, earned, and forecast as well as any actions taken or planned, if required, to mitigate adverse variances and maintain project objectives.

Collecting and reporting progress and performance data will be adapted to each Component’s requirements. Differences in contract methodology (i.e. EPC, T&M, Lump Sum, Unit Price, etc.) have different approaches in terms of management as well as methods for measuring progress. This procedure provides guidelines for progress and performance monitoring which can then be adapted to the needs of each Component/Contract.

Various systems for tracking Contractor and overall Project Construction Progress will be utilized. Examples of tracking systems include: PM+, P6, Excel spreadsheets, etc. Each Contractor shall supply all required information for the Initial Setup & Weekly updating related to the measurement of Progress and Productivity for their Contract. Upon award, the Component Project Controls Team and the Contractor shall agree upon a Progress Breakdown based on the Contract Schedule of Prices Breakdown or Bill of Quantities (BOQ) and the Scheduling/WBS (IPS Site and Facility) needs of the Component Project Team.

The Contractor has the responsibility to develop the initial schedule which, once accepted, will become the baseline against which progress and earned value will be measured for the entirety of the project. Only if substantial changes are required, will the baseline change through a structured change management process.

5.2 Contractor Post Award Submission Requirements

Following contract award the required members of the Component Project Controls Team (such as the Component Project Controls Lead and Component Planner) shall attend all Contractor kick-off meetings, and outline to the successful Contractor the expectations relating to Project Planning, Reporting and Progress Measurement. It is important that expectations are

COMPONENT CONSTRUCTION PROGRESS AND PREFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	6

defined between Contractor and the Component’s Project Controls Team at the outset, and these kick-off meetings are the appropriate forum for this.

The Component Project Controls Team shall ensure that Contractors develop their own progress measurement plans at a level of detail consistent with the requirements of the Component Project Team. It is acceptable to provide detailed guidance to Contractors when it comes to project controls deliverables, but care should be taken not to inadvertently relieve them of their contractual responsibilities in the process.

The Contractor shall provide a Progress Measurement Plan (PMP) with its Schedule Development and Control Plan, which defines the Contractor’s plans for carrying out progress measurement during the term of the contract. At a minimum, the progress measurement plan must clearly demonstrate the ability to assess progress for all progress earning activities, provide a clear view of current project status and, for each commodity, describe the progressable items (i.e. individual foundations and pours) and the progress rules of credit used for earning partial progress (if applicable).

The Contractor shall demonstrate its progress measurement system to the Component’s Project Controls Team, including the actual take-off from IFC drawings or estimates of quantities (from IFC drawings or Material Take-Offs) and the direct work hours, if appropriate (including a clear and concise definition of “direct” and “indirect” work hours based on the actual work scope). If appropriate for the needs of the Component, all direct man-hours must be clearly broken down between the major items within a type of work (i.e. structures for steel, foundations for concrete, size and material type for pipe [i.e. 3” CS vs. 8” Chrome Moly], etc.). The Progress Rules of Credit Percentages (weighted percentage per Credit Rule) must be clearly identified for all phased type work. Major Equipment work must be broken down into definable and measurable Progress Items. The Contractor shall provide a clear definition of the work included under each Construction Commodity, which has been tailored to their contract work scope.

The Contractor shall work with the Component Project Controls Team to finalize the input into the appropriate tracking tools (i.e. PM+, P6, Excel, etc.) for setup of the contract to enable the proper tracking of planned and actual progress of the work.

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	7

5.3 Progress Measurement Definitions

The Implementation of Progress and Performance Monitoring will allow the project team to review the current performance of the work from inception to completion through periodic updates, and to facilitate course corrections as required. In order to ensure proper earned value management, the Component Project Team will decide on the appropriate methodologies to be used for capturing work accomplished. Different work scopes and contract structures dictate different methodologies to be used to communicate work accomplished. Progress Measurement is to be taken for all direct construction work and not against indirects. It must use one or a combination of the following techniques to ensure accurate measurement of earned value and avoid subjectivity. The Progress measured at the lowest level must be able to roll up to intermediate control levels and overall progress using a defined weighting system.

The following identify the methodologies used in progress measurement:

- **Units Completed** – This method can be used when the work scope can be broken down into fairly homogeneous units of work that each require approximately the same level of effort to accomplish, and for which units completed can be measured while work on other units continues.
- **Progress Rules of Credit** – This method can be used for commodity type work, where the work proceeds in Phases (i.e. Concrete Foundations work is completed in phases such as: Formwork; Rebar; Anchor Bolts & Embeds; Placing Concrete & Initial Finishing work; Stripping Formwork; Point & Patch; Exposed Concrete Grouting; etc.). To properly progress this Phased Work a weighted percentage (of a total of 100%) is assigned to each Rule of Credit (or phase) and each phase is measured individually. The weightings are typically to be derived from estimated effort.
- **Progressable Work Activity Items** – This method can be used for Major Equipment Installation type work. The overall Equipment scope is broken down into Individual Progress Items (includes the splitting of the total direct man-hours to each, if required), which are definable and measurable using one of the two methods above.

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	8

5.4 Establishing the Baseline

The development of the project schedule is the responsibility of the Contractor and once reviewed and accepted by the Component Project Team, establishes the baseline by which construction progress and performance will be measured. Once established, the baseline is frozen and will only change through a structured change management process to establish a re-baseline if significant changes require. Otherwise, the baseline is the gauge against which project performance is measured throughout the life of the project. This baseline will be incorporated into P6 and PM+ and other progress tracking tools to support the tracking of progress and performance analysis throughout the project.

5.5 Updating Requirements

Progress shall be measured and reported weekly by the Contractor. Tabular reports shall include both weekly (period) and cumulative progress. The output from these reports shall be the basis for updating all planned vs. actual progress curves and the percent complete of schedule activities in P6.

Progress verification techniques can be slightly different depending on the contracting strategy. For lump sum contracts, progress shall be verified by carrying out spot checks on site by the Component Site Project Controls Team or Site Inspectors and confirmed with the appropriate Area Construction Manager. Activities that are found to be over-progressed should be challenged as well as activities that are significantly under progressed. It is important that physical completion is reported as accurately as possible. For Contractors that are paid based on installed quantities, project controls shall verify physical progress versus issued for construction (IFC) drawings. In general, a Contractor will provide proof of quantity variations as the work progresses. The verification of actual quantities installed for payment purposes shall be carried out by the Site Project Controls Team or Site Inspectors and confirmed with the appropriate Area Construction Manager.

The Component Project Controls Team will have the responsibility for incorporating updates received from the Contractor into the established tracking tools. The Component Project Controls Team has the ultimate responsibility for tracking and reporting progress and will provide status updates based on input from the Contractor, perform schedule analyses (with input from the Component Planner), and provide independent reporting to augment information provided by the Contractor.

COMPONENT CONSTRUCTION PROGRESS AND PREFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	9

Upon review and approval by the Component Project Controls Team, this progress data will be incorporated into the established tracking tool by the Component’s Project Controls Team. The Contractor shall also establish procedures (for review and approval by Project Controls), which includes responsibility assignments among their staff to provide weekly progress/quantities for all work performed each week. The type and format of the data must be acceptable to the Component’s Project Controls Team.

Following the contract kick-off meeting the required members of the Component Project Controls Team shall attend weekly progress meetings with the Contractors and take a lead role in reviewing key dates, progress, scope changes and deviations to the plan in these meetings. The agenda for all Contractor weekly progress meetings should contain a section for Project Controls.

5.6 Performance Evaluation and Variance Analysis

Weekly analysis will be conducted by the Component Project Controls Team to identify variances from plan and to evaluate performance. The Component Project Controls Team will also use progress data and graphs to confirm if the Contractor’s schedule forecasts for remaining work to be completed is realistic based on current and historical production rates.

Variances and changes to the schedule will be analyzed for impact and will be addressed by both Contractor and the Component Planner. Some variations from plan are to be expected on a project of this magnitude. The planning team, in conjunction with Area Construction Managers, will determine if the observed variances warrant immediate recovery actions or are to be monitored.

5.7 Forecasting

The Contractor’s performance to date will be used to support forecasting of likely completion of important milestones as well as overall project completion. Forecasting is performed monthly in accordance with the Integrated Progress Schedule (IPS) procedure (LCP-PT-MD-0000-PC-SH-0001-01). The Progress measurement and analysis should be considered in supporting the Forecast by considering:

- Past performance, installation rates, resource availability.
- Remaining effort required to complete work scope.
- Materials and Equipment needed to support work effort.
- Critical path of the project.

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	10

- Issues or critical concerns that may affect future performance.

5.8 Reporting

The Contractor will provide monthly reports that will include tabular reports and graphs summarizing progress of the period as well as progress to date. Contractor’s report will provide Contractor’s analysis of their progress and performance for review by the Component Project Team.

The Component Project Controls Lead/Planner will provide independent review and analysis of both the Contractor’s monthly report as well as the raw progress data provided by the Contractor and will document this independent review in the Component’s Monthly Report. This analysis will include development and review of Performance Indices and other earned value measures. This report will analyze Contractor performance to date and will use this data to forecast completion, identify issues and critical areas of concern, and propose possible corrective actions.

The data captured within this Procedure shall form the inputs to the Key Quantity Report as outlined in the *Procedure for Key Quantity Monthly Progress Report - LCP-PT-MD-0000-PC-PR-0018-01*.

6.0 INPUT INTO THE IPS

6.1 Purpose

The Monthly Update of the Component Construction Progress shall provide the basis for updating the Construction Progress in the applicable portions of the *Integrated Project Schedule (IPS) - LCP-PT-MD-0000-PC-SH-0001-01*.

6.2 Responsibilities

The Component Project Controls Team maintains the Component Construction Progress in Excel/P6 and provides the Component Monthly Construction Progress data in the format required by the IPS Planner.

As required, the Component Project Controls Lead shall also provide a written Construction Progress narrative into the IPS report for the consideration of the IPS Planner.

COMPONENT CONSTRUCTION PROGRESS AND PERFORMANCE MANAGEMENT PROCEDURE		
Nalcor Doc. No.	Revision	Page
LCP-PT-MD-0000-PC-PR-0019-01	B1	11

The IPS Planner is responsible for updating and issuing the IPS Schedule and Status Report.

6.3 Method

After finalizing the Excel/P6 Construction Progress monthly update the Component Project Controls Team shall provide copies to the IPS planner (summarized by contract and grouped by IPS site code).

The Component Project Controls Team shall have an opportunity to review the Monthly IPS schedule update of their Component and will have an opportunity to provide comments on it. Authority over the final content that is published rests with the IPS planner.