nalcor energy
LOWER CHURCHILL PROJECT

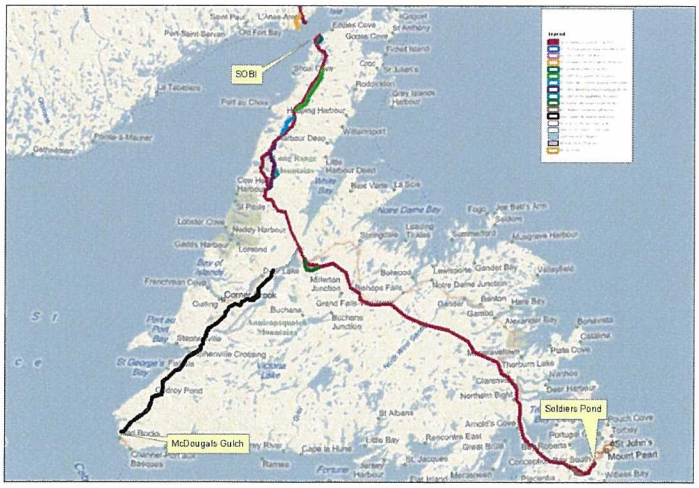
SNC·LAVALIN

Lower Churchill Project
Phase I

Agreement LC-G-002 for EPCM Services

Kickoff Meeting

30 – 31 March 2011



nalcor energy LOWER CHURCHILL PROJECT

SNC·LAVALIN

DAY 2 (31-Mar-2011)

8:00 AM – 8:30 AM – Team Arrival and Continental Breakfast

8:30 AM – 10:00 AM

12 – Safety Moment	SLI
13 – EPCM Execution	SLI Team
– Organization and Structure	F. Couturier
– Procurement	I. Hendry

COMFORT BREAK (10:00 – 10:15)

10:15 AM – 12:15 PM

– Component 1	F. Couturier
– Component 3	S. Sud
– Component 4	A. Hussain

LUNCH (12:15 PM – 1:00 PM)

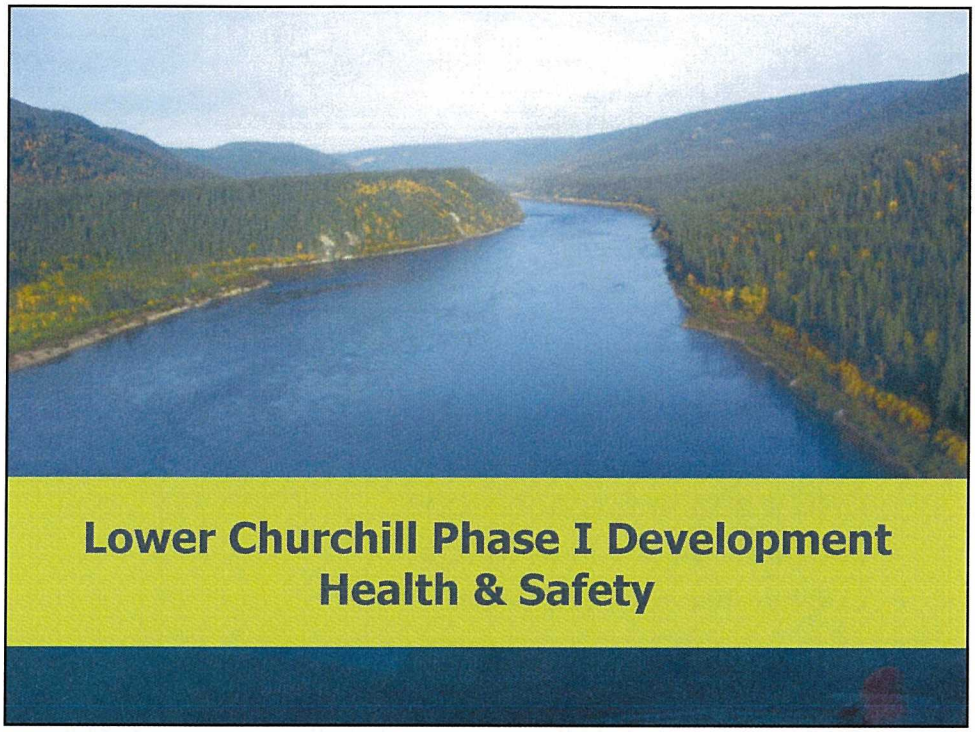
1:00 PM – 3:00 PM

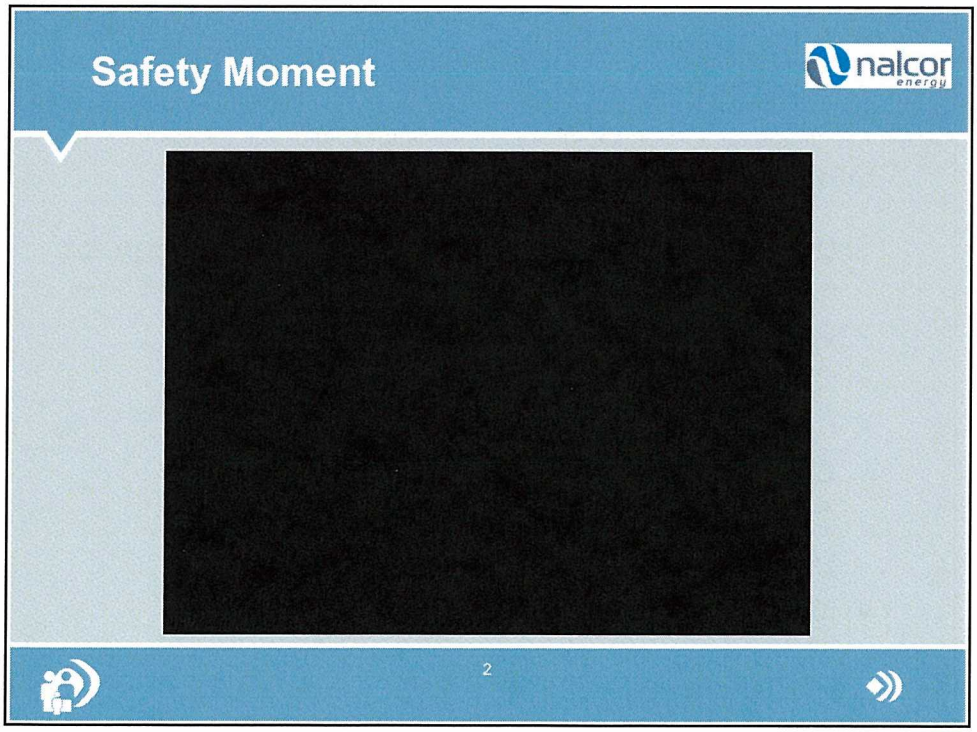
14 – Construction Management Presentation	
– Approach and Structure	N. Mills
– Component 1	N. Mills

COMFORT BREAK (3:00 – 3:15)

3:15 PM – 5:00 PM

– Component 3	S. Sud
– Component 4	F. Bergman / B. Stacey
15 – Other Key Focus Areas	
a) Regulatory and Environment	M. Organ
b) Quality Management	D. Green
16 – Project Office – Description and Status Update	E. Reid
17 – Plan for Focused Workshops	R. Power
18 – Wrap-up	


Lower Churchill Phase I Development
Health & Safety


Safety Moment
nalcor energy
2

Health and Safety

Nalcor Expectations (in summary):

- ❑ Providing a safe and healthy workplace for all;
- ❑ Not compromising one's focus on safety to achieve other project objectives;
- ❑ Everyone taking personal responsibility for safety;
- ❑ Zero Harm – Nobody Gets Hurt.

SNC-Lavalin Expectations:

- ❑ Exactly the same as Nalcor;
- ❑ Why - because WE CARE.

3

Health and Safety

Where are we today?

- ❑ Draft of Health and Safety Management System is nearing completion and ready for comment.
- ✓ Roles and Responsibilities
- ✓ Company Rules
- ✓ Contractor Safety Prequalification
- ✓ Contractor Management
- ✓ Contractor Non-Conformance
- ✓ Hazard Identification
- ✓ Meetings and Communications

4

Health and Safety

Where are we today cont'd;

- ✓ Incident and Injury Management
- ✓ Development of management system Standards (safe work procedures) in progress
- ✓ Monthly Health and Safety Performance Summary Reporting

- ❑ Critical Risk Control Protocols established

5

Health and Safety

Planned:

Safety Leadership Training for the SLI Project Team

This is an 6-hour session designed specifically for project management, engineering and construction staff.

The training goes through 4 core areas:

- ✔ Believing in Safety
- ✔ Creating a Safety Culture
- ✔ Safety Applications at SNC-Lavalin
- ✔ Expectations of our People around Safety

6

Health and Safety

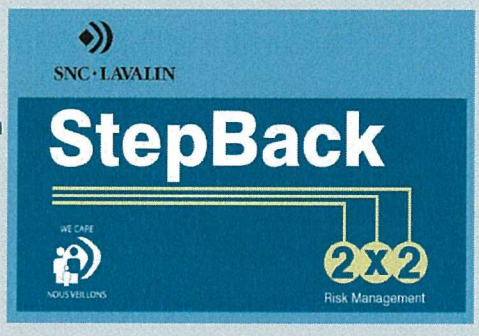
Step Back – Risk Awareness

Intent: Measure risk in the working environment;

Approach: Doing a risk calculation on every task we do;

Development: Every worker before beginning a task to determine the level of risk;

Results: Worker thinks about the task from a new perspective.



7

Health and Safety

Risk Registers

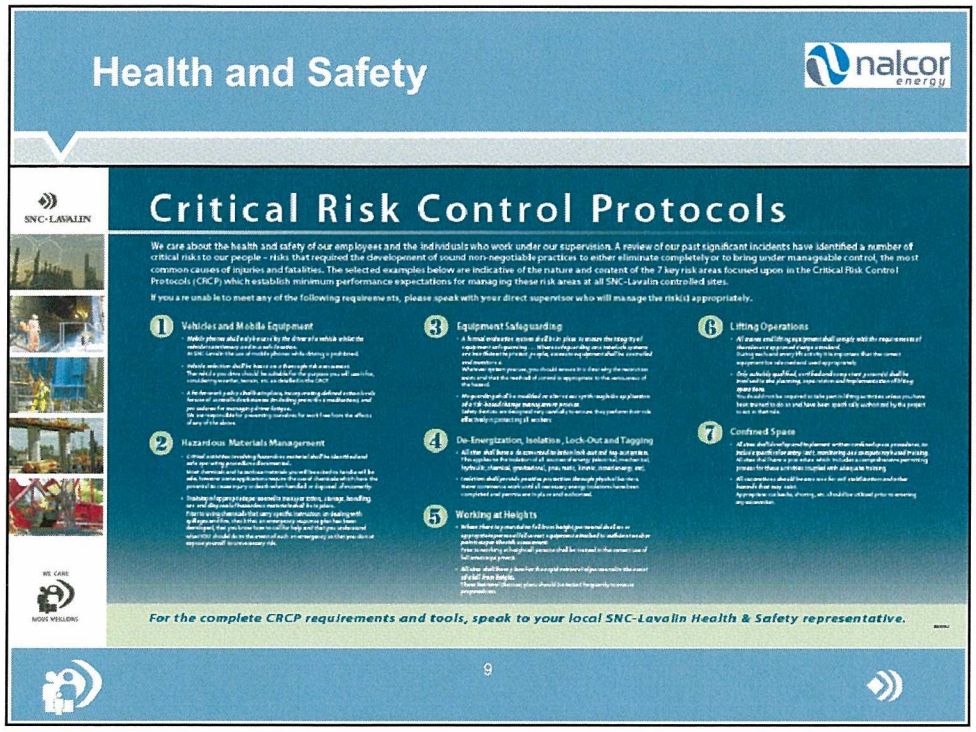
- ✓ Identify Hazards and Outcomes
- ✓ Assess exposure and controls
- ✓ Calculate Risk Levels
- ✓ Develop Action Plans to eliminate or mitigate risks

Positive Incentive Program

Experience tells us, that for any incentive program to be effective and reinforce behaviour, it must meet three criteria:

- ✔ Desirable: Reward schemes are attractive for the project labour demographic;
- ✔ Attainable: Possible for any and all workers to achieve a reward;
- ✔ Associating: It must be immediately tied to the specific behavior identified

8



Health and Safety

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Critical Risk Control Protocols

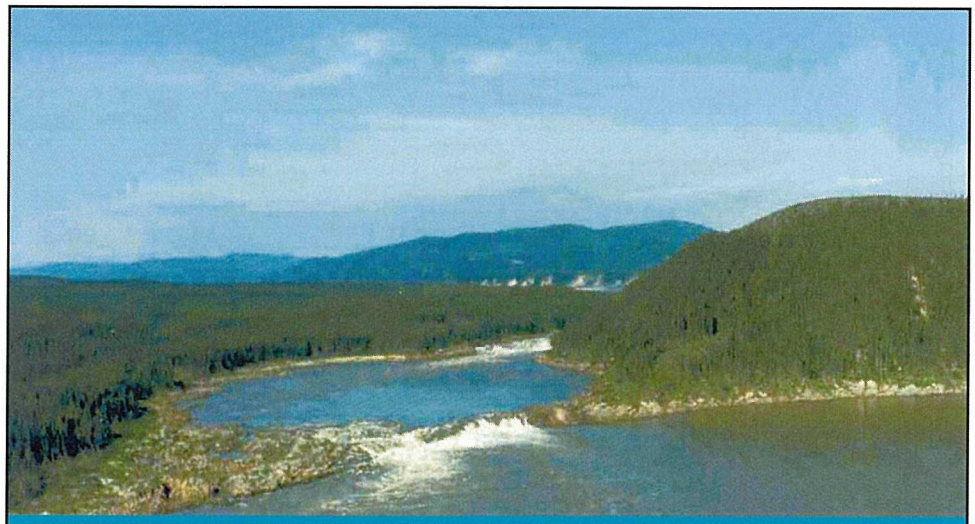
We care about the health and safety of our employees and the individuals who work under our supervision. A review of our past significant incidents have identified a number of critical risks to our people – risks that required the development of sound non-negotiable practices to either eliminate completely or to bring under manageable control, the most common causes of injuries and fatalities. The selected examples below are indicative of the nature and content of the 7 key risk areas focused upon in the Critical Risk Control Protocols (CRCP) which establish minimum performance expectations for managing these risk areas at all SNC-Lavalin controlled sites.

If you are unable to meet any of the following requirements, please speak with your direct supervisor who will manage the risk(s) appropriately.

1. Vehicles and Mobile Equipment
2. Hazardous Materials Management
3. Equipment Safeguarding
4. De-Energization, Isolation, Lock-Out and Tagging
5. Working at Heights
6. Lifting Operations
7. Confined Space

For the complete CRCP requirements and tools, speak to your local SNC-Lavalin Health & Safety representative.

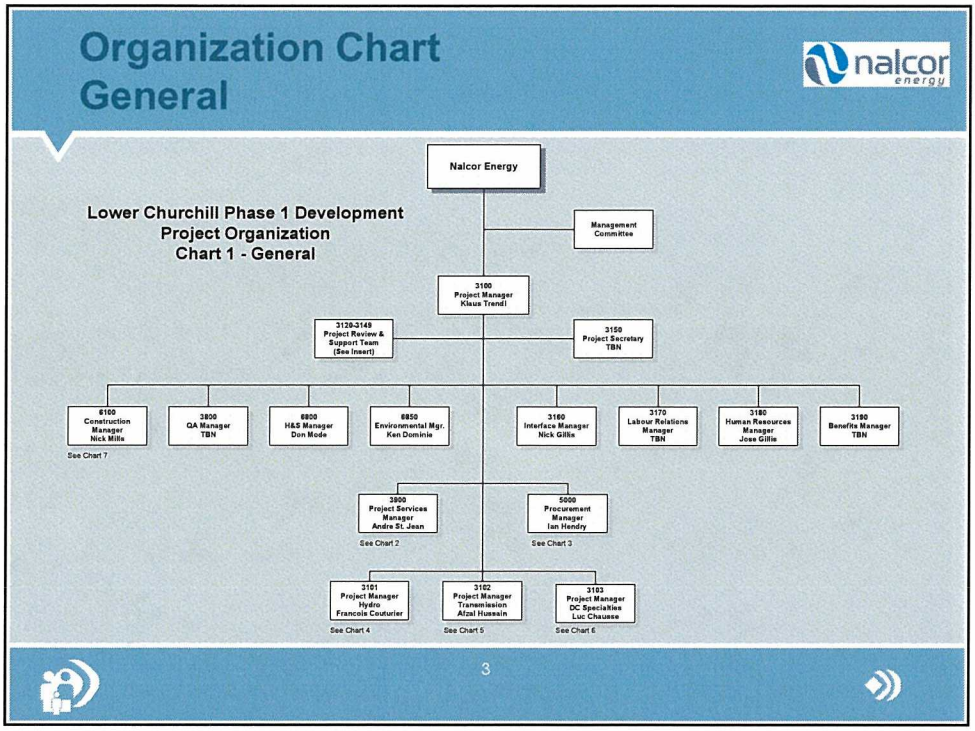
9



Lower Churchill Phase 1 Development
EPCM Execution
Organization and Project Management

Content

1. General organisation and structure
2. Milestones and Gateway process
3. Deliverables
4. Project management aspects (misc)
5. Area Management concept
6. MFL curve


Organization Chart
General
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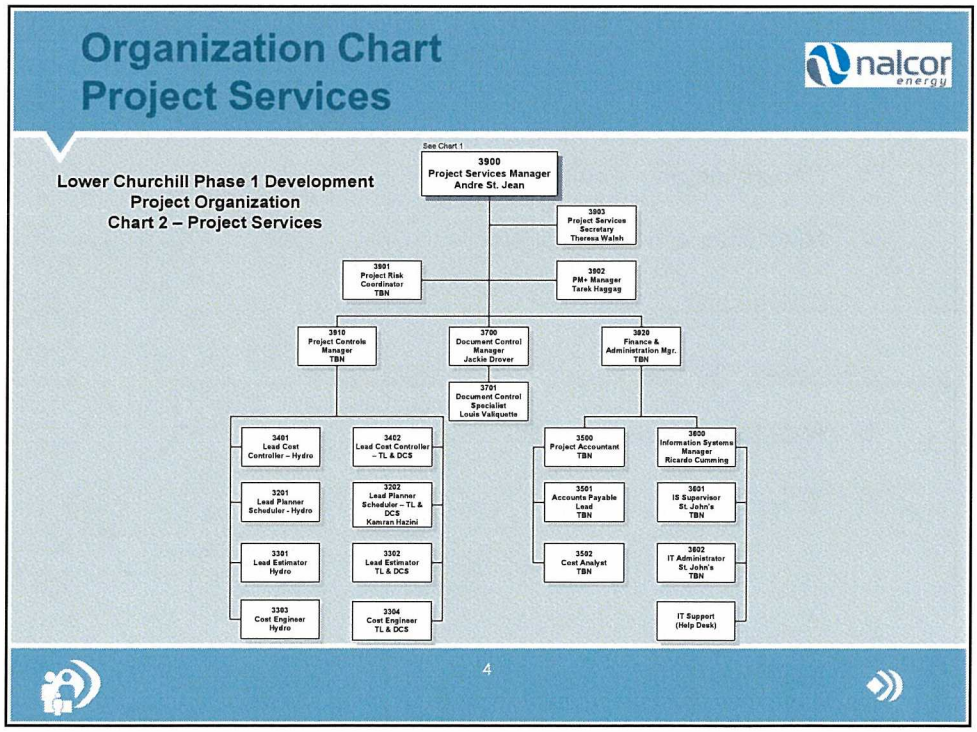
Lower Churchill Phase 1 Development
Project Organization
Chart 1 - General
Nalcor Energy
Management Committee
3100 Project Manager Klaus Trendl
3120-3149 Project Review & Support Team (See Insert)
3150 Project Secretary TBN
6100 Construction Manager Nick Mills
See Chart 7
3800 QA Manager TBN
6800 H&S Manager Don Mode
6850 Environmental Mgr. Ken Dominie
3160 Interface Manager Nick Gillis
3170 Labour Relations Manager TBN
3180 Human Resources Manager Jose Gillis
3190 Benefits Manager TBN
3900 Project Services Manager Andre St. Jean
See Chart 2
5000 Procurement Manager Ian Hendry
See Chart 3
3101 Project Manager Hydro Francois Couturier
See Chart 4
3102 Project Manager Transmission Afzal Hussain
See Chart 5
3103 Project Manager DC Specialties Luc Chausse
See Chart 6
3


Organization Chart
Project Services
nalcor energy
Lower Churchill Phase 1 Development
Project Organization
Chart 2 – Project Services
See Chart 1
3900 Project Services Manager Andre St. Jean
3903 Project Services Secretary Theresa Walsh
3901 Project Risk Coordinator TBN
3902 PM+ Manager Tarek Haggag
3910 Project Controls Manager TBN
3700 Document Control Manager Jackie Drover
3920 Finance & Administration Mgr. TBN
3701 Document Control Specialist Louis Valiquette
3401 Lead Cost Controller – Hydro
3402 Lead Cost Controller – TL & DCS
3201 Lead Planner Scheduler - Hydro
3202 Lead Planner Scheduler – TL & DCS Kamran Hazini
3301 Lead Estimator Hydro
3302 Lead Estimator TL & DCS
3303 Cost Engineer Hydro
3304 Cost Engineer TL & DCS
3500 Project Accountant TBN
3501 Accounts Payable Lead TBN
3502 Cost Analyst TBN
3600 Information Systems Manager Ricardo Cumming
3601 IS Supervisor St. John's TBN
3602 IT Administrator St. John's TBN
IT Support (Help Desk)
4

Organization Chart Procurement

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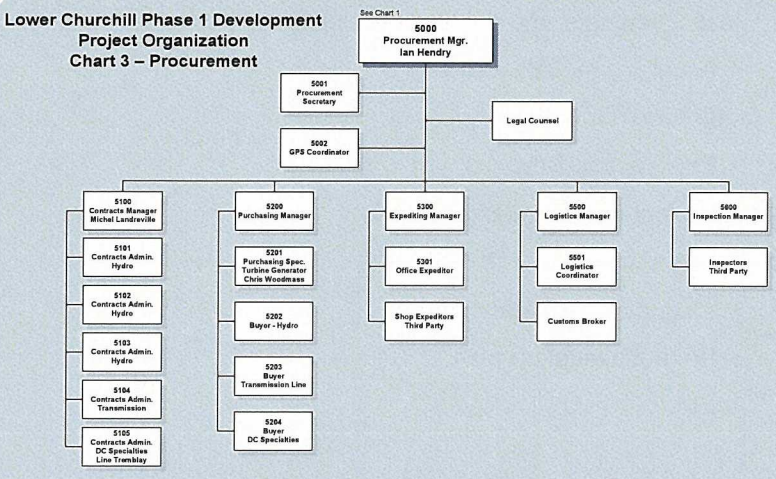
Lower Churchill Phase 1 Development
Project Organization
Chart 3 – Procurement



5

Milestones (Ref. Exhibit 7)

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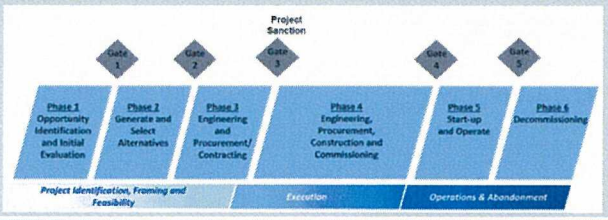
➢ Project Sanction – Gate 3	December 15, 2011
➢ Commence Bulk Excavation	July 1, 2012
➢ MF to CF Transmission Line	August 31, 2014
➢ First Power MF	October 31, 2016
➢ Island Link	January 30, 2017
➢ Full Power MF	May 31, 2017



6

Deliverables for Gate 3

- Class 3 estimate and detailed execution schedule
  - Accuracy -10%, +20%
- Other requirements
  - Final layout drawings
  - Project-specific design criteria
  - Basis of design
  - All geotechnical surveys
  - Project execution plan
  - Etc.

7

Project Management

Leadership and Coordination in EPCM Context

- Owner – EPCM contractor team liaison
- Engineering
- Procurement
- Construction
- Project Controls

8

Project Management

Objectives

- HSE: Zero recordable incidents
- Building a best in class hydro plant and transmission system
- Meeting or improving schedule and budget
- Complying with Company's community commitments and requirements
- Optimising construction, operations and maintenance
- Value Engineering….

9

Project Management

…Objectives

- Cap on CAPEX
  - Value engineering
  - Monitoring of quantities in the course of engineering
  - Actions to reduce quantities
  - Procurement in low cost countries – SLI's Shanghai Office
  - Pro-active approach instead of reactive

10

Project Management

Early Deliverables (*Table 1.1, Exhibit 5*)

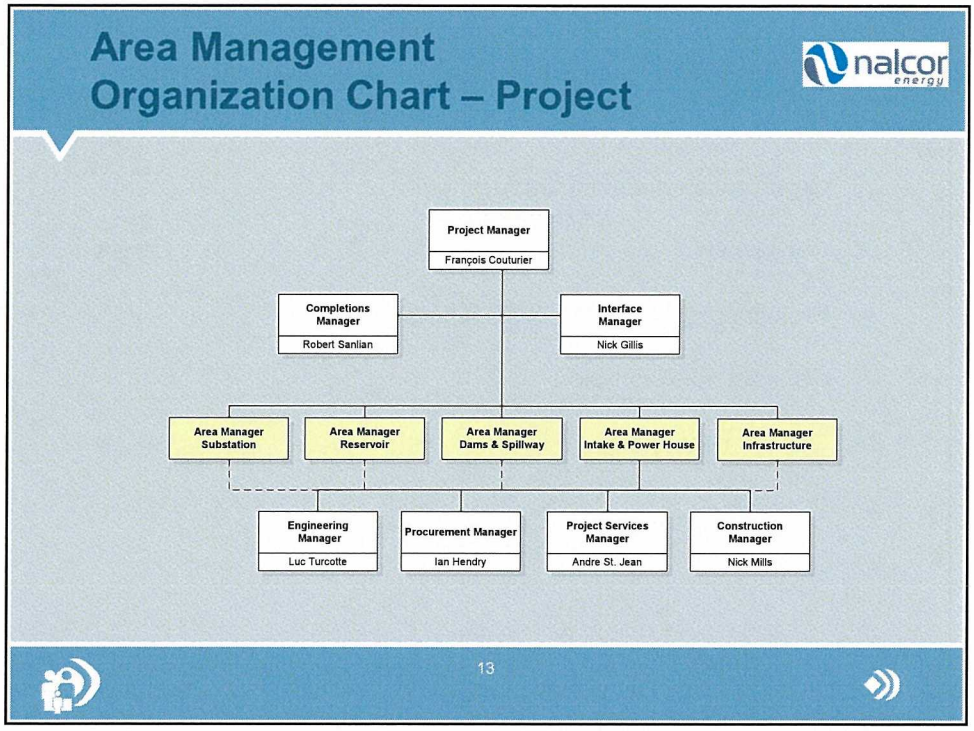
- 36 documents, E P CM and PM
  - Execution Plan
  - HSE Plan
  - Quality Plan
  - Risk Management Plan
  - Procurement Plan – Contract Strategy
  - Project Instructions

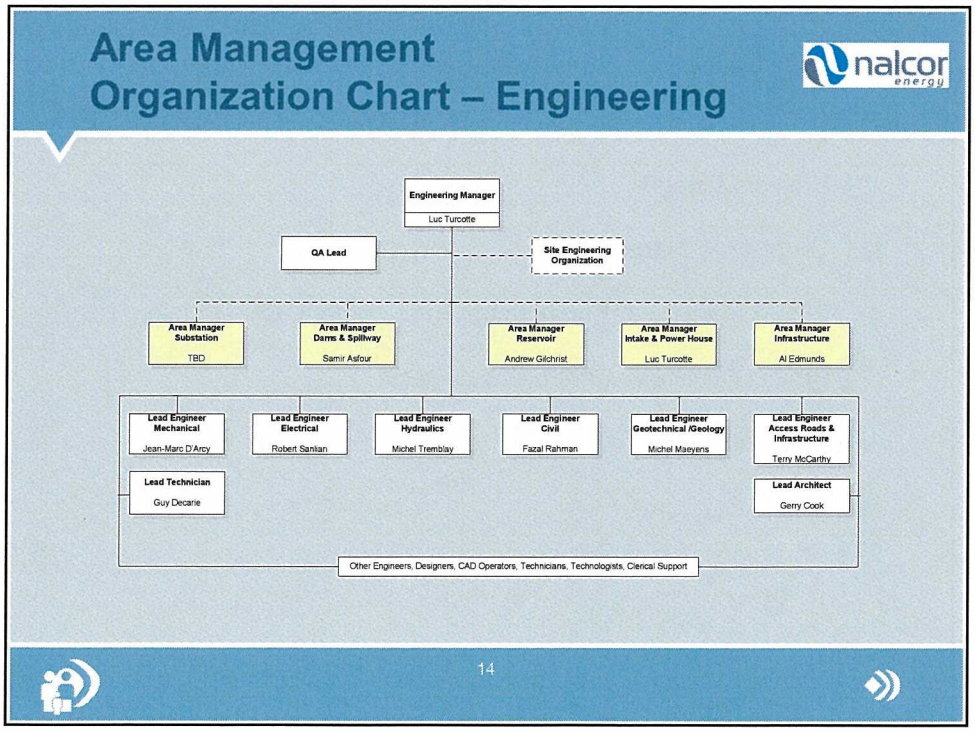
11

Area Management Approach

- Matrix organization
- Project is broken down into key areas
- Area managers are assigned for each area
- Area managers report to the Project Manager
- Interface with all functional groups for area work –
  - Engineering, procurement, project services, construction management and interface management
- Interface with the field for the construction stage
- Provides continuity

12


Area Management
Organization Chart – Project
nalcor energy
Project Manager
François Couturier
Completions Manager
Robert Sanlian
Interface Manager
Nick Gillis
Area Manager Substation
Area Manager Reservoir
Area Manager Dams & Spillway
Area Manager Intake & Power House
Area Manager Infrastructure
Engineering Manager
Luc Turcotte
Procurement Manager
Ian Hendry
Project Services Manager
Andre St. Jean
Construction Manager
Nick Mills
13


Area Management
Organization Chart – Engineering
nalcor energy
Engineering Manager
Luc Turcotte
QA Lead
Site Engineering Organization
Area Manager Substation
TBD
Area Manager Dams & Spillway
Samir Asfour
Area Manager Reservoir
Andrew Gilchrist
Area Manager Intake & Power House
Luc Turcotte
Area Manager Infrastructure
Al Edmunds
Lead Engineer Mechanical
Jean-Marc D'Arcy
Lead Engineer Electrical
Robert Sanlian
Lead Engineer Hydraulics
Michel Tremblay
Lead Engineer Civil
Fazal Rahman
Lead Engineer Geotechnical /Geology
Michel Maeyens
Lead Engineer Access Roads & Infrastructure
Terry McCarthy
Lead Technician
Guy Decarie
Lead Architect
Gerry Cook
Other Engineers, Designers, CAD Operators, Technicians, Technologists, Clerical Support
14

Responsibilities of Area Managers

- Organization and planning
- Coordination
- Project controls (Area), cost, schedule
- Contract administration
- Quality assurance
- Reporting

15

Working Relationships

- Project Manager
- Client Area Manager
- EPCM Managers (Engineering, Procurement, Construction, HSE)
- Project Services / Controls Managers
- Commissioning Team

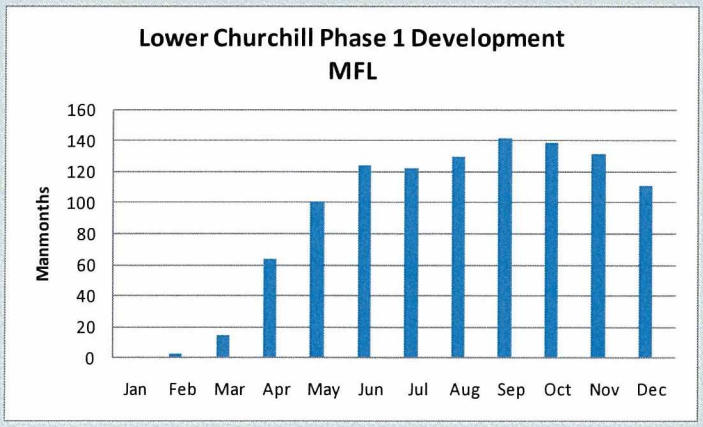
16

Benefits of Area Management

- Good interface management
- Timely resolution of issues
- Enhanced quality of work
- Productive work environment
- Efficient communications and reporting
- Optimized cost and schedule control

17

MFL



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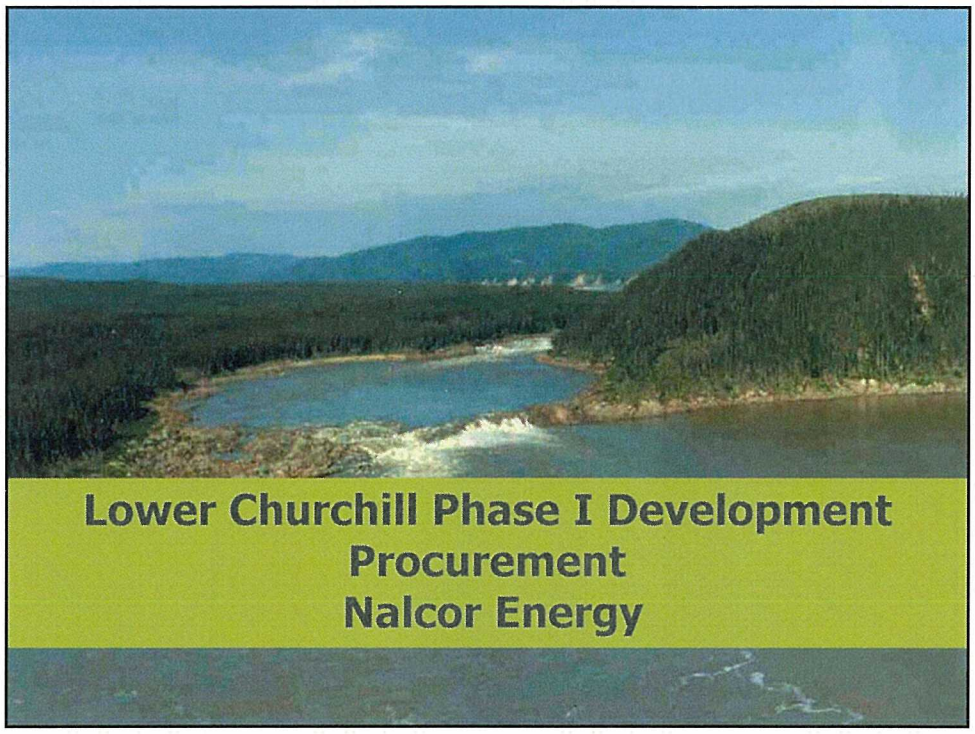
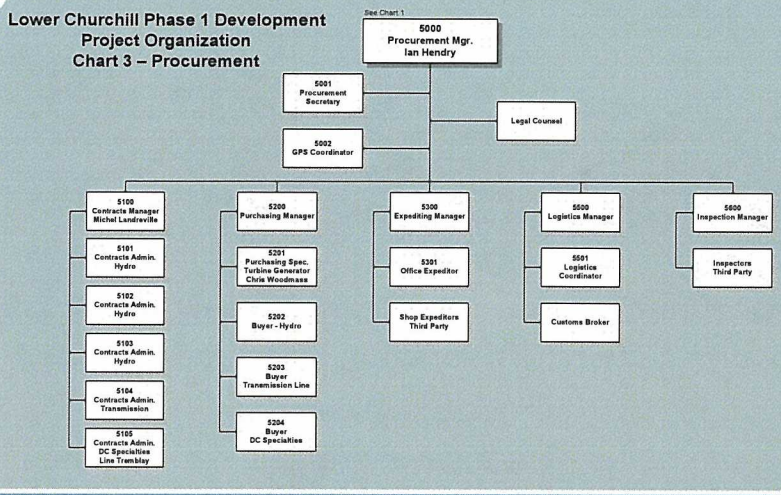


Procurement

Procurement on the Lower Churchill Development will consists of Contracts, Purchasing, Expediting, Inspection, Logistics & Material Control

2

Organization Chart Procurement



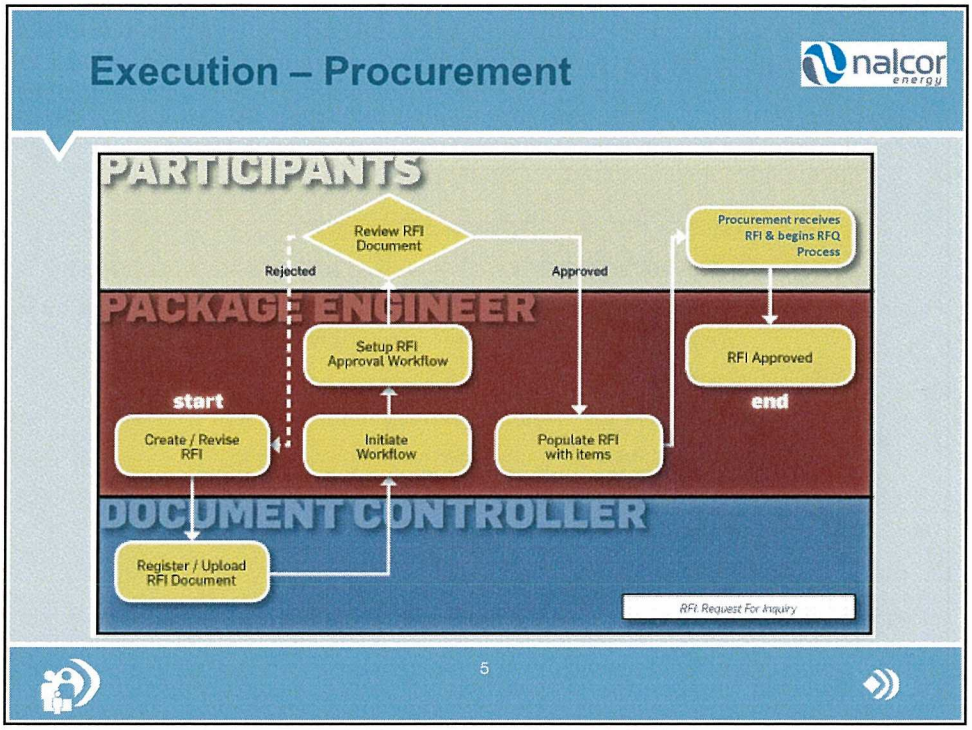
3

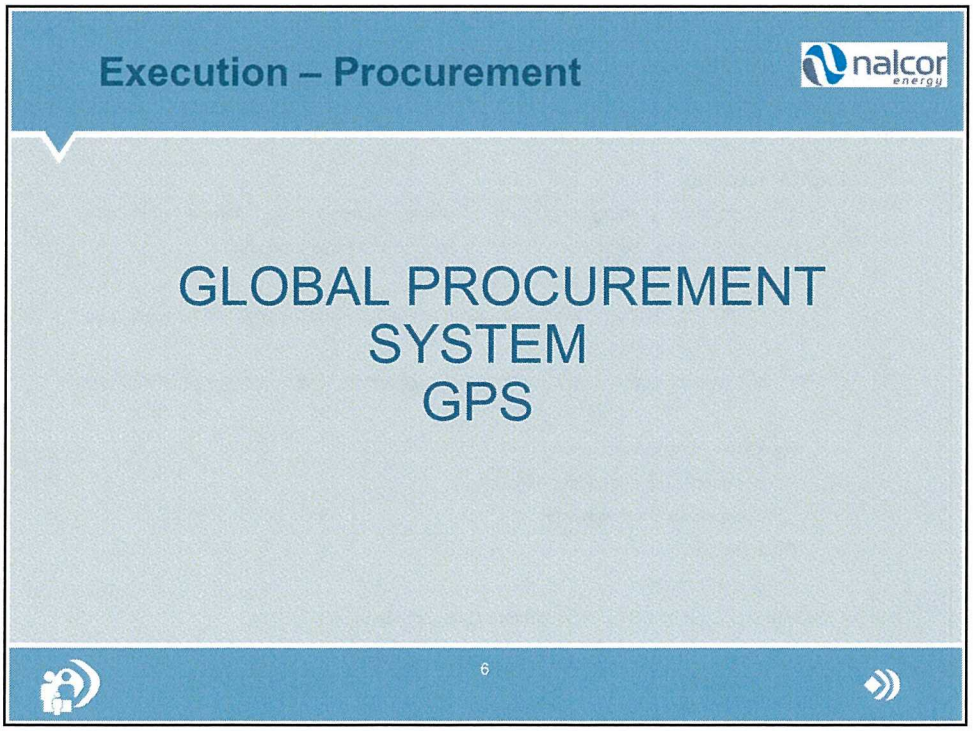
Execution – Procurement

Early Activity Status

- Key personnel confirmed / mobilized
- Overall Contract and Purchasing Plans – Rev A issued for internal review
- Materials Management & Logistics Plans started. Forecast issue for internal review week 11 April
- Full Execution Plan – Procurement section started; draft forecast completion 15 April
- Procedures downloaded to project PDM. Gradual modification to LC requirement over the year
- EPC (Converter and TG) contract individual plans started
- RFI (auto) & GPS System implementation in planning
- Lead time and cost checks
- Contract package list review
- Global equipment sources
- Risk identification

4


Execution – Procurement
nalcor energy
PARTICIPANTS
Review RFI Document
Rejected
Approved
Procurement receives RFI & begins RFQ Process
PACKAGE ENGINEER
Setup RFI Approval Workflow
RFI Approved
start
end
Create / Revise RFI
Initiate Workflow
Populate RFI with items
DOCUMENT CONTROLLER
Register / Upload RFI Document
RFI Request For Inquiry
5


Execution – Procurement
nalcor energy
GLOBAL PROCUREMENT SYSTEM
GPS
6

Global Vendor Database

- Central repository of all SNC Lavalin approved vendors
- Fed both externally and internally
  - Externally: vendor web-based self-registration process
  - Internally: vendor "post mortem" assessments
- All inputs carefully reviewed on an ongoing basis
  - by Global Procurement Category Managers
  - by Global Procurement Supplier Assessment Manager
- Searchable through multiple criteria
  - Supplied categories, geographical location, qualifications, etc.

7

Global Sourcing Knowledgebase

- Logically structured
  - 13 macro sourcing categories (Electrical, piping, automation, etc.), segmented in 200+ detailed sourcing categories – this will change to add more groupings
  - Standard display of information at each level
    - → Intuitive use and navigation, even for someone who had no training on the system
- Central sourcing information repository for buyers, estimators, and anybody else dealing with suppliers
  - Market trends and lead times
  - Vendor qualifications and classifications
  - Global framework agreements
  - Price indexes
  - Contact information
- Constantly updated by Global Procurement Category Managers

8

Global Spend Analysis

Ability to "slice and dice" SNC Lavalin spend along the following dimensions:

- Vendor
  - Name
  - Geographical location
- Type of goods or services
  - Sourcing Category Codes (standard classification for all SNCL purchases)
  - Commodity Resource Codes (CRCs)
- Project
  - Name
  - Client
  - Industry
  - Type (EPC vs. EPCM)
- Time

Global eSourcing

- Request For Information (eRFI)
- Request For Quotation (eRFQ)
- Request For Proposal (eRFP)
- Reverse auctions

Global eSourcing

Seamless, paperless process covering the following steps

- Bidders list creation and approval
- Vendor invitation
- Vendor bidding
- Bid analysis
- Online negotiation
- Award recommendation and approval

11

Global Sourcing Planning

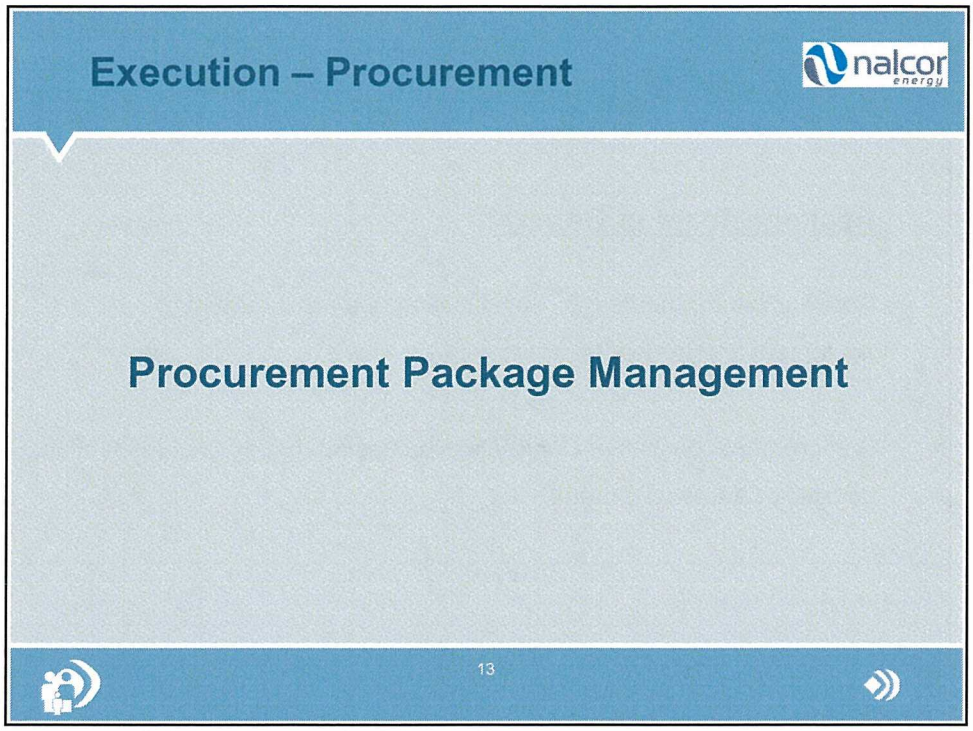
Time-phased visibility into planned procurement activities

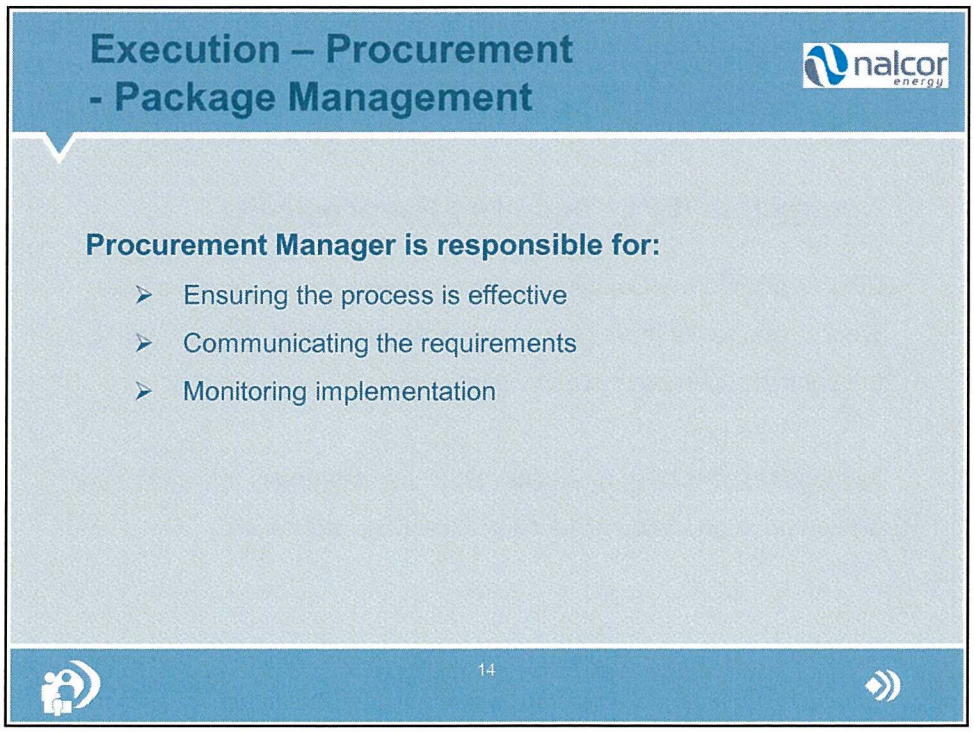
- Encompassing all projects,
- Regrouped by sourcing categories

Such horizontal visibility enables Global Procurement category managers to:

- Proactively support projects in their bidders list creation process
- Identify risks of supply capacity shortage situations as soon as possible
- Identify group buying opportunities

12


Execution – Procurement
nalcor energy
Procurement Package Management
13


Execution – Procurement
- Package Management
nalcor energy
Procurement Manager is responsible for:
Ensuring the process is effective
Communicating the requirements
Monitoring implementation
14

Package Management

Package Team in General

Responsible for the design, specification and procurement of equipment and materials for the works

Procurement consists of Contracts, Purchasing, Expediting, Inspection, Logistics & Material Control

15

Package Management

Contractors (EPC) Suppliers Responsibility

EPC Contractors & Suppliers are responsible for the design of their product and for its manufacture and delivery / installation according to the contract / purchase order requirements.

Includes responsibility for quality, HSE, completeness, on time delivery, agreed price and in compliance with relevant legislation.

16

Package Management

Package Team Responsibilities

- Package management from EOI to package close-out
- Sole point of contact for bidders and contractor / supplier
- Acting according to highest standard of business ethics
- Bid List Development
- EOI, RFI and RFP
- Evaluation and Recommendation
- Requisition for commitment
- Contract / Purchase Order preparation for issue by Nalcor
- Contract / Order administration
- Budget accountability

17

Package Management

The Package Team

Each package managed as a team activity

Package team comprises:

- Contract Administrator (CA) or Package resp. Buyer (PRB) – Commercial matters incl. E&I and joint package coordination with PRE
- Package Responsible Engineer (PRE) – Technical matters and joint package coordination with PRB
- Package Quality Engineer (PRQ) – Quality matters
- HSE and others as required

Support groups:

- Engineering Design
- Construction team
- Commissioning
- Operations and Maintenance
- 3rd party services (E, I, L)

18

Package Management

PRE Responsibility

- Joint Package Management
- Defining work scope / package dictionary
- Package criticality rating
- Bidder list development / supplier prequalification
- Job Specification
- Technical evaluation
- Overall review, comments, coding & sign off of technical data
- Ensuring documents are reviewed by discipline engineering
- Ensuring expert is present or represents team at supplier's works for document reviews.

19

Package Management

The CA / PRB is responsible for:

- Joint Package Management
- Overall package management coordination
- EOI , Prequalification , Bid List & RFP Process (lead)
- Commercial evaluation and joint recommendation
- Supplier interface
- Benefits interface
- E & I through the E & I Mgrs
- Contract (through Constr. Group) / PO administration
- Contract (through Constr. Group) / PO Close-out

20

Package Management

PRQ Responsibility

- Ensuring quality rating compliance
- Supplier audits
- QA evaluation
- Manage quality issues & 3rd party inspection*
- Final release quality related documentation
- Bidder prequalification Supplier interface
- Close-out (Q related)

* EPC packages

21

Package Management

Expediting and Inspection

- Expediting will be coordinated through Expediting Mgr.
- Inspection will be coordinated through Inspection Mgr. in close liaison with PRE.
- 3'rd party Expeditors & Inspectors will be used
- Visits to be meaningful and not routine
- Visits to follow Inspection and Expediting plan
- E & I according to the criticality rating
- Duplication to be avoided (activities to be coordinated)

22

Package Management

Contacts

- One point of contact (both parties)
- Correspondence issued shall be over the name of CA / PRB copy to PRE & PRQ

Package Management

Correspondence and filing

- Correspondence will be controlled
- Correspondence incoming to attention CA / PRB copy to PRE
- Dedicated package email address per package
- Individual Package folders in PDM
- Email automatically copied to PDM

Procurement Execution - Benefits

Strategy

- Comply with the IBA
- Support Nalcor's overall benefit initiatives
- Maintain transparency with business community
- Optimize local spend
- Implement training and succession planning

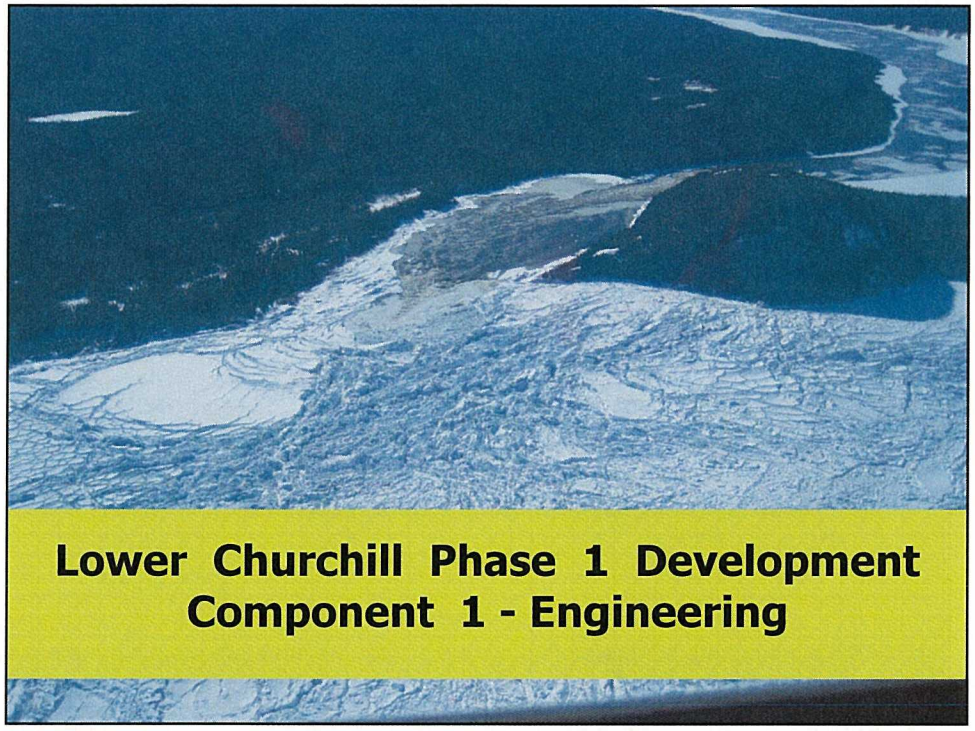
25

Execution – Procurement

Procurement Committee

- Establish a committee comprising the Procurement Manager, Project Manager, Area Manager and Nalcor representatives
- Purpose of the committee is to jointly approve awards of contracts and POs promptly
- Committee will convene at regular intervals to review award recommendations submitted by Procurement for approval

26



Execution - Engineering

1. Strategy
2. Organisation
3. Early Activities
4. Progress
5. Change Management
6. Engineering Processes
7. 3D Models
8. The Project Status
9. Further Studies
10. How it is Built

2

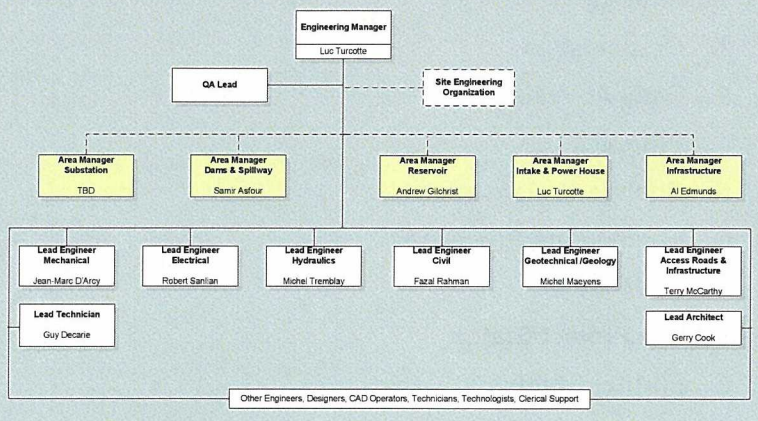
Execution – Engineering

Strategy

- Engineering Studies
- Value Engineering
- Reviews - Constructability, Operability, Maintainability, Design for Safety
- Use of 3D models
- Drawings (ACAD) and specifications are basic deliverables

3

Engineering Organization



4

Execution – Engineering

Early Activity

- Prepare engineering packages (IWP) that will include:
  - Complete and detailed list of engineering deliverables
  - Budgeted hours for each deliverable
  - Schedule for 60%, 90% and 100% for each deliverable or group of deliverables
  - List of personnel involved in the preparation of the package
  - List of input information needed to complete the engineering of the particular package
- Prepare design criteria and specifications for Turbine Generator Package; coordinate with competitive model tests
- Start equipment lists for layout purposes
- Prepare preliminary specification for budget pricing
- Conduct value engineering / risk analysis sessions…

5

Execution – Engineering

Early Activity (cont'd)

- Prepare specification for hydraulic model
- Define program for geotechnical investigations

Early Works Engineering

- Prepare bid package for:
  - Access roads
  - Construction site power
  - Site clearing and Excavation package
  - Construction camps and services
  - Site Communication

6

Execution – Engineering

Monitoring of Engineering Work Progress

- Engineering progress monitored with PM+ Internal mandate, using earned hours concept
- Review of progress for each engineering packages on a monthly basis
- Integration of design reviews in the engineering process

PM+

Curve

7

Execution – Engineering

Change Management

- Proactive approach to changes
- Monitoring of quantities and changes
- Analysis of changes
- Changed conditions (geotechnical/hydrological)
- Minimize changes through bidding with detailed drawings
- Organized effort to reduce quantities

8

Execution – Engineering

Processes

- Value Engineering
- Constructability Reviews
- H&S Reviews (Construction and Operation)
- Risk Assessment

3D Digital Models

- **Scope**
  - Site
  - Powerhouse
  - Spillway
  - Other structures
- **Disciplines**
  - Geology/geotechnical
  - Civil
  - Mechanical & Electrical
  - Structural steel
  - Architectural elements

3D Digital Models

- **Applications**
  - Quantities
  - Coordination
  - Visualisation
  - Reviews
  - Presentation
  - Input to analysis software
  - Production of reference drawings
- **With CATIA and PDM Link**

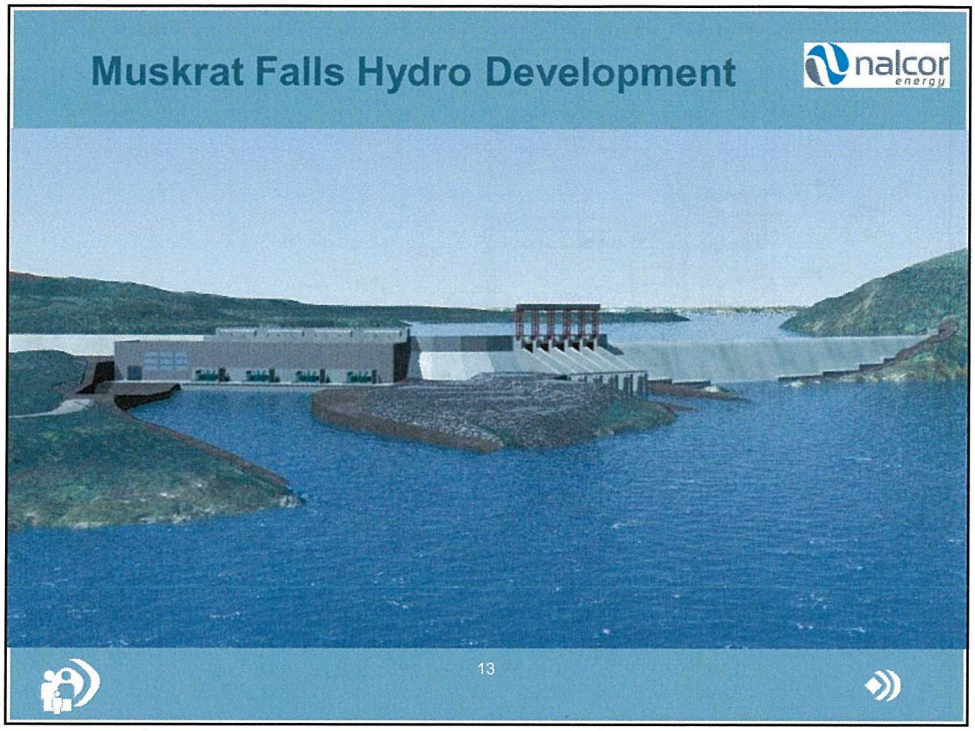
11

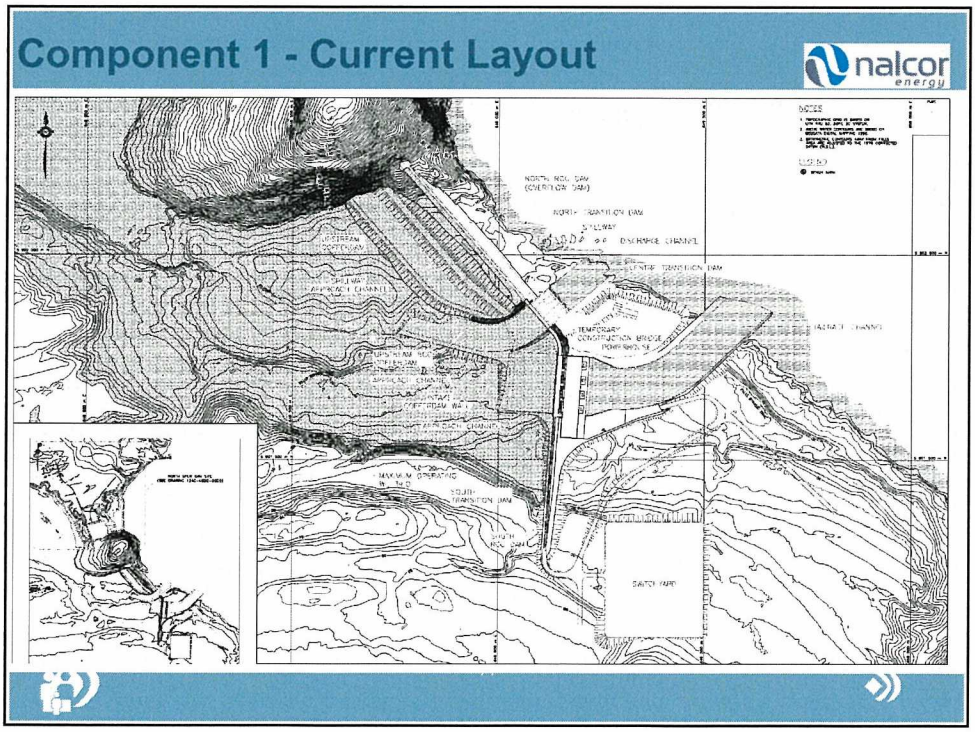
Component 1 – The Project Status

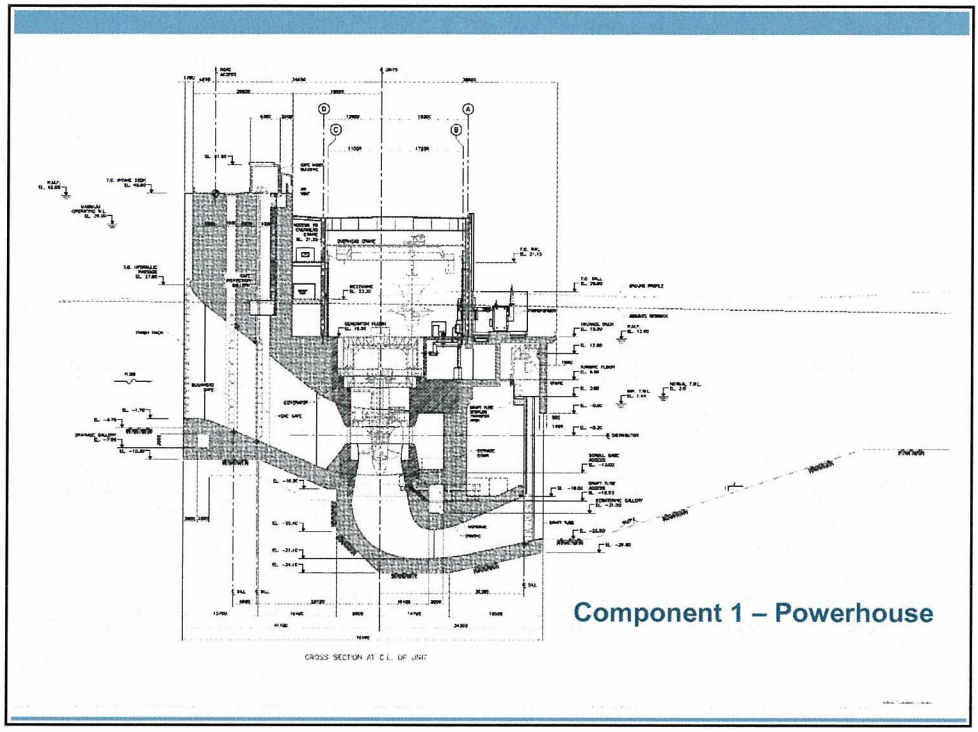
Background

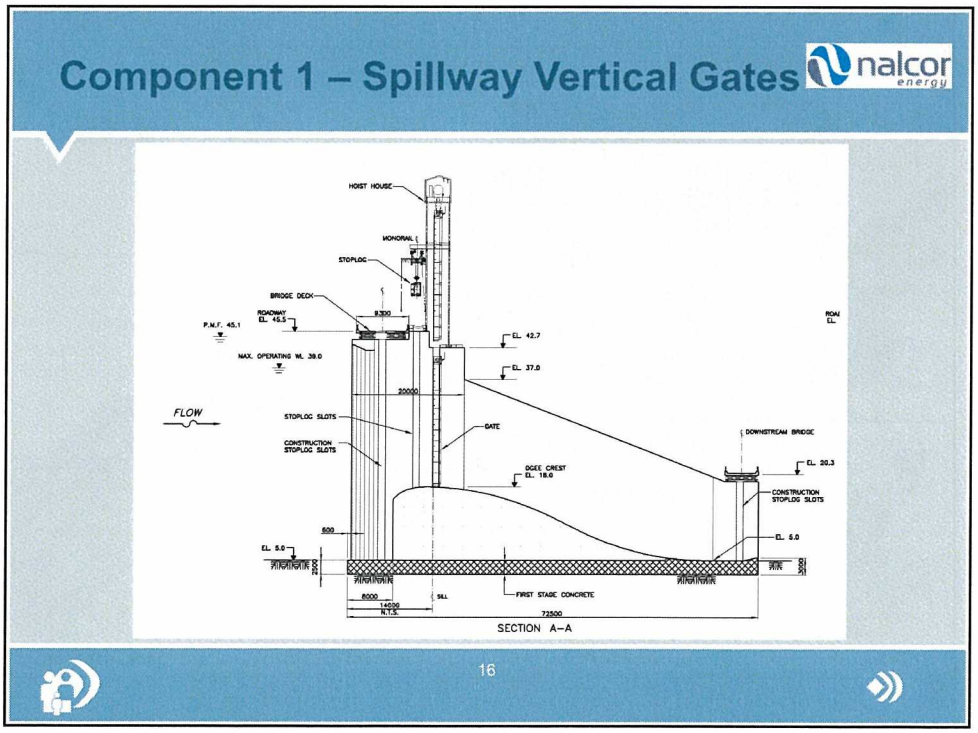
- The current layout for the Muskrat Falls Hydroplant is based on the recent studies of 2010 and 2011
  - MF1310 – Muskrat Falls Site Access Review
  - MF1340 – Review and Confirmation of Muskrat Falls Layout, Structures and Interfaces
  - MF1360 – Review and Update of Numerical Modeling of Muskrat Falls Structures
  - MF1390 – Review of Impact of Muskrat Falls Construction on Gull Island and Later Gull Island Construction on Muskrat Falls

12

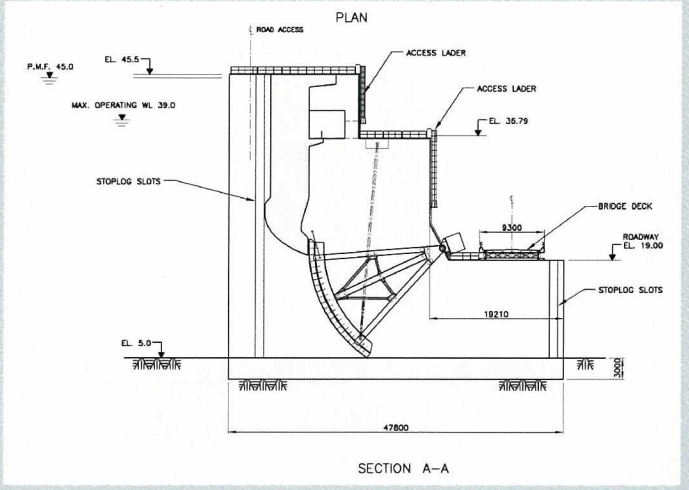

Muskrat Falls Hydro Development
nalcor energy
13


Component 1 - Current Layout
nalcor energy


Component 1 – Powerhouse
GROSS SECTION AT C.L. OF UNIT

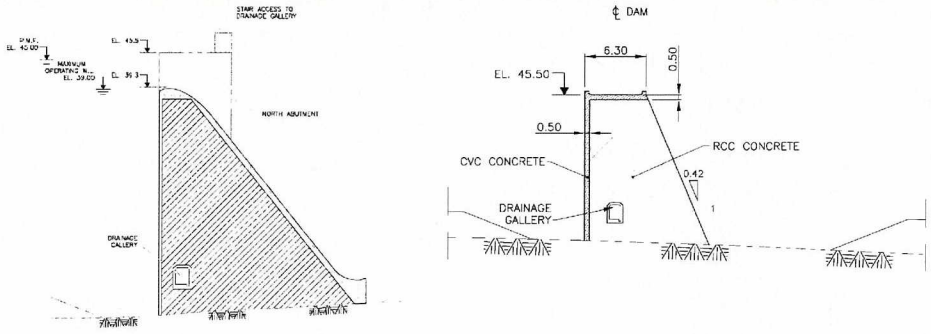

Component 1 – Spillway Vertical Gates
nalcor energy
HOIST HOUSE
MONORAIL
STOPLOG
BRIDGE DECK
ROADWAY EL. 45.5
P.M.F. 45.1
MAX. OPERATING W.L. 39.0
EL. 42.7
EL. 37.0
20000
FLOW
STOPLOG SLOTS
CONSTRUCTION STOPLOG SLOTS
GATE
DOWNSTREAM BRIDGE
EL. 20.3
OGEE CREST EL. 18.0
CONSTRUCTION STOPLOG SLOTS
600
EL. 5.0
EL. 6.0
8000
14000
N.T.S.
SILL
FIRST STAGE CONCRETE
72500
SECTION A–A
16

Component 1 – Spillway Radial Gates



17

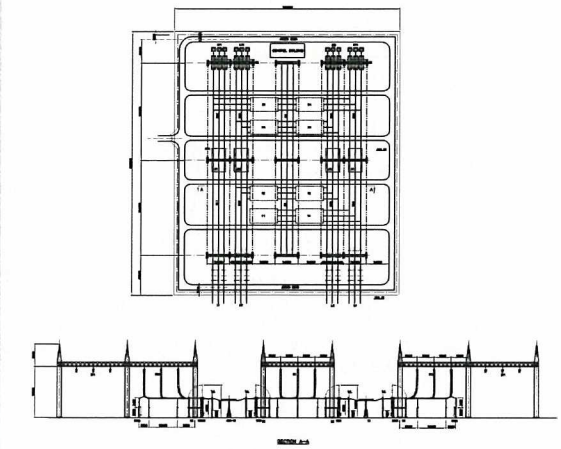
Component 1 – RCC Dams



North Dam **South Dam**

18

Component 1 – Switchyard



19

Component 1

Required further studies and optimisation

- Selection of spillway type
- Operating water levels
- Powerhouse general cross-section
- Alignment of powerhouse
- Approach channel
- Tailrace channel
- HV Switchyard

20

Component 1 – How it is Built

Project Characteristics

- No tunnel or any permanent construction in rock knoll
- Accesses from south - TLH
- Major structures located on right side abutment, where they will be constructed in the dry
- Gated spillway structure serves double duty as diversion flume
- Good foundation conditions, sufficient rock, granular and till materials available

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Component 1 – How it is Built

Principle Elements

- North dam including overflow spillway
- North transition dam (between North dam and spillway)
- U/S gravity cofferdam (abuts North transition dam)
- Gated spillway
- Center transition dam (between spillway and powerhouse)
- Intake and powerhouse
- South gravity and transition dam (U/S of service bay, connects intake with South dam)
- South dam
- U/S and D/S cofferdams and related structures including access
- Substation
- North spur

22

Component 1 – How it is Built

Hydraulic Criteria

- Revised construction flood: 5,890 m^3/s
- River water levels before diversion:
  - Winter peaks (caused by ice build-up) Jan-Mar 15 m (+/-)

After diversion, headpond to be kept at elev. 24 m during the winter season.

23

Component 1 – How it is Built

Materials and Materials Management

Rock

Available from excavations	2,000,000 m^3
Required for fill and aggregate production	1,800,000 m^3

Granular

Excavations quantity	1,500,000 m^3
Required from borrow pits	600,000 m^3
Spoil areas required on north and south shores	

Transport of materials from one shore to another possible over cofferdam beginning late 2014.

24

Component 1 – How it is Built

Construction Start-up Strategy

- Turbine-generator supply and erection
- Access road to site
- Site clearing (excluding the reservoir)
- Overburden excavation and preliminary rock excavation of the spillway, intake and powerhouse
- Balance of the rock excavation and concreting of the spillway, intake and powerhouse
- Supply and erection of the spillway, intake and powerhouse gates

25

Component 1 – How it is Built

Construction Plan – Key activities by year

- Year 1 (2011) Environmental Assessment Release and Project Sanction (Dec. 2011)
- Year 2 (2012) Site access and the accommodation complex
  Continue with site infrastructure
  General excavation work for foundations
- Year 3 (2013) Complete excavations except for rock plugs
  General civil work (concreting)
- Year 4 (2014) Structures concrete substantially complete
  Open spillway channel for diversion flows
  Complete U/S and D/S cofferdams and related work
- Year 5 (2015) Construct North Dam (RCC)
  Building finishes for Intake and powerhouse
  PH superstructure completed and bridge crane erected
  Electrical –Mechanical Installation
- Year 6 (2016) First two units on line
- Year 7 (2017) Last unit on line May 2017

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Component 1 – How it is Built

Start-up Activities

- Award contract for clearing and excavation on Project Sanction (Dec 2011)
- Construct site access road on south shore
- Excavate structures and channels (2012) behind temporary embankment cofferdam
- Award General Civil Works (2012)
- Complete first phase of spillway (base slab, sluices, piers and deck) (2012)
- Begin Intake and powerhouse structures (2012)
- Spillway gate erection on temporary sill on base slab (2013)
- Diversion (2014)
- South Dam not critical, but important as access to Intake deck

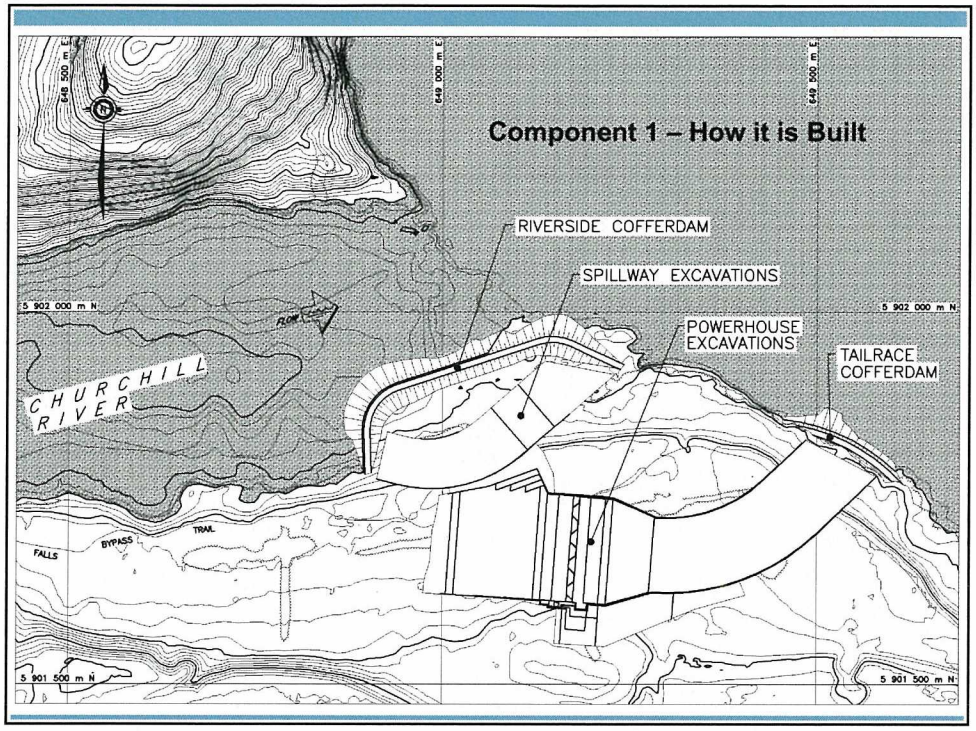
27

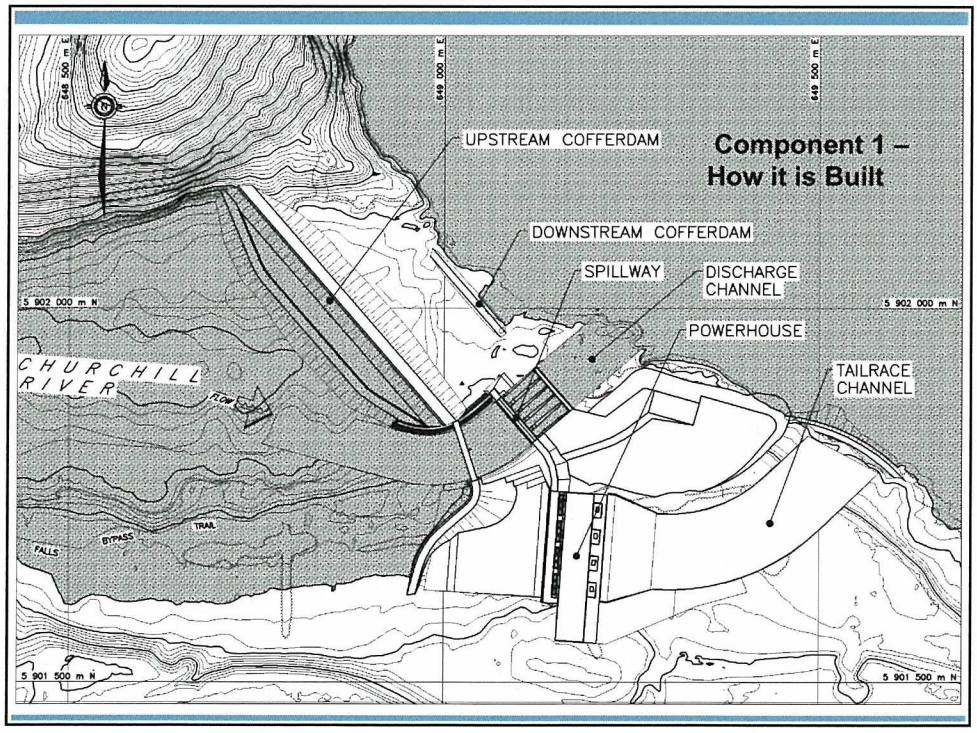
Component 1 – How it is Built

River Diversion

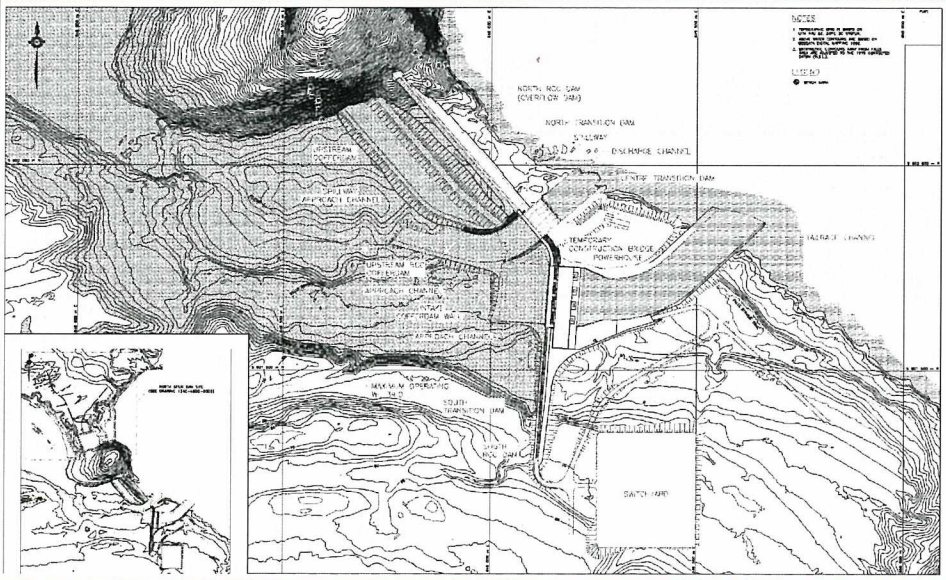
- Spillway configurated as flume, with gates temporarily set on base sill for winter control of headpond
- Concrete gravity cofferdam will be constructed perpendicular to the North dam to tie in with the U/S cofferdam
- Spillway channels opened up to allow passage of river flow
- Access to cofferdam construction by bridge crossing spillway approach and discharge channels
- U/S cofferdam – construct twin rock groins infilled with transition and till – Force all flows through spillway flume
- North dam (RCC) to be constructed in one year
- After north dam higher than cofferdam, begin to construct rollways in spillway
- Rollways complete, can impound to FSL
- Power intake and tailrace channels opened for unit testing

28


Component 1 – How it is Built
RIVERSIDE COFFERDAM
SPILLWAY EXCAVATIONS
POWERHOUSE EXCAVATIONS
TAILRACE COFFERDAM
CHURCHILL RIVER
FLOW
TRAIL
BYPASS
FALLS
5 902 000 m N
5 901 500 m N
649 000 m E
649 500 m E


Component 1 – How it is Built
UPSTREAM COFFERDAM
DOWNSTREAM COFFERDAM
SPILLWAY
DISCHARGE CHANNEL
POWERHOUSE
TAILRACE CHANNEL
CHURCHILL RIVER
FLOW
TRAIL
BYPASS
FALLS
5 902 000 m N
5 901 500 m N
649 000 m E
649 500 m E

Component 1 - Current Layout

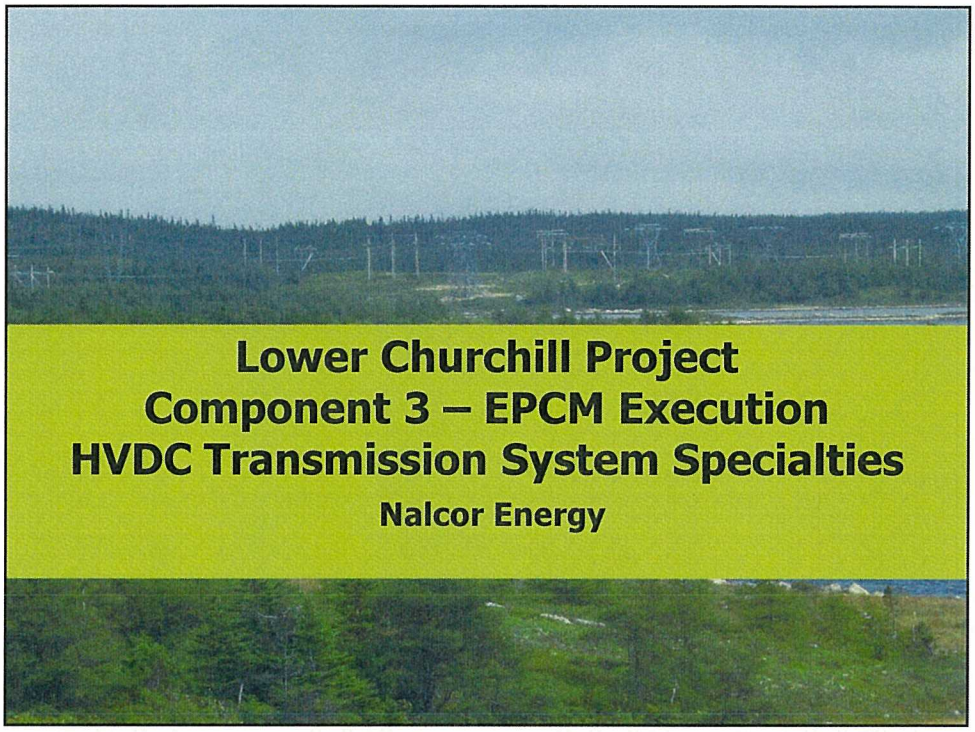


Component 1 – How it is Built

Strategy for Powerhouse

- Complete concrete foundations up to level of structural steel as early as possible
- Erect structural steel superstructure to allow overhead crane installation and enclosure installation
- Use pre-fab concrete elements where possible

32



Component 3 Presentation

Project Scope Summary
Project Organization
Key Roles and Responsibilities
Project Execution:

- Planning
- Engineering
- Procurement & Contracts
- Construction
- Completions

Component 3 Scope Summary

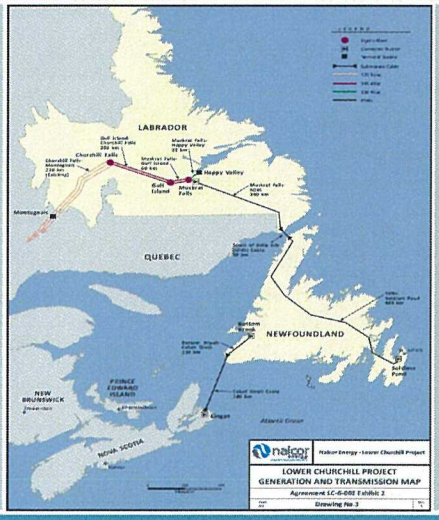
Muskrat Falls HVdc converter station:
- HVdc bipolar converter station
- 345 kV ac converted to/from ±320 kV dc,
- Pole capacity of 450 MW, and
- Shoreline pond electrode located on the Labrador side the Strait of Belle Isle

Soldiers Pond HVdc converter station:
- HVdc bipolar converter station,
- 230 kV ac converted to/from ±320 kV dc
- Pole capacity of 450 MW
- Shoreline pond electrode located on the east shore of Conception Bay

HVdc Transition Compounds:
- One transition compound for each side of the Strait of Belle Isle submarine cable crossing
- Associated switch works to manage the connection of multiple submarine cables and the overhead transmission line

3

Project Map



4

Project Plan

- Provide engineering services for the HVdc Transmission System Specialties (Component 3)
- Provide full EPCM services – Engineering, Procurement, Construction and Commissioning Support. This is the execution phase of the project leading to a fully commissioned plant ready for start-up
- Field investigations at converter sites, sites for electrodes & transition compounds
- Coordination with work related to infrastructure provided by Components 1 & 4
- Define interfaces and coordination with Components 1 & 4 as well as with NLH network

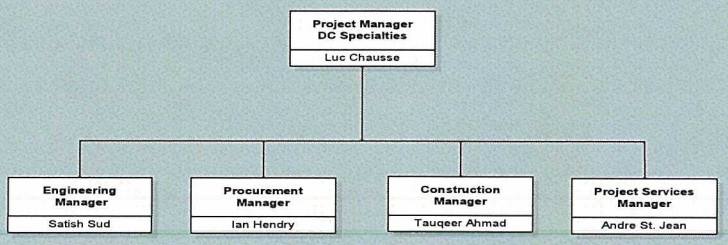
5

EPCM Execution

- Management
- Engineering
- Procurement
- Construction
- Completions

6

Project Organization



7

Project Organization

Project Management Team

- Luc Chausse, Project Manager
- Satish Sud, Engineering Manager
- Tauqeer Ahmad, Construction Manager
- Ian Hendry, Procurement Manager
- Andre St. Jean, Project Services Manager

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Key Roles and Responsibilities

Project Manager	Project planning and execution, client interface, leadership Project activities, commitments and procedures
Engineering Manager	Engineering, studies, design, tools, documents, reviews and quality
Proc & Contracts Manager	Procurement planning, vendor management, tenders, contract administration
Construction Manager	Construction execution, material control, site activities, contractor management, commissioning support

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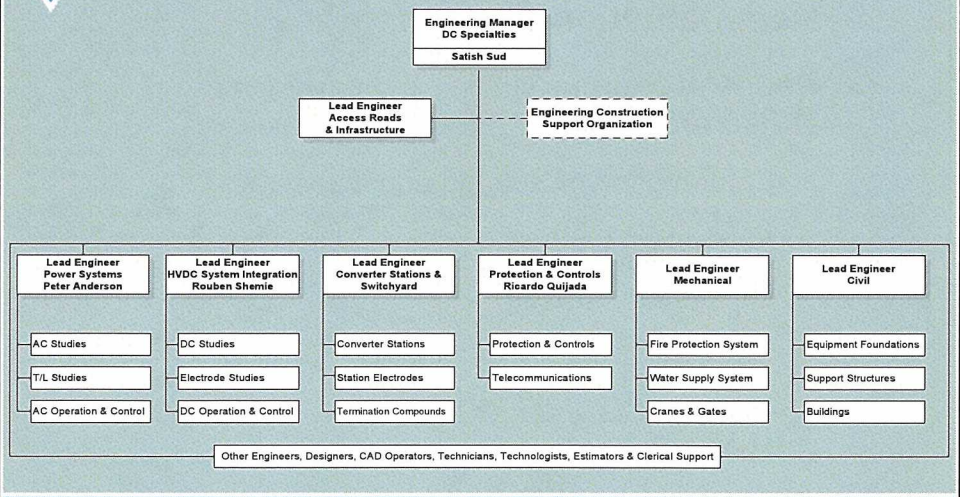
Execution - Engineering



10

Execution – Engineering

Principal activities

- Engineering Studies
- Technical Specifications
- Review of Detailed Engineering
- Engineering Follow-up and Support
- Completions

11

Execution – Engineering

System Definition studies:

- Review of previous studies and development of studies program for System Definition:
  - Confirmation of Voltage and Capacity
  - AC system studies
  - DC system studies
  - Harmonic Impedance studies
- Specialised Software: PSS/E, EMTP-RV, PSCAD, CYMHARMO, etc.

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Execution – Engineering

System studies

- Transmission Line Electrical Studies:
  - Confirmation of voltage and capacity
  - Confirmation of the technical and economic selection of conductor
  - Electrical parameters of the HVdc line and electrode lines
  - Reliability of separate wood-pole long electrode line in Labrador in comparison with using the HVdc line tower to mount the electrode line
  - Selection of insulators for the transmission line including specification of minimum creepage; and
  - Selection of OPGW and parameters

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Execution – Engineering

System studies

- Reactive Power Study
- Loadflow and Shortcircuit study
- Stability Study
- Modes of Operation and Control Strategies Study
- Harmonic Impedance Study

14

Execution – Engineering

System Design studies

- Insulation Coordination Study
- Transmission Line and Electrode line Electrical Design basis
- Design of Shoreline Electrodes
- Design basis for the Transition Compounds
- Telecommunication requirements
- Design basis for Protection and Control

15

Execution – Engineering

System Studies and Design Studies Output

- HVdc system configuration, voltage and capacity
- HVdc technology to be used, LCC
- Transmission Line Conductor selection
- HVdc Transmission Line Insulation Requirements
- Ground return versus metallic return
- Design of the shore or sea electrodes
- Choice of Converter Transformers
- Insulation Coordination
- Design of the Transition compounds (overhead to cable transition)
- Coordination with system reinforcement requirements

16

Execution – Engineering

Converter station design studies

- Field investigations to confirm location, access and soil conditions
- Station single line diagrams to establish: the configuration of the converter valve groups, poles and bi-pole and the connection to the AC systems
- Conceptual design, parameters and facilities for the overall HVdc system control and management
- Overall Station Layout and maximization of indoor located equipment;
- Type and layout of the Converter buildings and related buildings
- Conceptual drawings for protection, control, DCS, communication and SCADA systems
- Conceptual drawings for auxiliary AC and DC electrical distribution and supplies
- Ground return electrode studies

17

Execution – Engineering

HVdc OH/cable Transition Compounds

- Selection of landing sites for the submarine cable on either side of the strait of Belle Isle
- Detailed layouts and single line diagrams showing the switching and protection required to manage the connection between the submarine cables (3 ± 320 kV cables, one spare) and the overhead lines
- The electrodes and the transition compounds will be fully engineered by SNC-Lavalin

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Execution – Engineering

Preparation of Technical Specifications

- Converter Stations: A performance/functional specification for a complete turnkey contract to design, supply and construct the two converter stations
- Electrode Stations: A detailed specification for the construction of two electrode stations
- SVC's and/or Synchronous Condensers: Performance/functional specifications for a complete turnkey contract to supply and construct. It should be noted that these specifications may be combined with the converter specification if the equipment is located at the converter station
- HVdc OH/cable Transition Compounds

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Execution – Engineering

Engineering during implementation

- Design review and approval
- Manufacturing follow-up, HVdc specialist inspection & testing
- Field engineering support for the Construction
- Completions: Factory tests, carry over management, preparation of As-built and OM Manuals, pre-commissioning, commissioning, trial operation, close-out and hand over to Operations

20

Design Review and Approval

- Technical compliance of Contractors designs with Technical Specifications and applicable standards
- Technical quality and soundness of Contractors design
- Review of Contractors' specialized network studies by SNC-Lavalin high caliber experts in HVdc applications
- Review and approval of all studies, reports used to define equipment characteristics
- Review and approval of equipment and details for interfacing with the utility's substations
- Ensure the Quality Assurance processes are applied to Contractor's designs
- Tracking and monitoring of Contractor's design documents

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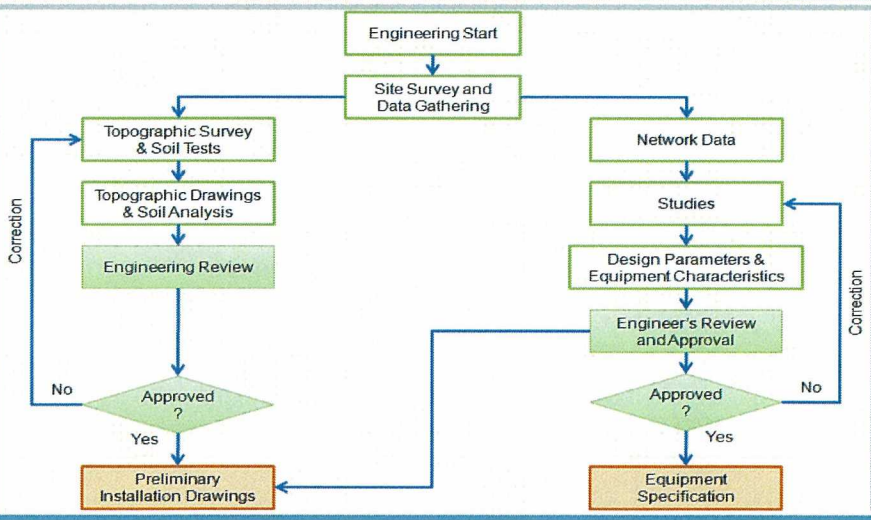
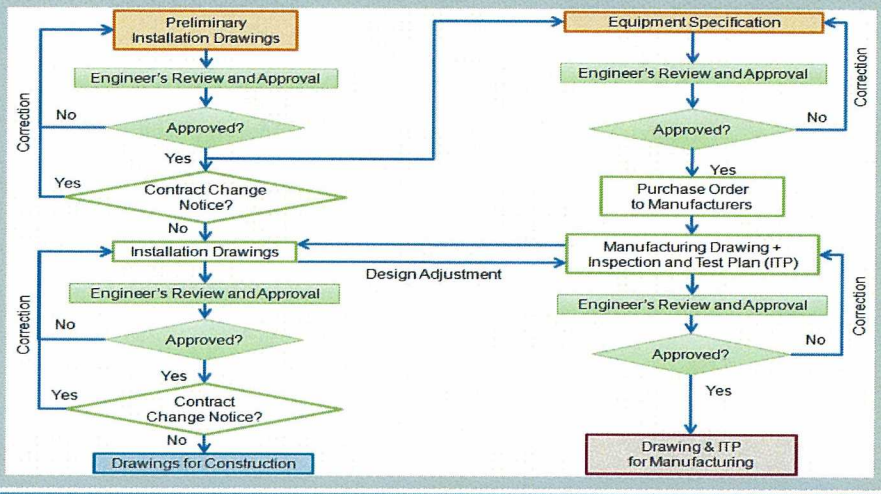
Design, Review and Approval Process 1/2



22

Design, Review and Approval Process 2/2

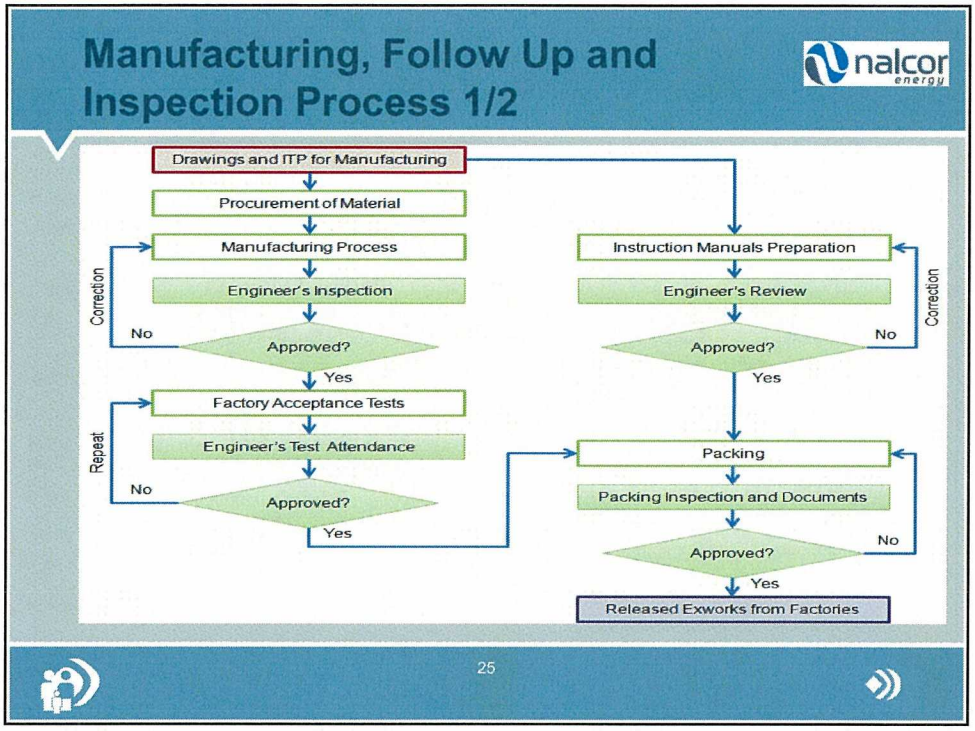


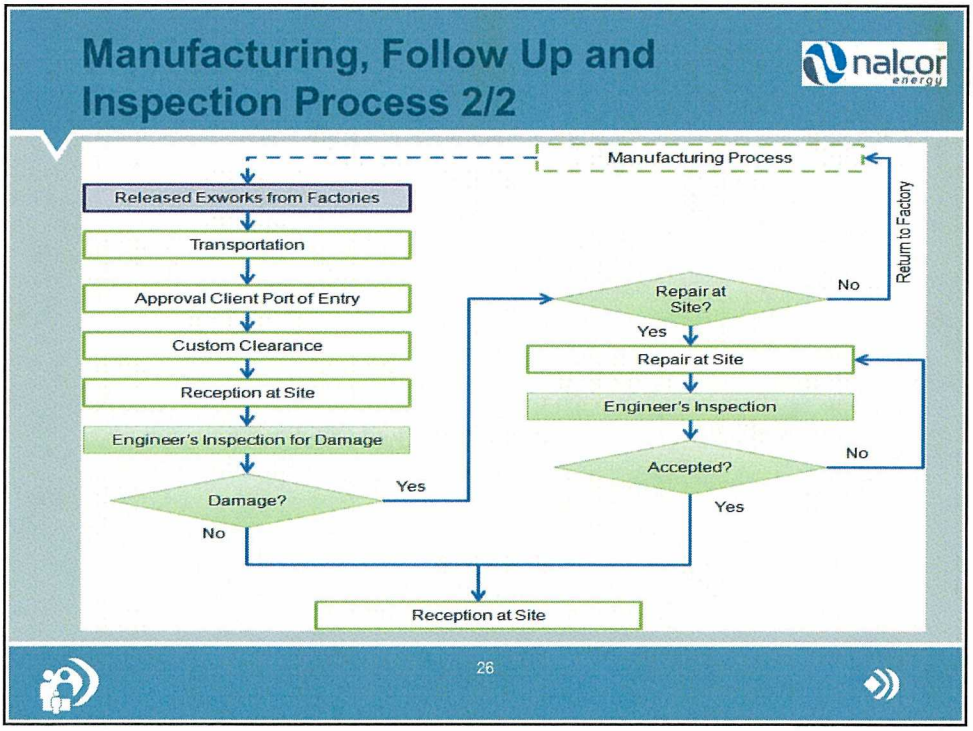
23

Manufacturing Follow-Up and Inspection

- Manufacturing Quality Assurance Manual review
- Identification of shop inspection records, non-compliance records and corrective actions
- Technical inspection of the equipment during manufacturing (at specific milestones or stop points), prior to test and delivery
- Factory Acceptance Testing (with Nalcor participation)
- Inspection of packing and transport documentation
- Acceptance for shipment
- Specialized equipment for the HVdc converters will require inspection and test attendance from SNC-Lavalin specialists
- SCADA along with control, protection and telecommunication will be inspected and tests of representative panels will also require witnessing by SNC-Lavalin specialists

24


Manufacturing, Follow Up and Inspection Process 1/2
nalcor energy
Drawings and ITP for Manufacturing
Procurement of Material
Manufacturing Process
Engineer's Inspection
Approved?
No
Yes
Correction
Factory Acceptance Tests
Engineer's Test Attendance
Approved?
No
Yes
Repeat
Instruction Manuals Preparation
Engineer's Review
Approved?
No
Yes
Correction
Packing
Packing Inspection and Documents
Approved?
No
Yes
Released Exworks from Factories
25


Manufacturing Process
Released Exworks from Factories
Transportation
Approval Client Port of Entry
Custom Clearance
Reception at Site
Engineer's Inspection for Damage
Damage?
Yes
No
Repair at Site?
No
Yes
Return to Factory
Repair at Site
Engineer's Inspection
Accepted?
No
Yes
Reception at Site
26

Execution – Procurement

Converter Stations

- Turnkey contract due to their very specialized nature and in order to ensure compatibility of equipment and provide the master control of the HVdc transmission, which has to be provided at one or both the converter stations
- Performance guarantees and warranties will be specified for the major equipment and the system
- Pre-qualified specialized international suppliers will be invited to bid in a competitive tendering process for engineering, design, fabrication and supply, delivery, installation and commissioning of the converter stations
- One single supplier will be selected for the two converter stations

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Execution – Procurement

Converter Stations Tendering Process

- Vendor EOI and pre-qualification
- Preparation of tender package and tender issue
- Bids preparation and submittal
- Bid preliminary evaluation
- Bid detailed evaluation – technical and commercial
- Bid evaluation report and recommendation
- Contract negotiation and award
- Contract Document preparation and sign-off

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Execution – Procurement

Electrodes and Transition Compounds

- The equipment and materials will be engineered, purchased and provided to the Contractors
- Two construction contracts will be awarded for the construction of the electrode stations
- One construction contract will be awarded for the transition compounds to connect the submarine cable to the overhead transmission lines at the respective two shores of the Strait of Belle Isle

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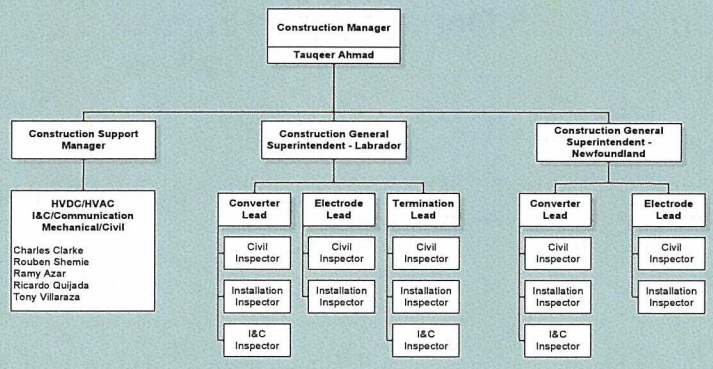
Construction Organization



30

Execution – Construction Management

Construction Management Team

- Established on a geographical basis for ease of execution to cover each construction site. Areas defined to cover:
  - Labrador – Gull Island converter station, both transition stations and the electrode site at Strait of Belle Isle
  - Newfoundland – Soldiers Pond converter station and Conception Bay electrode site
- Construction Manager - will manage the overall construction activities and will be responsible for the global execution of the works in respect of the schedule, cost, quality and HSE objectives
- Construction Support Manager and HVDC specialists
- General Construction Superintendents- construction managers in their respective areas and report to the Construction Manager
- QA and HSE
- Construction Leads – for each site
- Field Supervisors/ Inspectors – as required

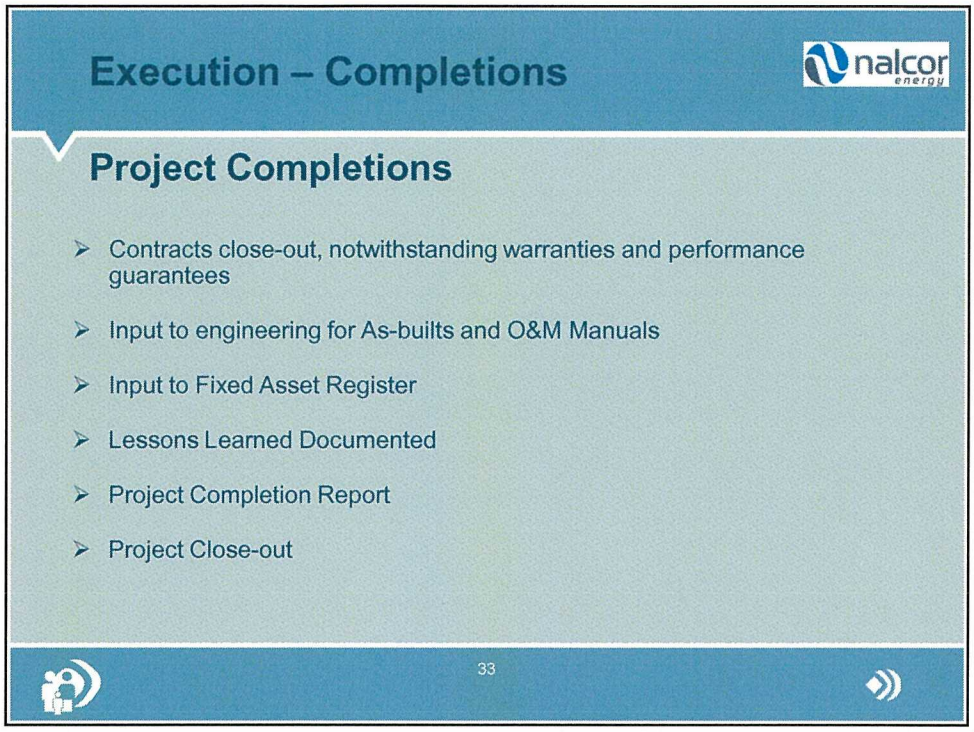
31

Execution – Construction

Construction Management Process

- Project Delivery with details on Construction Management to Project closeout covered in second presentation

32


Execution – Completions
nalcor energy
Project Completions
Contracts close-out, notwithstanding warranties and performance guarantees
Input to engineering for As-builts and O&M Manuals
Input to Fixed Asset Register
Lessons Learned Documented
Project Completion Report
Project Close-out
33

Lower Churchill Phase 1 Development Component 4: HVAC and HVDC Overhead Transmission Lines EPCM Execution

Nalcor Energy

Agenda

Strategy for Lower Churchill Phase-1 Development Component 4 – Transmission

- Project Overview
- Project Objectives
- Project Team & Organization
- Project Execution

Project Overview - Component 4

Sub Component 4A

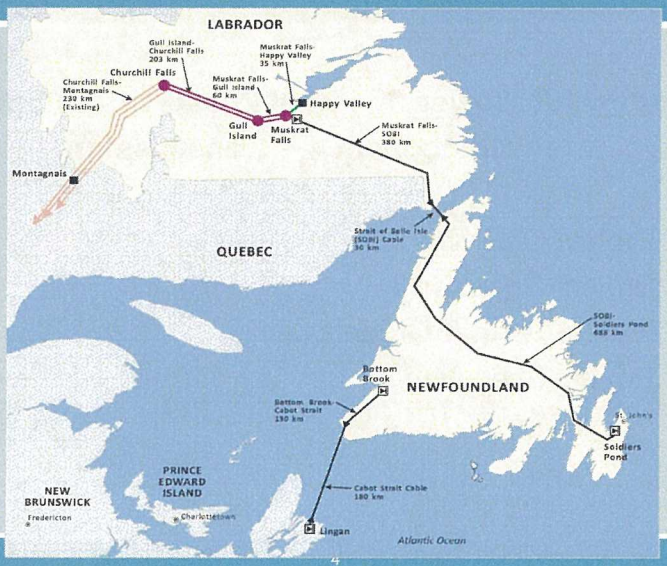
- HVDC Transmission lines from Muskrat Falls Converter Station to Soldiers Pond Converter Station about 1100 km in length.
  900MW, +/- 320kV dc, bipole line.
- Electrode lines from Muskrat Falls Converter Station to Strait of Belle Isle about 400 km length; and from Soldier Pond Converter Station to the East Coast of Conception Bay about 10 km in length

Sub Component 4B

- Two 345 kV ac single circuit transmission lines from Muskrat Falls to Churchill Falls, each one about 265 km in length.

3

Project Map



4

Project Objectives

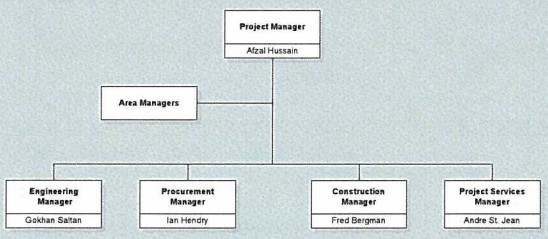
Project Objectives

- Meet all Health, Safety, Environmental and Benefits commitments
- Provide engineering services for the HVDC and HVAC Transmission lines to complete Phase 3 – Engineering and Procurement of the Gateway Process to meet Gate 3 schedule for project sanction
- Deliver high quality transmission lines that achieve design capacity
- On Time On Budget Project Delivery in coordination with other project components. Continuous communication throughout the project
- Maximize local content and participation of local communities

5

Project Team

Component 4
Transmission Lines
Project Management Organization



6

Project Team Component 4

Senior Management

➢ Project Manager	Afzal Hussain
➢ Engineering Manager	Gokhan Saltan
➢ Procurement Manager	Ian Hendry
➢ Construction Manager	Fred Bergman

7

Key Roles and Responsibilities

Project Manager	Project planning and execution, client interface, leadership Project activities, commitments and procedures
Engineering Manager	Engineering, design, tools, documents, reviews and quality
Procurement Manager	Procurement planning, vendor management, tenders, contract administration, materials management & logistics
Construction Manager	Construction execution, material control, site activities, contractor management, final inspections

8

Project Execution

Mobilization Plan

Key concurrent activities will include:

- Review Company provided data/documents
- Alignment Workshop preparation and participation
- Define / prepare and implement first Safety Leadership meeting
- Establish roles and responsibilities
- Start the review of the current Health and Safety Plan and Policies
- Start the review of the Environmental and Permitting Plans and current status
- Start the review and coordination/update of Project Procedures
- Develop the HR Plan and prepare for mobilization of personnel
- Start the Personnel Project Induction e-Learning Module
- Conduct site visits of the key/lead team members

9

Execution – Implementation Strategy for First 345 kV AC Line

- In service date August 31, 2014.
- Most of the design and tendering to be completed by end of 2011.
- Purchase orders to be placed after project sanction before April 1st, 2012.
- This allows us construction time of 29 months for first HVAC line and 25 months for second HVAC line.

10

EPCM Execution

- Health, Safety & Environment
- Engineering
- Procurement
- Construction
- Completions
- Project Services
- NL Benefits
- Labour Relations

11

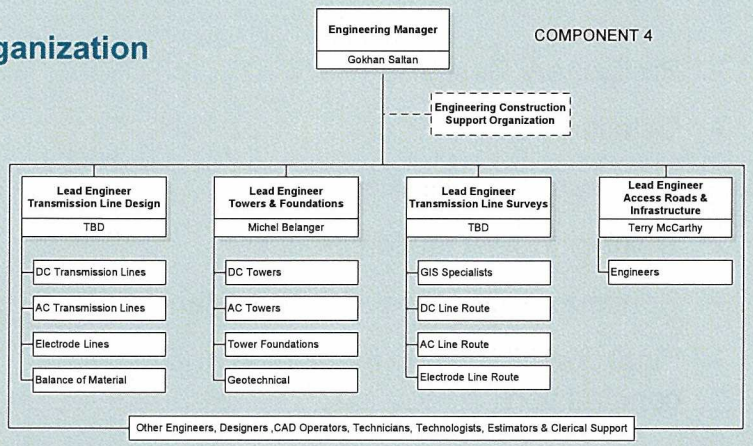
Execution - Engineering

Engineering

12

Execution – Engineering

Organization



13

Execution – Engineering

Execution Plan – Early Activities

- Review of Company provided data/documents
- Obtain LiDAR and other survey data and examine
- Start determining the centreline
- Identify engineering deliverables
- Prepare Design Criteria
- Prepare geotechnical specifications and planning of soil investigation works.

14

Execution – Engineering

Execution Plan

- Preliminary Design
- Detailed Design
- Constructability Review
- Input to the estimation process
- Continuous Technical Interface Management
- Final documentation for bidding and/or construction

15

Execution – Engineering

Survey

- Managing survey data
- High resolution aerial pictures
- Legal plans
- Identification of centerline within the existing 2000m corridor

16

Execution – Engineering

Preparation of Design Criteria

- Definition of ice/wind zones
- Conductor types and mechanical tensions
- Overload factors and loading cases
- Ruling span, wind span, weight span
- Ground clearances, phase-phase and phase-grounds required air gap

17

Execution – Engineering

Tower Design

- Reviewing the requirements
- Establishing family (s) of towers/structures for each line
- Preparing Design Requirement Drawings (DRD) for bid purpose
- Preparing tower manufacturing and delivery specifications
- Detailed design drawings by manufacturers
- Review and approval of detailed vendor drawings
- Towers prototype assembly and testing by manufacturer
- Tower erection drawings by manufacturer

18

Execution – Engineering

Tower Spotting

- Survey, tower and conductor data
- Constraints and sensitive areas
- Preparation of PLS-POLE models for wood pole structures of electrode lines, if required.
- Preparation of PLS TOWER models or use of vendor supplied tower models
- Detailed line layout design using PLS CADD software
- Special crossing layouts
- Plan and Profile drawings
- Site structure staking during engineering process
- Staking list and structure list
- Sagging charts
- Material list

19

Execution – Engineering

Foundation Design

- Geotechnical investigation along the route
- Analysis of soil data
- Identifying the foundation types e.g
  - Concrete or steel
  - Hybrid concrete/steel
  - Rock type
  - Piles
  - Caisson
- Detailed foundation design

20

Execution – Engineering

Material Specifications

- Towers
- Conductors
- Insulators
- OPGW and OHSW
- Hardware and fittings
- Guy wires and guy anchors
- Earthing material
- Foundations materials

21

Execution – Engineering

Contracts Specifications

- RoW Clearing
- Construction access road preparation
- Storage yard and construction camp preparation
- Transmission Line construction
- Reclamation

22

Execution – Engineering

Engineering Support

- Supporting Drawings/documents for permit applications
- Procurement and Contracts:
  - Responding to bidder's queries
  - Bid evaluation
  - Vendor drawing reviews
  - Witness testing
  - Support during factory QA/QC surveillance
- TL Construction and Completions:
  - Dedicated Site Engineering support team

Execution – Engineering

Key Factors

- Constructability
- Engineering Design Change Management
- Interdiscipline coordination
- Input to the estimation process for Gate-3 deadline

Execution – Engineering

Software

- PLS-Cadd
- PLS-Pole and PLS-Tower
- PLS-Caisson
- CDEGS
- AutoCad / Microstation, MS-Excel

25

Execution - Engineering Support During Procurement

Engineering Support During Procurement

26

Component 4 – Procurement

Procurement Planning

- List of procurement Packages
- Registration of vendors and contractors
- Pre-qualification of vendors and contractors
- International competitive bidding
- Participation of local vendors/contractors

27

Component 4 – Procurement

Material Testing, Inspection and manufacturing Surveillance expertise

- T&D specialist engineers for specifying testing requirements and witness tests for materials and services
- Inspectors from SLI offices in India, Brazil and around the world
- Third Party Inspectors

28

Component 4 – Procurement

Engineering Team will provide technical support to Procurement Team:

- Specifications /drawings and Purchase Orders of various line materials and Services and Construction Contracts will include Inspection and Testing requirements
- SLI Global Procurement Procedures and Nalcor requirements will be incorporated.
- Review of vendor's and contractor's technical submittals/drawings, ITP and Test Reports will be performed.
- Quality Surveillance during manufacturing
- Witness of key tests, e.g. tower loading tests, type tests of materials etc. and some FATs, if required
- Site tests at marshalling yards prior to installation

29

Component 4 – Procurement

Quality Surveillance – Technical Oversight

- Determination of Criticality rating
- Determine Quality Surveillance Level
- Determine the Quality Surveillance Types
- Quality Control Process
- Quality Control – Technical Specialists

30

Component 4 – Procurement

Quality Surveillance – Technical Oversight

- Typical standard Project Quality Surveillance Activity Types during manufacturing which are presently implemented on current T/L projects:
  - Documentation Review Point
  - Check Point or Monitoring Point
  - Witness Point
  - Hold Point

For example: Purchase of towers material from India and Brazil/Mexico for T/L project in Alberta

31

Component 4 – Procurement

Inspection at Delivery to Marshalling Yards

- Delivery schedules/prioritization and delivery destinations for various lots of materials
- Local transport from ports to marshalling yards
- Inspection of materials at Marshalling yards
- Preparation of Receiving and Damage reports and insurance claims, if any
- Maintaining of Inventories
- Layout and storage of materials
- Issuance of materials to construction contractors
- Materials control using PM+ centralized database

32

Execution - Completions

nalcor energy

Completions

33

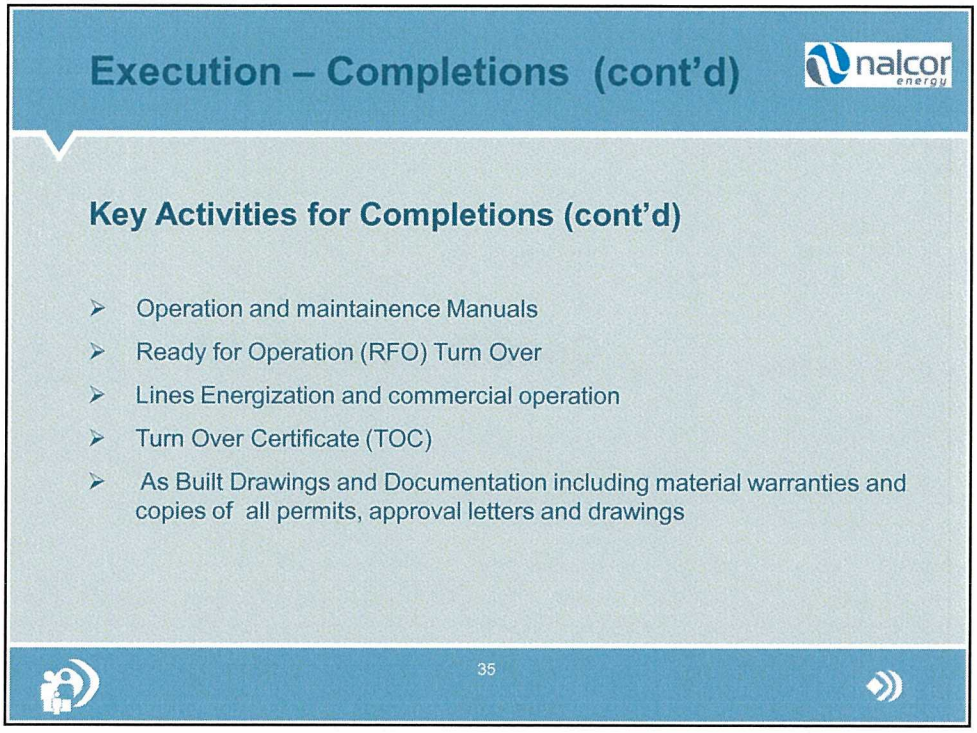
Execution - Completions

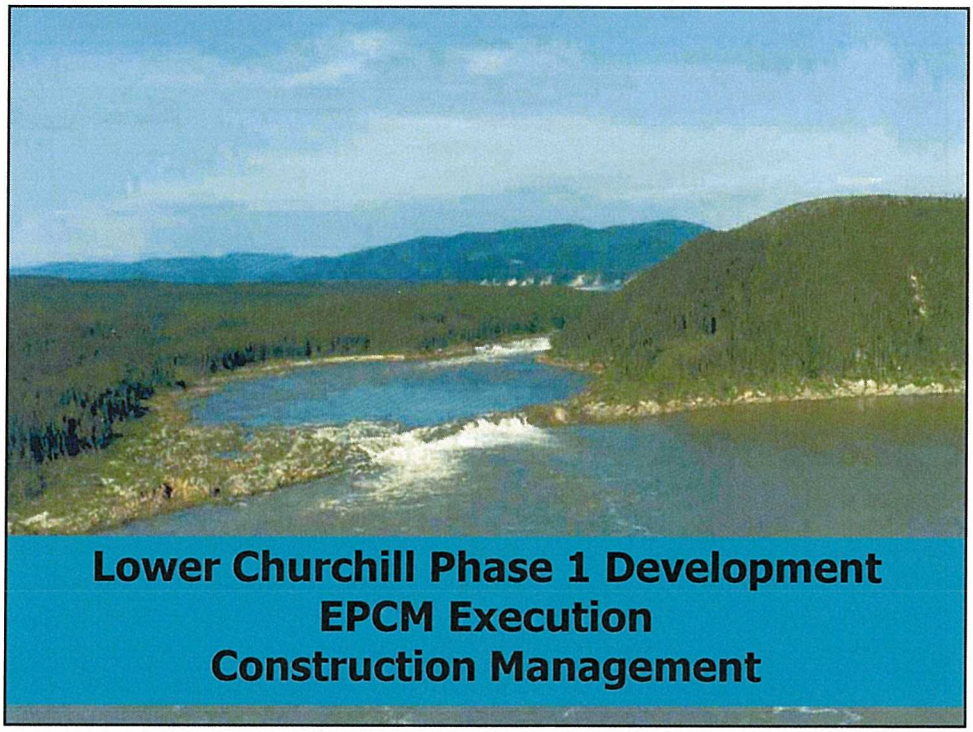
nalcor energy

Key Activities for Completions

- Factory Inspection and Test reports
- Dispatch Dossiers
- Site inspection and Test reports during Civil Works,Tower Erection and Stringing etc. including Structure Earthing, OPGW tests, Anchor pulling tests etc.
- Site QA/QC documentation
- Final Inspection records
- Punchlists
- Site Clean-up and rectification of punch list items necessary for line energization
- Pre-energizing Inspection records
- Readiness of line sections for end-to end commissioning of telecom, protection etc. by the contractor's of other components.

34


Execution – Completions (cont'd)
nalcor energy
Key Activities for Completions (cont'd)
Operation and maintainence Manuals
Ready for Operation (RFO) Turn Over
Lines Energization and commercial operation
Turn Over Certificate (TOC)
As Built Drawings and Documentation including material warranties and copies of all permits, approval letters and drawings
35



Construction Management

The Muskrat Falls project poses the following challenges:

- Large and long duration
- Labour and Industrial relation challenges
- Limited access to the construction sites
- Challenging logistics due to the site locations
- Cold weather construction in winter months

2

Construction Management

Management of Challenges

- Constructability planning at the basic engineering phase
- Construction sequence developed and followed religiously
- Personnel available to deal with the issues
- Forward planning
- Contingency planning at all times - if something halts work in one area there is a plan to start work in another
- Flexibility in the schedule
- Maintaining required on-site dates for materials and equipment
- Management of construction indirect services to support the construction program

3

Construction Management

SNC-Lavalin's Construction Management goals for the Muskrat Falls project are:

- Triple zero safety record
- Labour stability
- No significant environmental incidents
- Quality achieved
- Budget achieved
- Schedule achieved

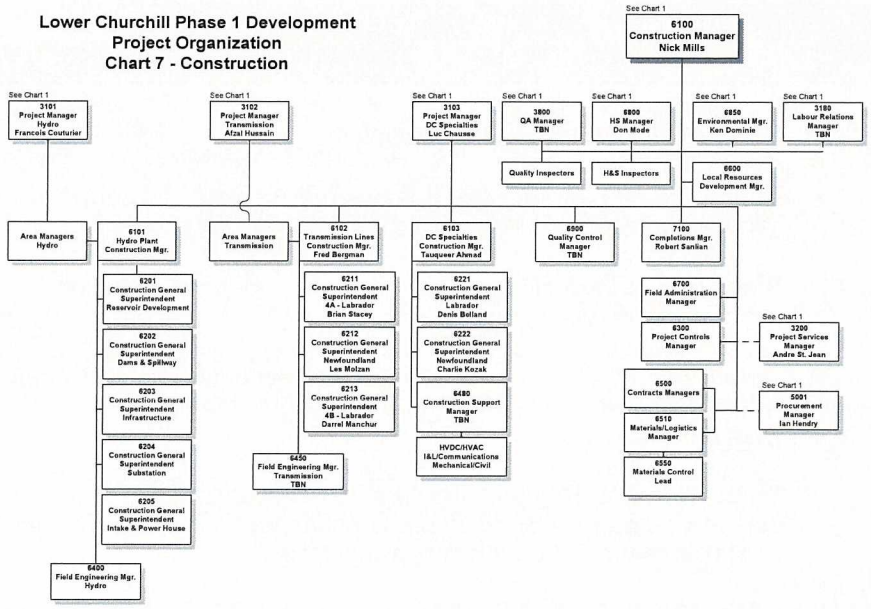
4

Construction Management Structure / Approach

- Organization
- Safety / Health / Environment
- Labor Relations
- Contracts Administration
- Construction Infrastructure
- Schedule
- Productivity Monitoring
- Constructability
- Construction Sequence
- Procedures
- Reporting / Statistics
- Communications
- Logistics
- Risks

5

Lower Churchill Phase 1 Development
Project Organization
Chart 7 - Construction



Construction Management Organisation

- Establish job descriptions
- Set roles and responsibilities
- Start recruitment
- Key positions to mobilize early
  - 3 Area Construction Managers
  - Safety Manager
  - Labor Relations Manager
  - Logistics Manager

7

SNC-Lavalin's Approach to Safety

- **Rules:** Follow the rules – Be compliant
- **Vulnerability**: Acknowledge humans make errors – maintain a sense of vulnerability even when we experience success
- **Risk Management**: Provide robust risk competency processes and training to reduce errors
- **Accountability**: Maintain a culture of full accountability for safety where everyone is a VISIBLE leader when it comes to getting the work done safely
- **Empowerment**: Maintain a culture where everyone has formal and implied permission to stop an unsafe act and where reporting a High Potential Incident is fully supported

8

SNC-Lavalin Health and Safety Management

Safety Leadership Training

This is an 8-hour session designed specifically for senior project and construction staff, business unit managers and company executives.

The course goes through 4 core areas:

- ✔ Believing in Safety
- ✔ Creating a Safety Culture
- ✔ Safety Applications at SNC-Lavalin
- ✔ Expectations of our People around Safety

Risk Registers

- Identify Hazards and Outcomes
- Assess exposure and controls
- Calculate Risk Levels
- Develop Action Plans to eliminate or mitigate risks

9

Construction Management

Health and Safety Implementation

- Develop a site specific safety orientation program suitable for all project personnel
- Develop a safety culture by means of training, leading by example
- Implement a field-level risk analysis program (FLRA)
- Safety training programs for all areas of work
- Ensure that job safety analyses are done for all tasks
- Implement a safety audit program
- Develop a reporting and monitoring system for all safety activities
- Work with medical provider to develop an occupational health and safety program
- Provide training on supervisory responsibilities with respect to safety
- Establish mobile equipment minimum standards

10

Construction Management

Safety Responsibility

- Individual workers responsible to ensure tasks are completed safely
- Management and Supervision have ultimate responsibility to ensure workers have received training, tools and equipment to complete tasks safely

Construction Management

Environmental Management

- Organization
- Managing the permit process and reporting regularly on status
- Ensuring that all hazardous materials on the project are recorded and stored in proper locations
- Managing the landfill and hazardous waste storage
- Ensuring that job environmental analysis (JEA) is done for all major construction activities
- Developing and managing the environmental emergency response team
- Ensuring the materials to manage spills are available on the project
- Working with the contractors to ensure compliance with the project's Environmental Management Plan
- Developing environmental reporting procedures

Construction Management

Labor Relations

- Develop a project labor strategy
- Evaluate local labor market
- Develop a data base of Labrador labor
- Pro active involvement with building trades council
- Develop a comprehensive site labor agreement
- Ensure site agreement includes provisions for non-union Labradoreans and aboriginal workers for Labrador work only

13

Contract Administration

- Establish general terms and conditions
- Establish supplementary terms and conditions
- Develop clear concise construction packages
- Develop Service contracts
- Develop and implement a contract strategy
- Develop bidders lists and pre-qualify bidders

14

Contract Administration

Contractor Selection

- Health, safety and environment performance in similar atmosphere
- Experience in equivalent projects
- Experience in the related scope
- Completed contracts of comparable size to the scope being tendered
- Financial status and reserves
- Contractors capacity to carry out scope
- Experience in working in similar climates
- Experience in type of contract tendering, that is, unit price, lump sum

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Construction Management

QA Program

- Develop QA standards for all aspects of the project
- Instruct third party QA contractor to conduct independent tests to verify quality
- Develop and maintain a data base for all QA test results
- Develop trends on QC results submitted by contractors
- Ensure re-tests are completed on failed tests
- Issue QA statistics on a monthly basis

16

Construction Infrastructure

- Temporary Facilities
  - Offices
  - Gate Houses
  - Warehouses
  - First Aid facilities
  - Maintenance facilities
  - Water Treatment and Sewage facilities
- Temporary Services
  - Power
  - Water / Sewage
  - Fuel Supply
  - Temporary Access

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Construction Infrastructure

- Temporary Communications
  - Project wide connectivity
  - Individual site communications
  - Internet
  - Handheld radio system
- Access Control System
  - Philosophy
  - Equipment
  - Software

18

Construction Infrastructure

- Personnel transportation plan
  - Newfoundland to Labrador
  - Goose Bay to Muskrat Falls
  - Goose Bay to Transmission lines
  - Camp to work site
  - On Island access to Transmission lines

Construction Infrastructure

- QA
  - Establish third party testing requirements, i.e. soils, concrete, etc.
  - Develop scope
  - Develop QA auditing program
- Surveying
  - Establish survey requirements
  - Develop scope
  - Set up data base

Construction Infrastructure

- FUEL
  - Develop project fuel policy
  - Establish site project fuel requirements
  - Fuel storage and dispensing equipment

Construction Infrastructure

- Catering
  - Establish catering philosophy
  - Establish food requirements and supply chain
  - Food storage requirements
  - Recreation plan and facilities
- Security
  - Establish security policy
  - Security personnel and equipment

Construction Infrastructure

- Medical services
  - Pre-deployment medicals
  - First aid facilities
  - Medical evacuations
  - Drug/ Alcohol testing
- Site services
  - Building maintenance
  - Temporary service operations
  - Snow removal and road maintenance
  - Fleet maintenance

23

Construction - Planning

- Establish project schedule
- Establish project milestones
- Manpower loading
- Develop manpower requirements by trade
- Develop project quantities
- Set productivity goals

24

Productivity Monitoring

Productivity Monitoring

- Establish production rates for all major quantities
- Produce quantity curves
- Weekly monitoring
- Evaluate productivity weekly implement recovery plans as required

25

Construction Management

Construction Management involvement during Design

- Construction Manager
- HSE Manager
- Interface/Risk Manager
- Project Services Manager
- Contracts Manager
- Materials/Logistics Manager
- Site Engineering Manager

26

Construction Management

Construction Involvement During Design

- Installation methodology and equipment (site access and plot plans), particularly in terms of space constraints, project elevation and limiting lay-down areas
- Minimizing scheduled conflicts, particularly mobilization, rock management and contractor interferences
- Special transportation and lifting considerations for oversize equipment
- Site safety requirements
- Considerations to expedite the schedule, improve safety, decrease environmental risk or otherwise save costs
- Cold weather construction considerations
- Temporary facilities plan
- Execution scope package development for the site works contracts

27

Construction Management

Transition to Site

- Construction will have a representative in the home office during basic and detail engineering
- There will be regularly scheduled constructability reviews
- Construction will sign-off on all details as part of drawing review
- Weekly conference calls between site and area managers in home office

28

Constructability Program

- Develop a constructability register
- Constructability Reviews
  - Issues that effect safety, environment , health, costs, schedule, etc.
- Constructability guidelines
  - Materials of construction
  - Construction equipment / Productivity
  - Construction sequence / RAS dates
  - General Arrangement review
  - Safety Program development and implementation
  - Climatic conditions
  - Contracting philosophy
  - Construction Camp

29

Logistics

- Establish logistics plan
- Shipping routes
- Shipping seasons
- Laydown and storage yards
- Shipping envelopes

30

Material Management

- Implementing material control program
- Receiving project supplied material
- Inspecting all shipments received
- Issuing material receiving reports
- Issuing material damage and short shipped reports
- Following up on all material damage and short shipments
- Ensuring special storage requirements are met
- Maintaining rotating equipment during storage
- Issuing materials and equipment to contractors
- Maintaining location reports on all material received

31

Reporting / Statistics

- Establish statistics to be reported on
- Set up data bases for statistics
- Weekly summary report
- Monthly safety report
- Monthly quantity curves
- Monthly Summary Material Receiving Report
- Monthly summary progress report including Project Contractor progress and performance statistics

32

Procedures

Construction Management Project Procedures Manual

- Site administration and organization
- Site quality assurance
- Site non-conformance control
- Site engineering queries
- Field work instructions
- Concession request
- Site document control
- Site purchases
- Contract administration

33

Construction Management

Construction Management Procedures

- Change orders to purchase orders and contracts
- Contractor claims
- Back charges
- Contract close-out
- Work permits
- Material receipt and control
- Material control – over, short and damaged (OS&D) reporting
- Construction controls
- Construction reports
- Site progress meetings
- Labour relations
- Safety/environment
- Construction safety tagging
- Project accounting
- Construction progress measurement

34

Risk Management

- Develop Construction Risk Register
- Set up regular reviews of risk register
- Each Construction Manager and Service Manager to participate in review

35

Safety

- Establish safety organization
- Develop site specific orientation
- Develop Emergency Response Plan
- Develop Health Services Plan
- Develop Emergency Response Team (volunteer)

36

Environmental

- Develop site specific environmental orientation plan
- Establish landfill sites
- Develop hazardous waste procedures
- Develop specific procedures dealing with silt
- Develop Emergency Environmental Response Plan
- Develop Environmental Emergency Response Team

37

Security

- Establish Security Plan
- Implement Access Control Plan
- Develop site rules

38

Early Works Execution

- Develop early works program
  - Logistics of personnel during site establishment
  - Services during site establishment
  - Emergency services during site establishment
- Prioritize facilities for site establishment
- Temporary facilities requirement
- Develop temporary facilities plan
- Develop access roads requirement

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Construction Management

Site Establishment

- Communications and data link
- CM office located at Muskrat Falls
- Warehousing
- Emergency Power
- Vehicle maintenance facilities
- Site maintenance facilities
- Fuel storage
- Accommodations
- Marshaling yards
- Medical and security facilities
- Service contracts (catering, fuel supply, site maintenance, medical, security)

40

Construction Execution

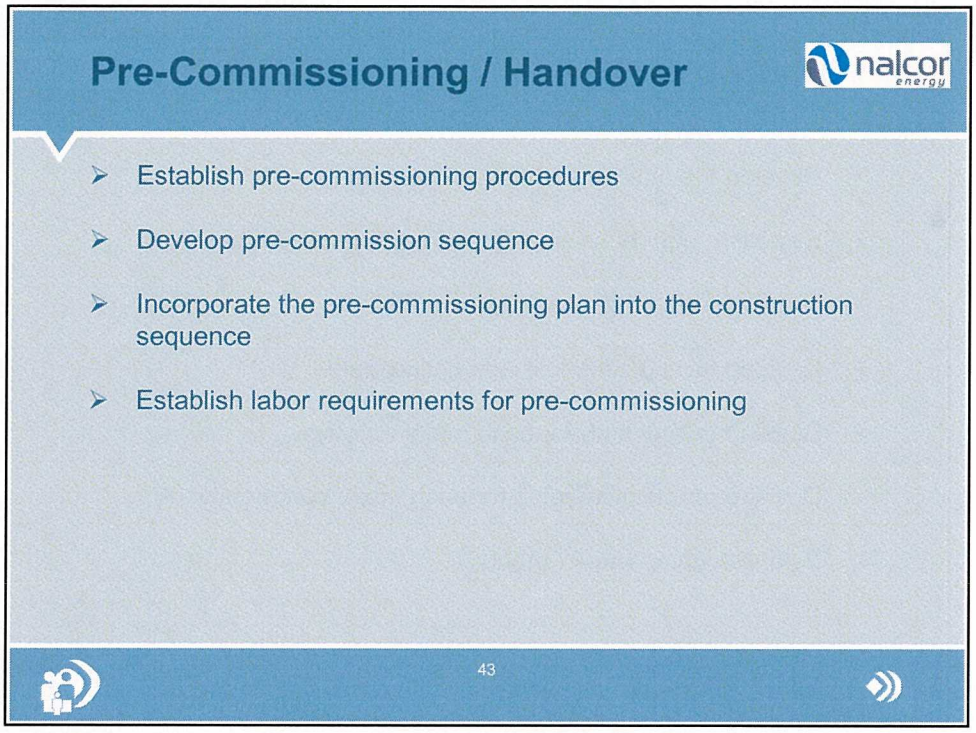
- Develop the final construction sequence
- Establish required-at-site dates for all supplied equipment
- Develop manpower loadings by trade
- Develop level 3 schedule with critical path
- Develop critical path for each major activity
- Develop productivity rates for each major commodity
- Establish camp requirements

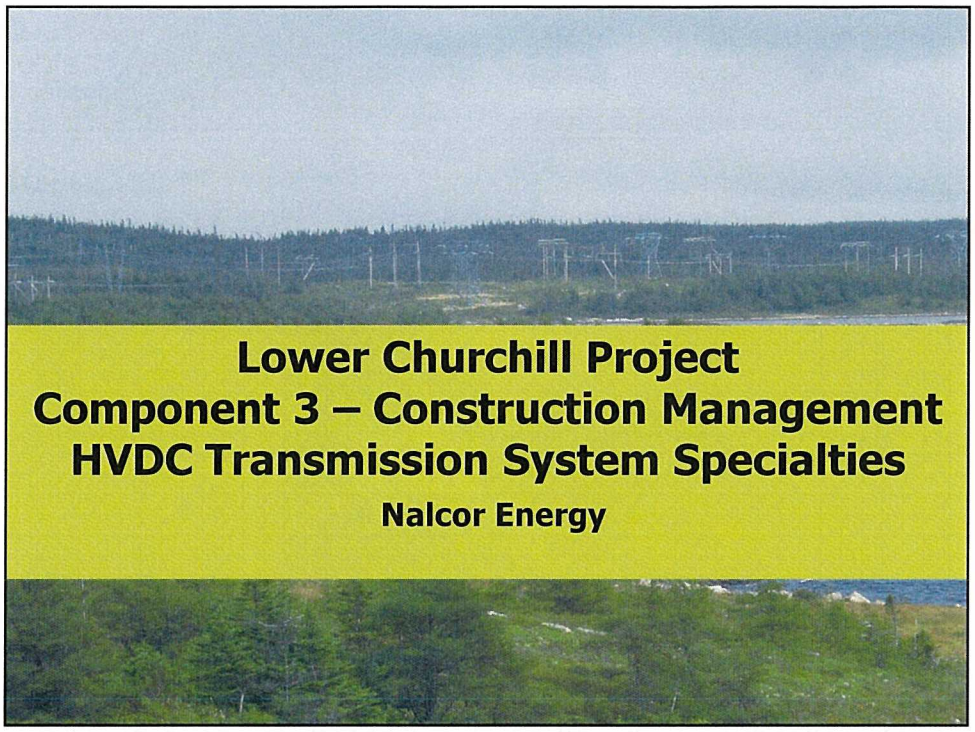
41

Quantities

- Establish quantity data base
- Set up quantity monitoring program
- Develop production rates
- Develop commodity curves

42


Pre-Commissioning / Handover
nalcor energy
Establish pre-commissioning procedures
Develop pre-commission sequence
Incorporate the pre-commissioning plan into the construction sequence
Establish labor requirements for pre-commissioning
43



Component 3 - Scope Summary

Muskrat Falls HVdc converter station:

- HVdc bipolar converter station,
- 345 kV ac converted to/from ±320 kV dc,
- Pole capacity of 450 MW, and
- Shoreline pond electrode located on the Labrador side of the Strait of Belle Isle

Soldiers Pond HVdc converter station:

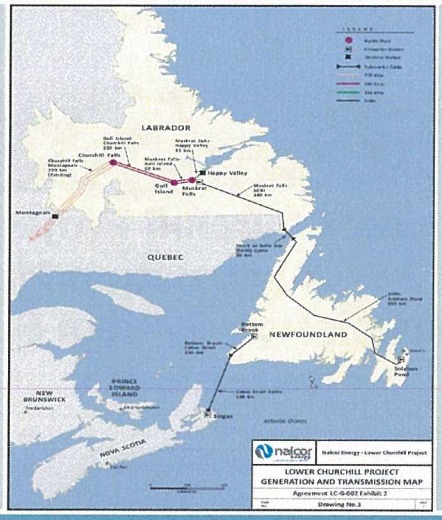
- HVdc bipolar converter station,
- 230 kV ac converted to/from ±320 kV dc.
- Pole capacity of 450 MW, and
- Shoreline pond electrode located on the east shore of Conception Bay

HVDC Transition Compounds:

- One transition compound for each side of the Strait of Belle Isle submarine cable crossing
- Associated switch works to manage the connection of multiple submarine cables and the overhead transmission line

2

Project Map



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Component 3 - Contracts

Converter Stations

- One turnkey contract for the design, build, installation and commissioning of the Converter stations. Turnkey contract due to their very specialized nature and in order to ensure compatibility of equipment and provide the master control of the HVdc transmission, which has to be provided at one or both the converter stations

4

Component 3 - Contracts

Electrodes and Transition Compounds

- Two construction contracts will be awarded for the construction of the electrode stations:
  - one on the Labrador side of the SOBI and
  - one on the east side of Conception Bay
- One construction contract will be awarded for the transition compounds to connect the submarine cable to the overhead transmission lines at the respective two shores of the Strait of Belle Isle

5

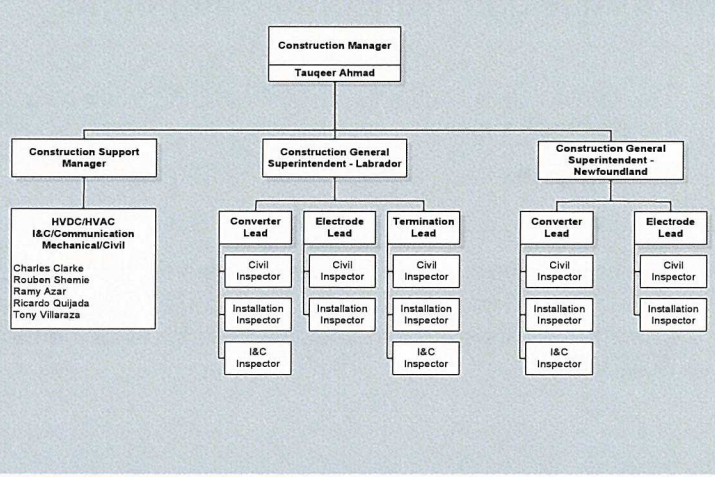
Execution – Construction Management

Construction Management Team

- Established on a geographical basis for ease of execution to cover each construction site. Areas defined to cover:
  - Labrador – Gull Island converter station, both transition stations and the electrode site at Strait of Belle Isle
  - Newfoundland – Soldiers Pond converter station and Conception Bay electrode site
- Construction Manager - will manage the overall construction activities and will be responsible for the global execution of the works in respect of the schedule, cost, quality and HSE objectives
- Construction Support Manager and HVDC specialists
- General Construction Superintendents- construction managers in their respective areas and report to the Construction Manager
- QA and HSE
- Construction Leads – for each site
- Field Supervisors/ Inspectors – as required

6

Construction Organization



7

Construction Management Services

- Development and Follow-up of Construction plans of turnkey contractor using SLI's proven project management systems
- Follow-up of turnkey contractor management processes and procedures
- Coordinate with the turnkey contractor for the provision of all support services and infrastructure at site
- Overall management and oversight of work performed by contractors at site including QA and HSE
- Administration of all Contracts
- Overall management of labour agreements used by the Contractors
- Overall management and oversight of mechanical completion, preservation, pre-commissioning, commissioning and turnover to Operations
- Implementation of best practices, risk mitigation and lessons learned

8

Component 3 – Plan for delivering Component

Principal activities

- Engineering Studies
- Technical Specifications
- Tendering and Award of EPC Contract for Converter Stations
- Design Review and Approval
- Manufacturing Follow-up
- Construction management
- Management of Pre-commissioning & Commissioning
- Completions

9

Component 3 – Delivery

- Design review and approval by HVdc specialists
- Manufacturing follow-up, HVdc specialist inspection & testing
- Construction Management
- Completions: Factory tests, carry over management, preparation of As-built and OM Manuals, pre-commissioning, commissioning, trial operation, close-out and hand over to Operations

10

Component 3 – Design Review and Approval

- Technical compliance of Contractors designs with Technical Specifications and applicable standards
- Technical quality and soundness of Contractors design
- Review of Contractors' specialized network studies by SNC-Lavalin experts in HVDC converter stations
- Review and approval of all studies, reports used to define equipment characteristics
- Review and approval of equipment and details for interfacing with the utility's substations
- Ensure the Quality Assurance processes are applied to Contractor's designs
- Tracking and monitoring of Contractor's design documents

11

Component 3 – Manufacturing Follow-Up and Inspection

- Manufacturing Quality Assurance Manual review
- Identification of shop inspection records, non-compliance records and corrective actions
- Technical inspection of the equipment during manufacturing (at specific milestones or stop points), prior to test and delivery
- Factory Acceptance Testing (with Nalcor participation)
- Specialized equipment for the HVDC converters will require inspection and test attendance from SNC-Lavalin specialists
- SCADA along with control, protection and telecommunication will be inspected and tests of representative panels will also require witnessing by SNC-Lavalin specialists
- Inspection of packing and transport documentation
- Acceptance for shipment to site and preservation

12

Component 3 –

Construction Planning and Methodology

Converter Stations:

- Management of turnkey contract
- Management of the Contractors' installation of the equipment, resolve specific technical issues and manage the commissioning activities
- Strict control of on-site contract administration and scope changes
- Management of the construction activities through commissioning and turnover
- Specialists will be assigned to manage the installation and commissioning

Electrodes and Transition Compounds:

- Logistics and deliveries synchronized with construction sequence
- Comprehensive construction procedures for the site works with emphasis on quality and HSE
- Training as required to locals interested and available to work in the project
- Management of the construction activities through commissioning and turnover

13

Component 3 –

Construction Management

- Conduct kick-off meetings with all Contractors to define key aspects of contract administration, review Contractors' contract organization, work program, etc.
- Preparation of integrated and coordinated work programs
- Review and approve work procedure and methods
- Follow-up and control of work progress, schedule regular work progress meetings with Nalcor representatives
- Provide periodic and special field progress reports as required and manage the reporting from the Contractors.

14

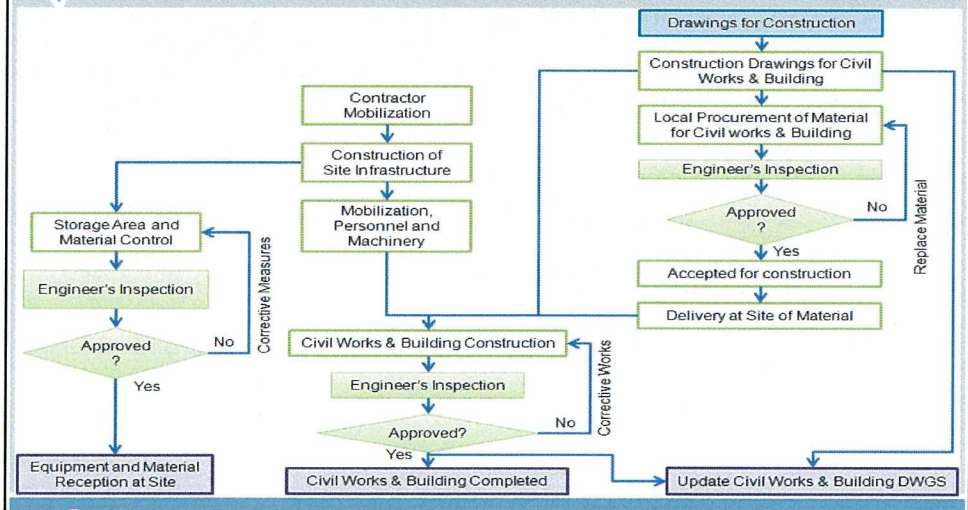
Component 3

Construction Management

- Evaluate the resources of Contractors and intervene with the Contractors to deploy additional resources as needed to meet the various milestones and the time for completion
- Ensure that material and equipment are inspected on delivery to site
- Prepare punch list of outstanding works and defects to be remedied at taking over and ensure that all works are completed before acceptance
- Ensure that Contract specific requirements are prevailing and manage the changes
- Ensure that all technical documentation will be updated during the construction and that mark-up drawings are returned for "As-Built"

15

Construction Process 1/2



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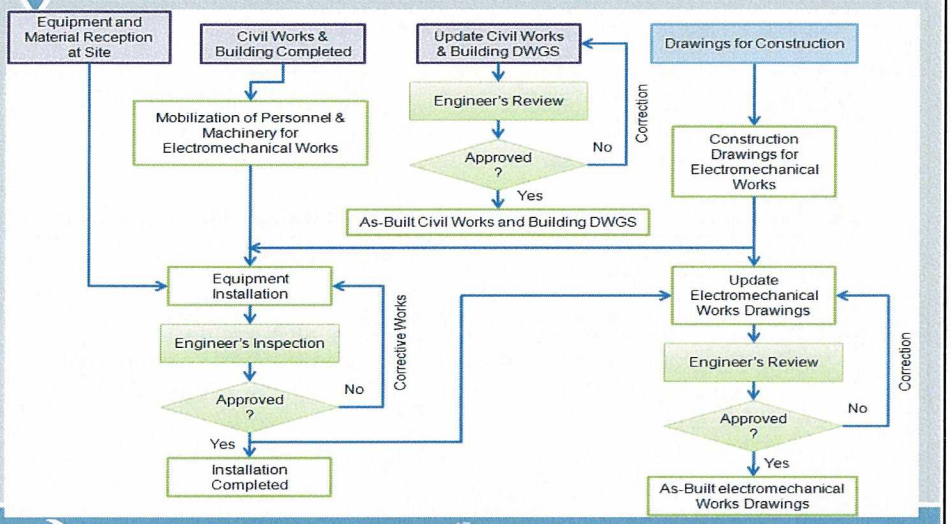
Construction Process 2/2



17

Execution – Completions

Project Completions

Methodology

- The project shall be executed generally following SNC-Lavalin policy, commissioning guidelines and procedures, start-up and data handover policies and procedures suitably amended to incorporate Nalcor's particular 'project completions' requirements
- The Completions plan will ensure:
  - The project is constructed, commissioned, certified and handed over ready for start-up, in a safe, structured and controlled manner
  - The project is provided with a comprehensive electronic set of certification and records for use during the life of the asset

18

Component 3 – Completions

Commissioning and Turnover

- The process starts as the installation is substantially completed until the end of the "Trial Operation" period and the start of Commercial Operation
- A detailed comprehensive Commissioning Plan will be prepared by the Contractors for each package, including test equipment, staff, acceptance criteria, etc.
- SNC-Lavalin will assist Nalcor in the preparation of the Energization Plan that will define the step-by-step sequence of manoeuvres to be applied during the energization process

19

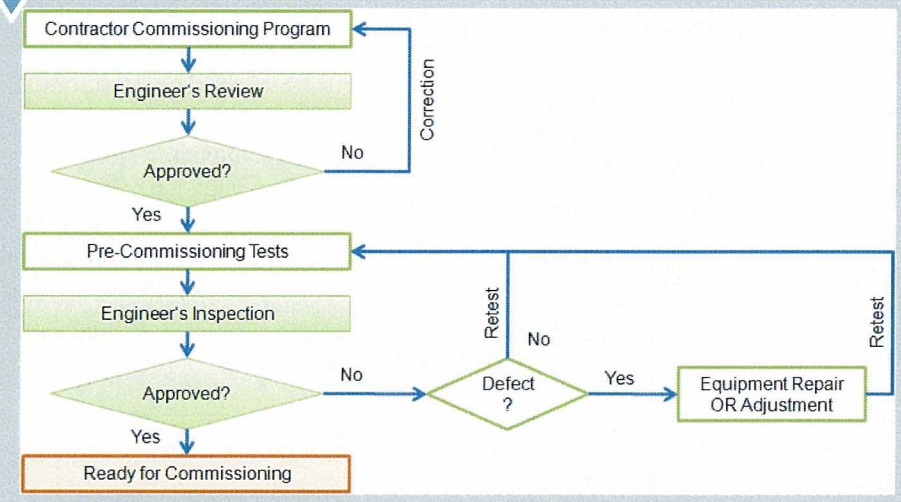
Component 3 – Completions

Commissioning and Turnover

- Pre-commissioning
  - Will be executed by the Contractors as individual equipment becomes available, on a piece-by-piece basis, or as each portion of the installation or sub-system is completed.
  - SNC-Lavalin field engineers will be supervising the pre-commissioning tests directly by attending the tests of each item of equipment

20

Commissioning Process 1/2



21

Component 3 – Completions

Commissioning and Turnover

- Commissioning
  - Energization will be performed in compliance with the sequence defined as part of the Energization Plan
  - A Commissioning Committee, headed by the Commissioning Manager and including the Commissioning Supervisors from SLI, Contractors and Nalcor, will be formed to conduct the energization process
  - The commissioning process will be allowed to stop, step-back, pause and resume as the need arises
  - Upon energization, performance tests are executed to verify the interconnection power transfer capacity

22

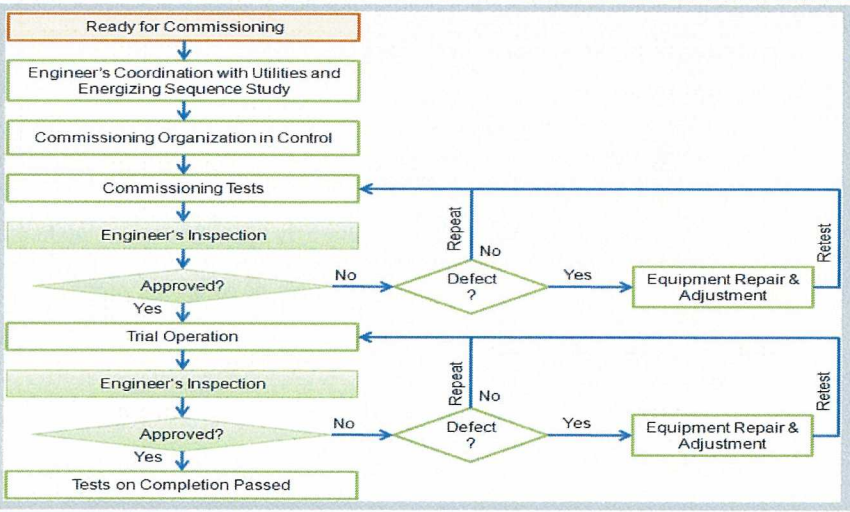
Component 3 – Completions

Commissioning and Turnover

- Trial Operation
  - The trial operation will be satisfactory if the number of forced interruptions and the total accumulated downtime do not exceed the values specified in the specifications
  - Frequent and long interruptions that are required by the Contractors to perform repairs or adjustments will cause the trial period to start again
  - Once the trial operation is completed, the system will be turn-over and the Commercial Operation will commence

23

Commissioning Process 2/2



24

Execution – Completions

Project Completions

- Handover at the end of the project through the use of the document management system - PDM. During execution, documents will be classified according to Nalcor handover requirements
- At the completion of the project, the files can be sorted as required and handed over via electronic transfer, via CDs, and/or printed and bound into hardcopy books
- Electronic repository has the ability to link to other document repositories used by Nalcor, contractors and vendors, if required. The Project PDM system repository will remain the master repository; however, within different offices (Nalcor, contractors, vendors), existing document management practices can continue to be utilized during document development and/or review

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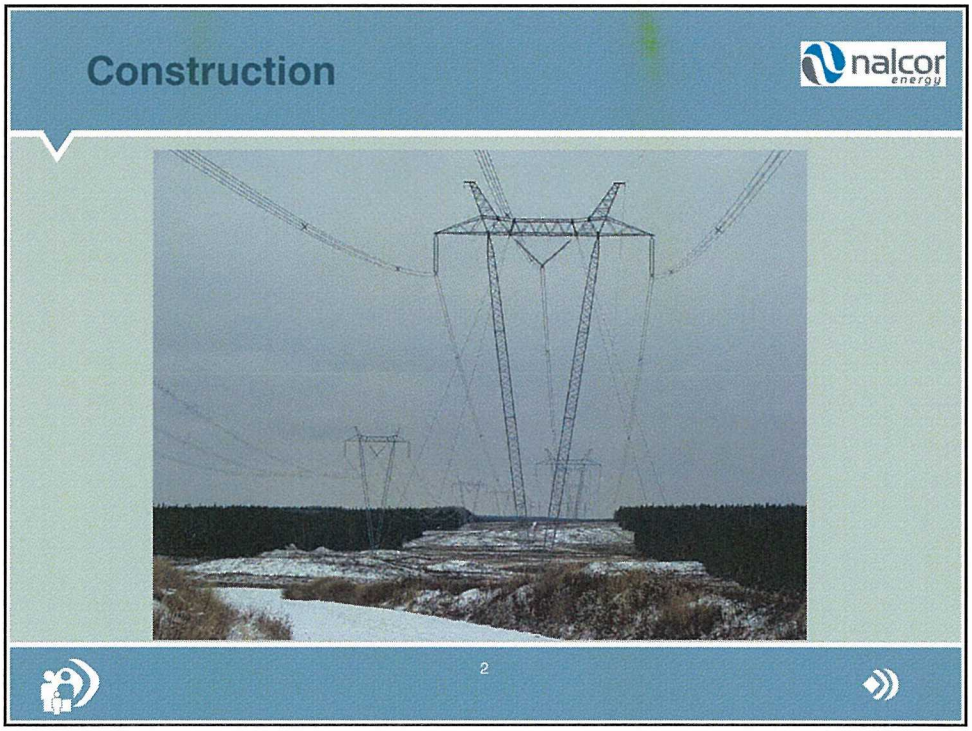
Component 3 – Completions

Project Completions

- Contracts close-out, notwithstanding warranties and performance guarantees
- Input to engineering for As-builts and O&M Manuals
- Input to Fixed Asset Register
- Lessons Learned Documented
- Project Completion Report
- Project Close-out

26


Lower Churchill Phase 1 Development
HVAC and HVDC Overhead Transmission Lines –Component 4
CONSTRUCTION MANAGEMENT
Nalcor Energy


Construction
nalcor energy
2

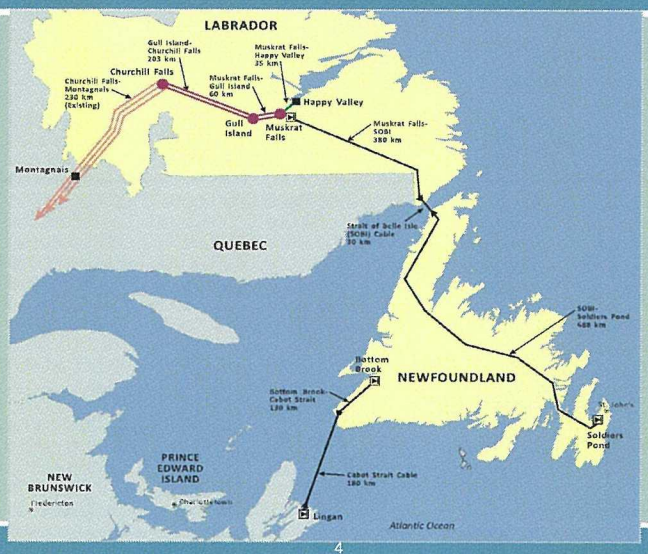
SNC Lavalin T&D - Health & Safety

Safety

- Safety is paramount in all transmission construction
- Hazard identification:
  - Working in the vicinity of high voltage
  - Working in cold extreme weather conditions
  - Helicopter work
  - Working at heights

3

Project Map



4

Construction - Project

3.2.4.1 Sub-component 4A: HVdc Overhead Transmission Lines Muskrat Falls to Soldiers Pond

a) Overhead Transmission Line:

Transmission line from Muskrat Falls converter station to Soldiers Pond converter station (near St. John's, NL):

- 900 MW, ±320 kV dc, bipole line, single conductor per pole,
- galvanized lattice steel guyed suspension and rigid angle towers, and
- 1100 km long.

Connections to HVdc transmission system specialties installations, as described in Component 3 herein, will be required.

b) Electrode Lines:

(i) Dual overhead conductors supported on a wood pole line from Muskrat Falls converter station to the shoreline pond electrode located on the Labrador side of the Strait of Belle Isle.

(ii) Dual overhead conductors supported on a wood pole line from Soldiers Pond converter station to the shoreline pond electrode located on the east shore of Conception Bay.

5

Construction - Project

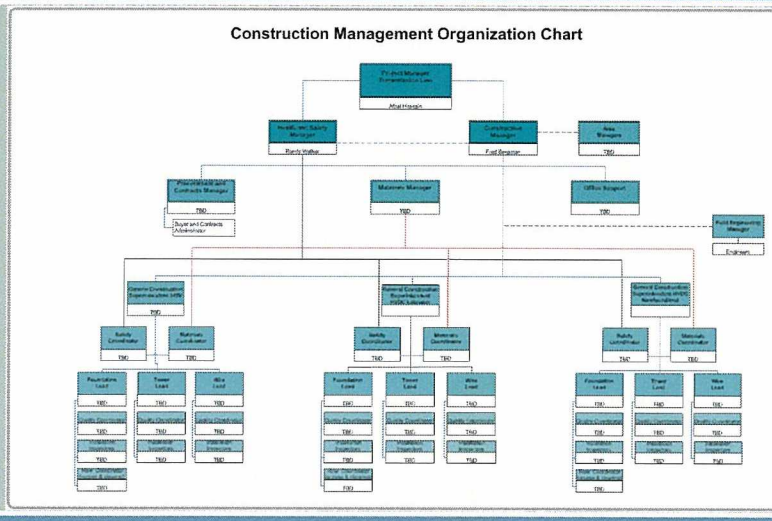
3.2.4.2 Sub-component 4B: HVac Overhead Transmission Lines Muskrat Falls to Churchill Falls

Transmission lines from Muskrat Falls to Churchill Falls:

- 2 – 345 kV ac, 3 phase lines, double bundle conductor,
- Single circuit galvanized lattice steel guyed suspension and rigid angle towers,
- 265 km long

6

Construction – Project Team



7

Construction - Mobilization

Mobilization Plan

- Early works - in Project office and in field locations to identify material marshalling yards, local opportunities and restraints (labour, equipment, material, etc.).
- Construction – in field locations prior to construction commencing and until all works are completed

8

Construction – Early Works

- **Main activities related to Lines Construction:**
  - Construction Execution Plan including commissioning and acceptance
  - Conduct site visits with key/lead team members and assess RoW
  - Review Newfoundland OHS and Labour policies
  - Review Project data
  - Review permitting status and follow up
- **Input into key concurrent activities will include:**
  - Health & Safety Management Plan
  - Environmental Management Plan
  - Risk Management Plan
  - Schedule
  - Quality Plan
  - Human Resources Plan including Local Business and Employment Plan
  - Communication Management Plan
  - Contract and Materials Management Plans
  - Scope of Work for construction activities (camp and material yard locations)

9

Construction – Strategy

Strategy

Year round work
- Winter work access issues (winter roads)
- Muskeg vehicle accessibility

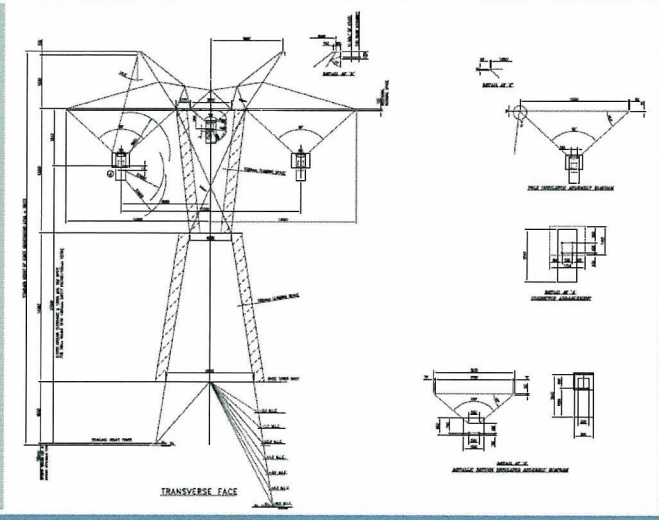
Material yards
- Material yards located close enough to construction for good access
- Tower assembly yards
- Material delivery schedule

Stringing and setting segments
- Helicopter stringing
- Length of conductor on reels (weight and size of reels)
- Value analysis for construction methods (helicopter tower erection)

Schedule
- Schedule 10 hour days, 6 days per week shift
- Camp size dependent on crew availability and size

10

Construction – HVDC Tower



11

Construction – Component 4a Labrador

Option 2: Muskrat Falls to the Strait of Belle Isle

Labrador - Island Transmission Link:
Labrador Converter Station and Transmission Corridor

12

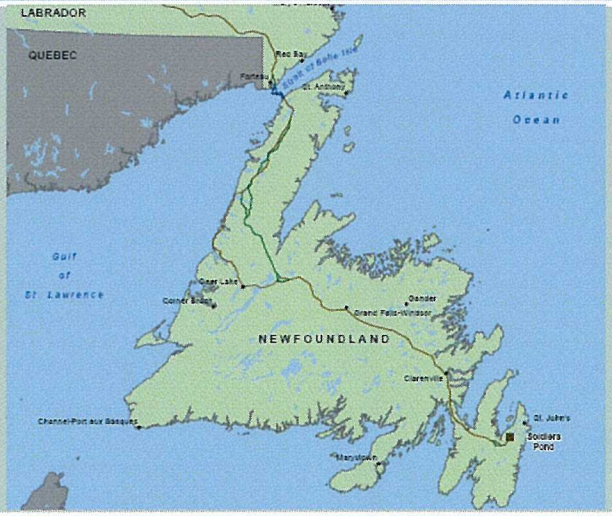
Construction – Component 4a Labrador

Execution Plan

- 400 km HVDC + 400 km Electrode Line
- Break into sections approximately 2 -300 km
- Camps and material yards approximately every 100 km
- Main camp at end of Trans Labrador road
- Concurrent activities to occur in sections
- Site access and RoW preparation to start August 2012
- Foundation work and anchors to start November 2012
- Tower assembly to start March 2013
- Tower erection and guy installation to start July 2013
- Stringing to start September 2013
- Electrode line to start April 2013

13

Construction – Component 4a Newfoundland



14

Construction – Component 4a Newfoundland

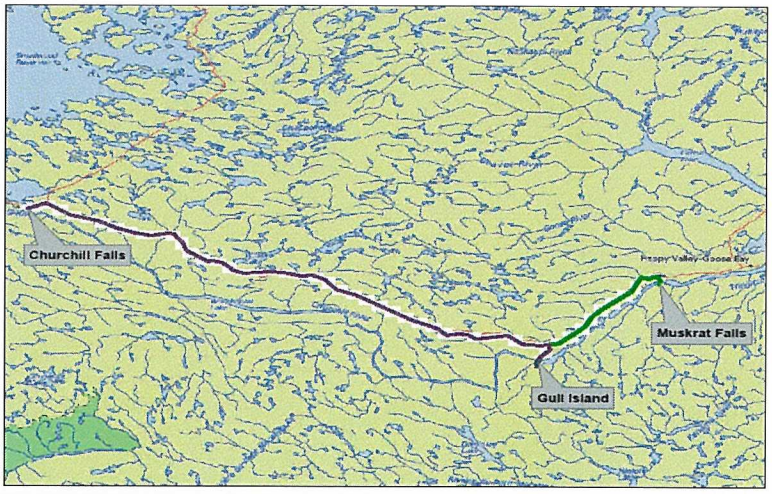
Execution Plan

700 km HVDC + 15 km Electrode Line

- Break into sections approximately 2-300 km
- Camps and material yards approximately every 100 km
- Concurrent activities to occur in sections
- Site access and RoW preparation to start August 2012
- Foundation work and anchors to start November 2012
- Tower assembly to start March 2013
- Tower erection and guy installation to start July 2013, depending on erection method utilized
- Stringing to start September 2013
- Electrode line to start June 2014

15

Construction – Component 4b



16

Construction – Component 4b

Execution Plan

265km 345kV AC Single Circuit Guyed Towers - 2 separate lines

- Salvage 138kV after completion of first 345kV line
- Camps and material yards located at Churchill Falls, Muskrat Falls and Gull Island
- Concurrent activities to occur
- Site access and RoW preparation to start July 2012
- First 345kV AC Schedule:
  - Foundation work and anchors to start August 2012
  - Tower assembly October 2012 – July 2013
  - Tower erection January 2013 – August 2013
  - Stringing April 2013 – June 2014

17

Construction - Quality

- Inspection Testing Plan (ITP)
- Monitor and record
- Document management
- Outstanding items (Punch List)
- Completions – sign off

18

Construction - Quality

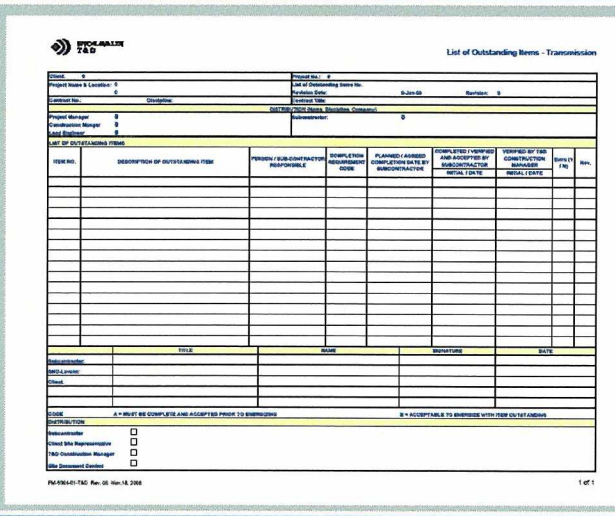
CHECKLIST FOR TRANSMISSION LINES (240 kV) QA/QC REPORTS

LOT A - 955L

STRUCTURE /TOWER NO.	TOWER TYPE	FOUNDATION REPORT (FM-062199-4100-03)	SPREAD FOOTING ACCEPTANCE (FM-	TOWER FOOTING ASSEMBLY (Phase I)	COMPRESSIVE STRENGTH RESULTS (Third Party)		SOIL COMPACTION REPORT (Third Party)	TOWER ASSEMBLY ACCEPTANCE (Phase II)	MEGGER GROUNDROD (FM-062199-4100-	STRINGING AND SAG DATA	FINAL PHASE III ACCEPT	PRE-COMMISSIONING CHECK	PATROL WORK SHEET	GROUNDING CLEARANCE REPORT	PICTURES		
					7 DAYS	28 DAYS											
1	HW	√	√	√	√	√	√	√	√	N/A	√	√	√	√	√	√	√
2	QQ	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3	HW	√	√	√	-	-	√	√	√	√	√	√	√	√	√	√	√
4	HW	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
5	HW	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
6	HW	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
7	HW	√	caisson	√	√	√	N/A	√	√	√	√	√	√	√	√	√	√
8	HW	√	caisson	√	√	-	N/A	√	√	√	√	√	√	√	√	√	√
9	HW	√	caisson	√	√	√	√	√	√	√	√	√	√	√	√	√	√
10	HW	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
11	HW	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
12	HW	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
13	0	√	√	√	-	-	√	√	√	√	√	√	√	√	√	√	√
14	0	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
15	HW	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
93	QQ	√	√	√	-	-	N/A	√	√	√	√	√	√	√	√	√	√

19

Construction - Quality


List of Outstanding Items - Transmission

20

Construction – Material Management

Material Management – Delivery Schedules

- Marshalling yards
- Foundations
- Towers
- Conductor
- Insulators
- OPGW/OHSW
- Hardware and fittings
- Make up steel fabrication facilities
- Guy wire fitting fabrication facilities

21

Construction - Contracts

Contracting Strategy

- The Right Packaging
- Lump Sum
- Unit Price
- Local Opportunities

Construction Work Package Definition

- RoW Clearing – various packages
- Construction access road preparation – various packages
- Storage yards and construction camps preparation
- Transmission Line construction - 4 Packages or more
- Restoration/Reclamation – various packages

22

Construction - Labour

Site Labour

- Training Programs (supervisor and craft labour)
- Special Task Training for General Work Force (i.e. Electrical, Equipment, First Aid, Work Procedures)
- Requirements for specific areas
- Crew qualifications and competencies
  - Workleader
  - Journeymen
  - Apprentices
  - Labourers
  - Equipment Operators

23

Construction - Constructability

Constructability

- Constructability Group (including construction contractors)
- Incorporate into Engineering Design
- Input to Procurement and Logistics
- Construction schedule
- Create a Constructability Log
- Lessons Learned

24

Project Offices

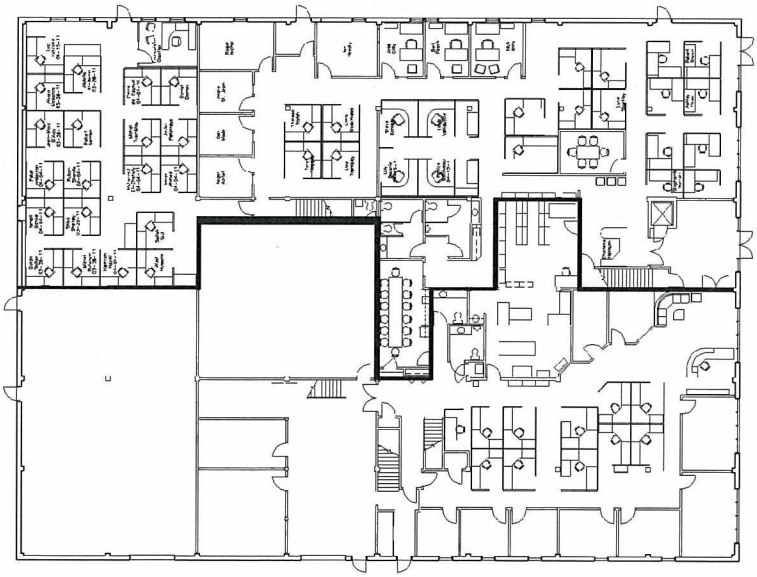
- Three office locations will be utilized
  - Starter Office at 1133 Topsail Road
  - Interim Office at 272 Torbay Road
  - Final Office at 141 Torbay Road

Starter Office

- 1133 Topsail Road
  - Project start-up to May 13, 2011
  - Accommodations for 48 EPCM personnel
  - 9 offices and 39 work stations
  - Will draw on SNC-Lavalin's Home Office for office equipment and support

3

Project Office Layout, 1133 Topsail Road

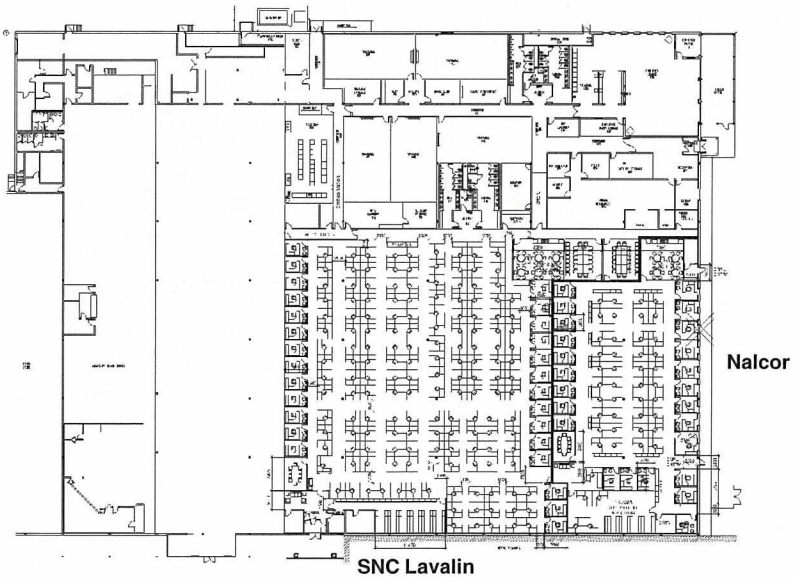


Interim Project Office

- 272 Torbay Road
  - May 16, 2011 to December 22, 2011
  - Accommodations for 254 project personnel
  - 27 offices and 158 work stations for EPCM staff
  - 24 offices and 45 work stations for Nalcor staff
  - Will be outfitted with new office equipment and furnishings

5

Project Office Layout, 272 Torbay Road



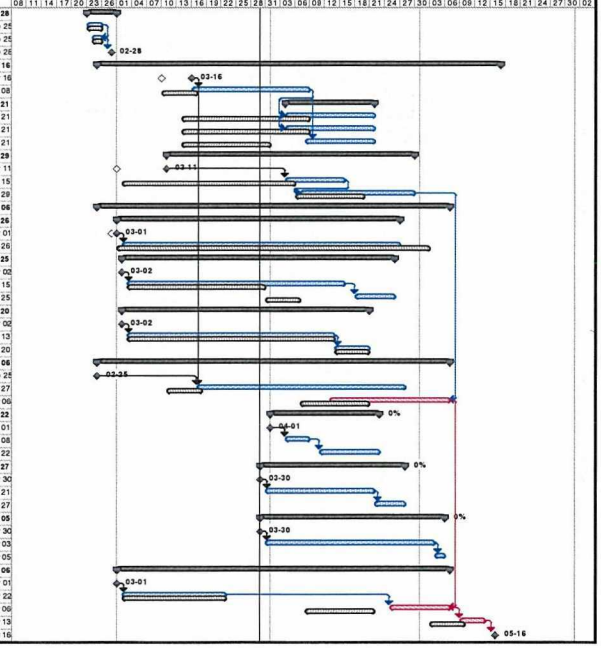
Final Project Office

- 141 Torbay Road
  - January 3, 2012 to project completion
  - Will accommodate all project personnel with separate offices for SNC-Lavalin and Nalcor
  - Available for tenant improvements – September 1, 2011
  - Space and functional planning currently ongoing
  - 56,500 sf available (49,000 main floor; 7,600 mezzanine)

7

Muskrat Falls Hydroelectric Development
Project Offices – Construction & Occupation Schedule

ID	Task Name	Duration	Start	Finish
1	**1133 Topsail Rd. Project Office**	**4 days**	**Feb 23**	**Feb 28**
2	Systems Furniture	3 days	Feb 23	Feb 25
3	IT/Data	2 days	Feb 24	Feb 25
4	Occupancy	1 day	Feb 28	Feb 28
5	**272 Torbay Rd. Project Office (Convergys)**	**57 days**	**Feb 25**	**May 16**
6	Access	1 day	Mar 16	Mar 16
7	Demolition	18 days	Mar 16	Apr 08
8	**New Work**	**14 days**	**Apr 04**	**Apr 21**
9	New Office Walls	14 days	Apr 04	Apr 21
10	Top Up Demising Walls	14 days	Apr 04	Apr 21
11	Electrical Change Over	10 days	Apr 08	Apr 21
12	**Systems Furniture**	**36 days**	**Mar 11**	**Apr 29**
13	Specify Order	1 day	Mar 11	Mar 11
14	Supply and Deliver	10 days	Apr 04	Apr 15
15	Install	17 days	Apr 07	Apr 29
16	**IT/Data**	**51 days**	**Feb 25**	**May 06**
17	**Outside Communication Link**	**41 days**	**Mar 01**	**Apr 26**
18	Specify Order	1 day	Mar 01	Mar 01
19	Supply and Install	40 days	Mar 02	Apr 26
20	**Servers**	**39 days**	**Mar 02**	**Apr 25**
21	Specify Order	1 day	Mar 02	Mar 02
22	Supply and Deliver	32 days	Mar 03	Apr 15
23	Install	6 days	Apr 18	Apr 25
24	**VOIP Equipment**	**36 days**	**Mar 02**	**Apr 20**
25	Specify Order	1 day	Mar 02	Mar 02
26	Supply and Deliver	30 days	Mar 03	Apr 13
27	Install	5 days	Apr 14	Apr 20
28	**Internal Cabling**	**51 days**	**Feb 25**	**May 06**
29	Specify Order	1 day	Feb 25	Feb 25
30	Supply and Install	30 days	Mar 17	Apr 27
31	Drop leg Terminals	18 days	Apr 13	May 06
32	**Security/Access System**	**16 days**	**Apr 01**	**Apr 22**
33	Order	1 day	Apr 01	Apr 01
34	Deliver	5 days	Apr 04	Apr 08
35	Install	10 days	Apr 11	Apr 22
36	**Multi Function Devices (Copier/Fax)**	**21 days**	**Mar 30**	**Apr 27**
37	Order	1 day	Mar 30	Mar 30
38	Deliver	16 days	Mar 31	Apr 21
39	Install	4 days	Apr 22	Apr 27
40	**Plotter**	**27 days**	**Mar 30**	**May 05**
41	Order	1 day	Mar 30	Mar 30
42	Deliver	24 days	Mar 31	May 03
43	Install	2 days	May 04	May 05
44	**PC's**	**49 days**	**Mar 01**	**May 06**
45	Specify Order	1 day	Mar 01	Mar 01
46	Delivery	15 days	Mar 02	Mar 22
47	Install	10 days	Apr 25	May 06
48	Set-up, Testing Systems, Cleaning	5 days	May 09	May 13
49	Operational	1 day	May 16	May 16



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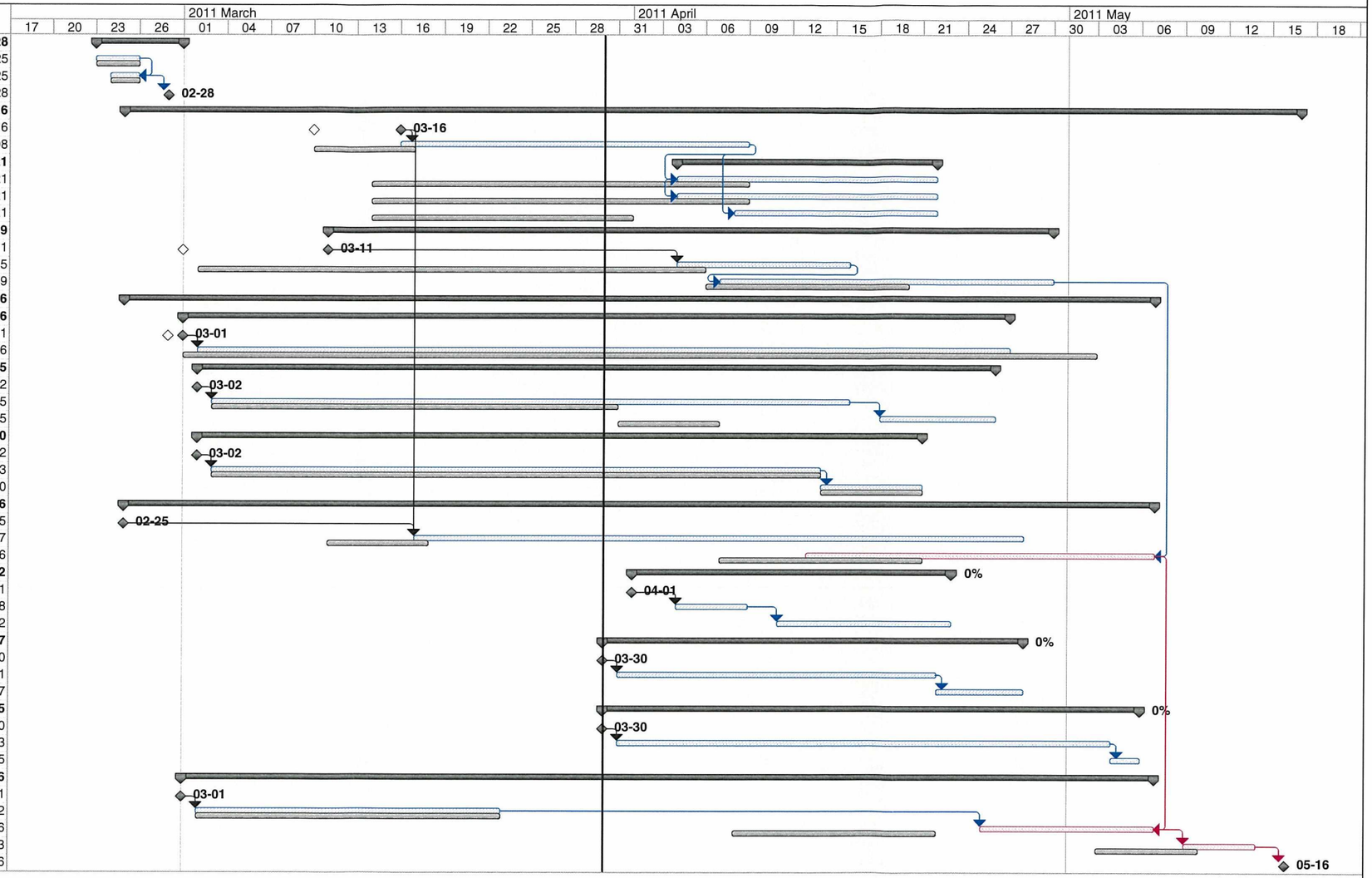
38	Deliver	16 days	Mar 31	Apr 21
39	Install	4 days	Apr 22	Apr 27
40	**Plotter**	**27 days**	**Mar 30**	**May 05**
41	Order	1 day	Mar 30	Mar 30
42	Deliver	24 days	Mar 31	May 03
43	Install	2 days	May 04	May 05
44	**PC's**	**49 days**	**Mar 01**	**May 06**
45	Specify Order	1 day	Mar 01	Mar 01
46	Delivery	15 days	Mar 02	Mar 22
47	Install	10 days	Apr 25	May 06
48	Set-up, Testing Systems, Cleaning	5 days	May 09	May 13
49	Operational	1 day	May 16	May 16



Critical | Task | Baseline | Milestone | Project Summary | Deadline

Critical Split | Split | Baseline Split | Summary Progress | External Tasks

Critical Progress | Task Progress | Baseline Milestone | Summary | External Milestone

Issued: March 30, 2011

SNC·LAVALIN