Lower Churchill Management Corporation

nalcor energy
LOWER CHURCHILL PROJECT

TECHNICAL INTERFACE MANAGEMENT PROCEDURE

Nalcor Doc. No. LCP-PT-MD-0000-PM-PR-0004-01

Comments: This procedure to be used in association with the following forms: LCP-PT-MD-0000-PM-FR-0002-01 (Technical Interface Request), LCP-PT-MD-0000-PM-FR-0003-01 (Technical Query), and LCP-PT-MD-0000-PM-FR-0004-01 (Request for Information). Changes in this revision have been made to reflect and be consistent with organisational changes on the Lower Churchill Project and to address some minor process adjustments.	Total # of Pages: (Including Cover): **34**

Status / Revision	Date	Reason for Issue	Prepared by	Functional Manager Approval	Quality Assurance Approval	Project Manager Approval
B3	18-Apr-2018	Issued for Use	G. Scott Gillis	Tanya Power	David Green	(See next page)

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Note: 1. "LCP" coded documents require all Project Managers' approval.

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Additional Approvals

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1 PURPOSE

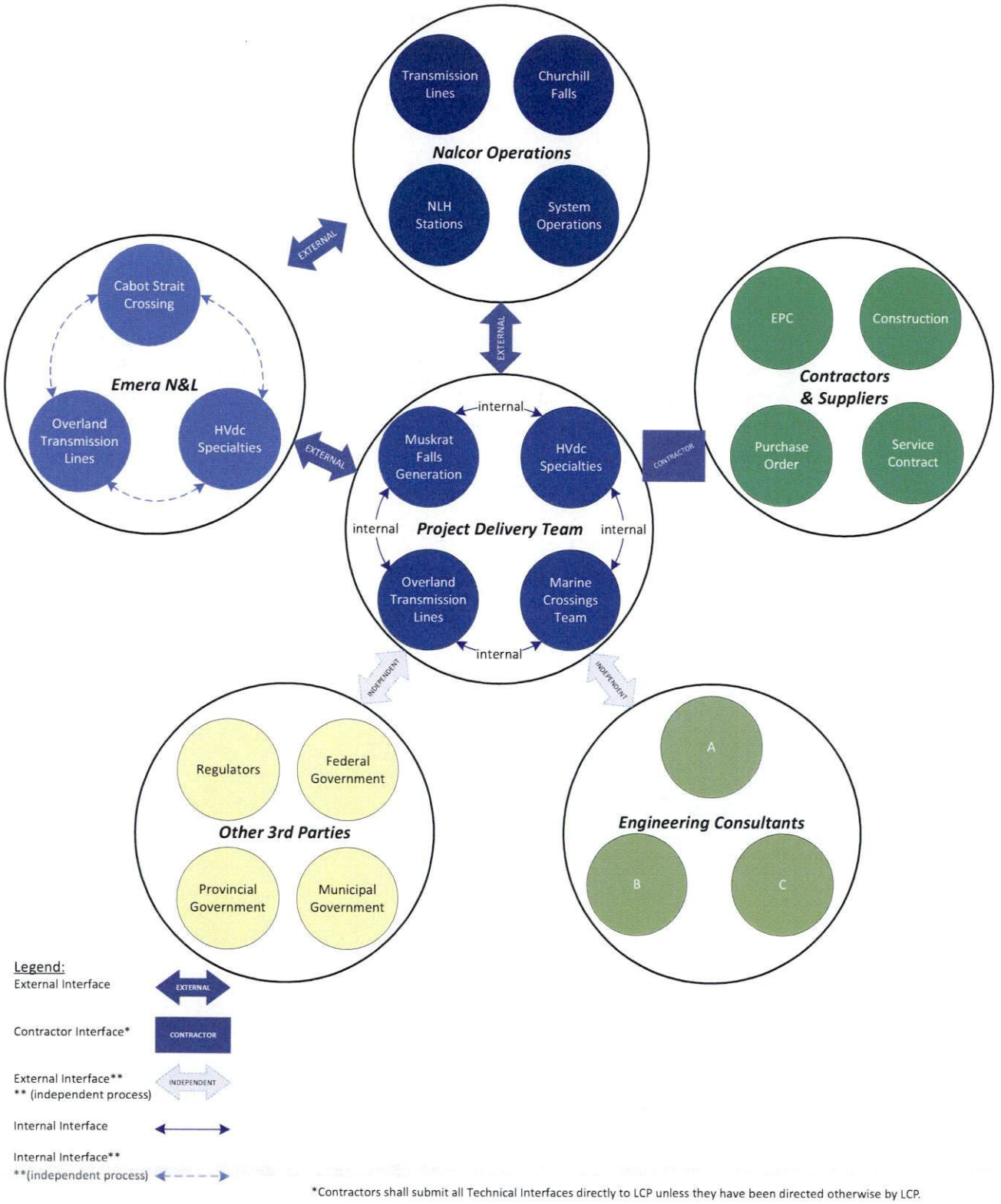
An effective Technical Interface Management procedure must adequately address the scope, roles, responsibilities, process and tools required. On the Lower Churchill Project it involves many stakeholders operating in multiple locations. In order to be effective it must be both functional and visible from all locations. This procedure clearly describes the process and responsibilities with respect to:

- the identification of potential technical interface issues in advance in order to avoid interface problems through timely proactive measures;
- promotion of clear, accurate, timely, and consistent communication with other commitment packages, Project scopes, and organizations for the transfer of technical interface information;
- identification of major technical interfaces early in the Project through a structured process;
- identification of critical technical interface issues with potential impact to Project targets, communication of these to the stakeholders, facilitation of their resolution, and minimization of their impacts;
- establishment of responsibility for, and association of timelines with, the provision of details to resolve interface requests;
- promotion of thorough and timely resolution of requests;
- forms and processes used to document and monitor technical interfaces;
- well defined monitoring and reporting of the status and resolution of interface issues; and
- creation of a record of all Project Technical Interfaces for future reference.

This procedure complies with the objectives of the *Technical Interface Management Plan* (Reference LCP-PT-MD-0000-PM-PL-0006-01). It must be understood and used effectively by all Lower Churchill Project (LCP) team members, other Nalcor business units interfacing with the project, Nalcor co-venture partners, and select EPC contractors as identified by the Project. Engineering, Procurement and Construction (EPC) contractors must have their own technical interface management plans that are consistent with the principles of this plan.

2 SCOPE

This *Technical Interface Management Procedure* is applicable to all sub-projects of the Lower Churchill Project (Phase I). The internal scope only of the Maritime Link managed by Emera Newfoundland and Labrador is subject to its own internal procedures (reference MLK-EN-MD-0000-PM-PL-0002-01). However, it will employ this procedure when addressing pre-existing Nalcor assets and the other sub-projects of the LCP. This document is intended to address all manner of technical interfaces that for the purpose of this procedure fall into the specific



*Contractors shall submit all Technical Interfaces directly to LCP unless they have been directed otherwise by LCP.

Figure 1 - Technical Interface Information Flow Overview

categories of Requests for Information (RFIs), Technical Queries (TQs) as well as Internal, External, and Contractor Technical Interface Requests.

This procedure shall apply to all hard and soft Technical Interfaces that exist between and amongst the various Project groups including, but not limited to: Muskrat Falls Generation; Transmission Lines; HVdc Specialties; Nalcor co-venture partners; EPC Contractors; Subcontractors; and other Consultants, Contractors, and Suppliers dealing directly with the LCP Project Team. Figure 1 below provides an illustration of some of the key groups between which and within which Technical Interfaces will exist. Examples of both external and internal interfaces are provided.

This procedure does not address construction and execution interfaces which are managed through the various Project planning processes and mechanisms, site coordination processes, and the contractors' own procedures. It is not to be used to address design questions identified during the construction phase of any scope of work which are to be managed through use of the Site Query Procedure (reference LCP-PT-MD-0000-CS-PR-0001-01). Nor does this procedure in any manner represent a substitution for change management. Any changes considered or implicated as a result of a technical interface must be addressed via the appropriate change management procedure(s).

3 DEFINITIONS

Battery Limit

A battery limit is a defined boundary between two areas of responsibility or scopes of work.

Closeout

Closeout is the formal endorsement by an authorized representative from the requesting party/group* indicating that the technical response is acceptable and the required deliverables (closeout package) have been provided. An interface record cannot be closed until the requesting party/ group* is satisfied that it has been resolved and the respective interface coordinator has signed and dated the form to that effect.
*Technical Interface Requests from or between Contractors must be closed by the appropriate Company representative.

Closeout Package

This assemblage contains a copy of the completed and signed relevant Technical Interface form along with any associated supporting information such as minutes of meetings, formal and informal documentation, reports, and correspondence including e-mails that the interfacing parties agree are relevant to and allow for closeout of the agreement. The closeout package is maintained electronically within the Technical Interface Register typically as a "zip" file and is developed during the period of information exchange as details are communicated between the Requesting and the Responding parties.

Hard Interface

A hard interface defines how two physical areas / items meet or fit together (e.g. size, material, location or other physical parameters). An example of a hard interface is an embedment in a concrete wall installed by one party / contractor that will support a piece of equipment being provided by another party / contractor.

Interface Coordination Groups

Four leadership groups established to provide direction on interfaces and the interface process within the areas of their specific interest or control. These groups are comprised of four or more members with representation from both the Lower Churchill Project and Nalcor Operations business divisions. The names / interest areas of the four groups are Churchill Falls, NLH Stations, System Operations, and Transmission Lines.

Interface Point	The physical location of a hard interface is known as the interface point. Interface points collectively establish the battery limits of a scope of work.
Request for Information	A Request for Information is a formal request for a document, record, or data set (typically static – not part of the project revision controlled design documentation) used internally by the Company, its partners, or affiliates that formalises and facilitates management of such requests between these parties. A Request for Information is not to be used by Contractors.
Soft Interface	A soft interface is an interface that does not pertain directly to the meeting or connection of two separate physical components. It relates to characteristics or properties rather than physical dimensions (e.g. environmental data, maintenance requirements, or flow rates).
Technical Interface	A common boundary (hard or soft), between temporary, permanent, or existing infrastructure that requires the exchange of technical / design information between those elements. A technical interface does not include the sequencing or timing of installation, or the modification of scope / Plant to facilitate construction.
Technical Interface Agreement	A Technical Interface Agreement exists when two parties have reached a consensus on what information one party (Requesting Group) requires from another party (Responding Group) including how, and within what timeframe the Responding Group shall provide that information. It is formalized by the completion of a Technical Interface Request that is signed and dated by managers representing both groups.
Technical Interface – Contractor (TIC)	A technical interface that exists between scopes of work, at least one of which is a Contractor / Supplier scope, is a Contractor Technical Interface. Such interfaces are indicated as such within the tracking system by the coding prefix "TIC". See also Figure 1.
Technical Interface – External (TIE)	A technical interface that exists between two separate organizations or the Project Delivery Team and another organization or Nalcor business unit is an External Technical Interface. Contractor Technical Interfaces are by definition External Technical Interfaces but due to their unique requirements are classified separately. Such interfaces are indicated as such within the tracking system by the coding prefix

"TIE". See also Figure 1.

Technical Interface – Internal (TII)

A technical interface that exists between two Commitment Packages within the design scope of the Project Delivery Team, whether within the same Component or not, is known as an internal interface. Such interfaces are indicated as such within the tracking system by the coding prefix "TII". See also Figure 1.

Technical Interface – Supplementary (TIS)

A technical interface that is created to supplement a Technical Interface submitted to the Project Delivery Team that cannot be completely addressed internally is known as a Supplementary Technical Interface. Such an interface may be raised by the Project Delivery Team to engage a Contractor or other party that is better able to provide the response or a specific portion thereof. Such interfaces are not identified as such in the tracking system as they will also fall into one of the coding categories "TIC", "TIE", or "TII".

Technical Interface Request

A Technical Interface Request is an electronic or paper form completed and submitted to another party on the Project to document and formalize Technical Interface Agreements (reference Forms 1 and 2). They shall be the basis from which the Closeout Package is developed.

Technical Interface Management System

This is the system defined by the Technical Interface Management Procedure, its register, associated forms and documents, and those responsible for its implementation.

Technical Interface Register

The Technical Interface Register is a tool used to record, track, and report on the status of all Technical Interfaces. LCP will maintain a register (*LCP Interface Mgmt*) using the Aconex software tool that has been configured to monitor Technical Interfaces through the use of metadata fields consistent with those found on the various Technical Interface forms. Completed Technical Interface forms and associated files are attached to records in the Technical Interface Register where they ultimately comprise the Closeout Package (see above).

Technical Interface Management Team

This is a team comprised of the Technical Interface Management Lead, the Technical Interface Engineers, along with any other staff who may be assigned to support those individuals.

Technical Query

A Technical Query is a formal mechanism used internally by the

Company, its partners, or affiliates for one party to ask a technical question of another party. It is used to address those technical inquiries that do not fall under the definition of Technical Interface and that occur during the design phase. An example of a technical query might be an inquiry about access or safety requirements or general information about existing infrastructure not associated with a specific physical interface. A Technical Query is not used by Contractors nor is it to be used for active construction site issues which are the within the scope of the Site Query Procedure (reference LCP-PT-MD-0000-CS-PR-0001-01). .

4 ABBREVIATIONS AND ACRONYMS

RFI	Request for Information
TIC	Technical Interface – Contractor
TIE	Technical Interface – External
TII	Technical Interface – Internal
TIS	Technical Interface - Supplementary
TQ	Technical Query

5 RESPONSIBILITIES

Area Manager

The Area Manager is accountable for ensuring that all Technical Interfaces associated with their area are valid, technically accurate, and adequately described. The manager is also accountable for the information provided in response to Technical Interface prior to closeout. It is the Area Manager's role to understand the impact / implications of the technical interfaces within their remit and engage or notify other stakeholders as appropriate.

Interface Coordination Group

These groups, representing the interests of NLH Stations, Churchill Falls, Transmission Lines, and System Operations, are mandated to provide direction, aid in establishing a list of all interfaces in their respective area, and address conflicts or uncertainties through regular meetings.

Interface Manager

Where identified as a contractual requirement Contractors shall appoint an Interface Manager. This individual is accountable for awareness and understanding of this procedure within their organization.. The Interface Manager shall have comparable responsibilities to the Company's Area Manager role. At the

Contractor's discretion this role may also include the responsibilities of the Interface Coordinator. The Interface Manager is accountable for ensuring that Technical Interfaces stemming from their scope are valid, technically accurate, and adequately described. The Manager is also responsible for ensuring that the appropriate Technical Contact is assigned to Technical Interfaces submitted to or originating from their package, that the requirements are clearly understood, and that the responses provided are acceptable.

Package Leader

The Package Leader is responsible for providing support and guidance to the Area Manager and ensuring that Technical Interfaces stemming from their package are valid, technically accurate, and adequately described. The Package Leader is also responsible for ensuring that the appropriate Technical Contact is assigned to (or acting in that role for) Technical Interfaces submitted to or originating from their package, that the requirements are clearly understood, and that the responses provided are acceptable. The Package Leader shall ensure relevant package distribution matrices are updated to include documentation referenced in responses to technical interfaces. They shall support their Area Managers by ensuring the integrity of the information contained within the requests and responses generated from within their scopes

Technical Contact

For the Requesting Group, the Technical Contact is the individual assigned or assuming responsibility for originating a Technical Interface. He/she will have a requirement for the information being requested and be knowledgeable enough in the technical subject to clearly describe it and understand the implications of the response. For the Responding Group, the Technical Contact is the individual assigned or assuming responsibility for providing the response to a Technical Interface.

Technical Interface Coordinator

This individual shall have a basic awareness and understanding of this procedure and be able to provide direction on its use within their group or organization. The Technical Interface Coordinator is responsible for managing the Technical Interface records and updating the Technical Interface Register. The Company Technical Interface Engineers assume this as part of their role.

Technical Interface

The Technical Interface Engineer shall represent their component

Engineer

or scope in support of their Project Manager. This individual shall organise workshops and meetings to assist in the identification of technical interfaces as well as provide guidance and support to their team on the overall process. This includes interacting with other Technical Interface Engineers to determine appropriate routing and when necessary assisting in the development of Supplementary Technical Interfaces. In addition they shall also act in the role of Technical Interface Coordinator to facilitate the raising, completion, monitoring, and closure of Technical Interfaces in the system.

Technical Interface Management Lead

The Technical Interface Management Lead is responsible for the maintenance and implementation of this procedure. This includes ensuring that the procedure reflects the current requirements of the Project as needs evolve, that the systems and processes associated with Technical Interface Management are clearly understood, managed, and executed by the Technical Interface Coordinators and Engineers. This individual is also responsible for representing the interests of the Project on interface issues such as participation on interface stakeholder groups as appropriate. Although the technical content of the Technical Interface Management System is not the responsibility of this role, the tools required to administer and report on the status of all technical interfaces is.

6 REFERENCES

LCP-PT-MD-0000-PM-PL-0006-01	Technical Interface Management Plan
MLK-EN-MD-0000-PM-PL-0002-01	Interface Management Plan
LCP-PT-MD-0000-CS-PR-0001-01	Site Query Procedure
LCP-PT-MD-0000-PC-LS-0001-01	Project Work Breakdown Structure and Code of Accounts
LCP-PT-MD-0000-PM-FR-0002-01	Technical Interface Form
LCP-PT-MD-0000-PM-FR-0003-01	Technical Query Form
LCP-PT-MD-0000-PM-FR-0004-01	Request for Information Form

7 PROCEDURE

7.1 GENERAL

For the purpose of this procedure, the term *Technical Interface* is the broader term and shall include *Hard* or physical interfaces (both *internal* and *external*), as well as *Soft* interfaces which frequently fall into the sub-categories of either Technical Queries (TQs) or Requests for Information (RFIs). This procedure will address all three types - differentiating between

internal, external, and contractor interfaces simply on the basis of the groups requesting and responding to the requests.

Hard Interfaces will use the Technical Interface Request form (reference LCP-PT-MD-0000-PM-FR-0002-01) that includes an agreement step whereby the initiator seeks from the responder, a commitment confirming that the requested details and delivery date are both understood and achievable (if not, any issues should be discussed and resolved prior to proceeding). The response section is thereafter developed for submittal to the Requesting party prior to the agreed deadline. It also includes an acceptance step that is used to indicate that the requester is satisfied with the response. Technical Queries and the Requests for Information use their own forms (reference LCP-PT-MD-0000-PM-FR-0003-01 and LCP-PT-MD-0000-PM-FR-0004-01) that do not include agreement / acceptance steps but otherwise are similar with many of the same fields. The deliverables are typically less complicated to provide, more easily understood, and typically less dependent upon any ongoing design development.

From the commencement of design the recording of technical interfaces requires the identification of all known hard interfaces. This is typically facilitated through the identification of interface points on drawings, through a register, or both. This effort shall be led by Package Leads with support from the various Technical Interface Coordinators / Technical Interface Engineers at the earliest opportunity. These will become the basis of the Technical Interface Requests submitted in the Aconex system. As the Project progresses and additional hard as well as soft interfaces are identified they should be added to the system and addressed as required.

7.2 NUMBERING SYSTEM FOR RECORDS

Record numbering in the Technical Interface Register is automated and governed by the completion of related metadata fields. The structure of the interface number shall be as follows:

AA(A)-BBB-CCC-####

Where:

1. AA(A) – represents the type of notice (TIC, TIE, TII, TQ, RFI)
2. BBB - represents the *Requesting Group* (e.g. MFL, MCT, NLH*)
3. CCC – represents the *Responding Group* (e.g. MFL, MCT, NLH*)
4. #### – represents a 4 digit sequential number (system generated)

* Note: These groups are defined in the Technical Interface Register which is updated as groups are added.

The Technical Interface form has fields corresponding to elements 1-3 above. These elements will be entered in the Technical Interface Register (Aconex *LCP Interface Mgmt*) upon receipt of an approved completed form along with the other request details in the metadata fields. Initial saving of the record will result in the system applying the information and generating the next sequential number (element 4 above). This number will be added to the Technical Interface form at this time. When the record has been generated the Technical Interface form will be attached to it electronically in the register. It is also possible to assign numbers in advance by registering a draft of the record (as long as the details required to completed the metadata are known) and attaching the completed form afterwards.

7.3 INTERFACE IDENTIFICATION AND MANAGEMENT

7.3.1 Interface Points

The most effective means of establishing sound Technical Interface Management is through the development and maintenance of Interface Points and a simple register of these points. This can be easily achieved by developing a (or leveraging an existing suitable) set of drawings to portray the hard interfaces associated with a package / contract scope and developing an associated register of these points. This essentially comprises the battery limits of that package / contract scope and will be the basis from which *Technical Interface Requests* will be developed. The Interface Point drawings and the associated register should be considered live documents to be diligently maintained as the design progresses. The following subsections describe the methods for developing, utilising, and evolving these points.

7.3.2 Interface Workshops

The identification and management of Technical Interfaces can be facilitated by means of workshops and coordination meetings. Workshops are an effective means to assemble the stakeholders at the commitment package level in a collaborative environment where an Interface Coordinator can facilitate the systematic review of the package. By initially establishing the battery limits of the package the group can determine a) what other packages (and if applicable existing infrastructure) their design is dependent upon and what those dependencies are; and b) what other packages are dependent upon their design and what those dependencies may be. Such workshops can only be successful if the appropriate stakeholders are in attendance. Technical experience in such forums is invaluable but the capability of the facilitator is also critical to ensuring the success of the process. Workshops are typically the best means to establish the bulk of the technical interfaces on the Project. Technical Interface records may be created directly in the meetings or developed afterwards depending on the preference or experience of the facilitator.

7.3.3 Interface Coordination Meetings

As deemed necessary by interfacing parties, interface coordination meetings may be called to identify additional technical interfaces, to develop or facilitate technical interface agreements, or to address issues with respect to deliverables or meeting required delivery dates. These meetings may be called ad hoc to resolve individual issues or may be scheduled as recurring to address multiple or more complex interfaces between two parties. Such meetings should be minuted including specific actions and copied to the attendees as well as any management who have indicated interest in the issues or due to the nature of the interface are deemed to be stakeholders.

7.3.4 Contractor Technical Interfaces

Contractors have specific obligations and responsibilities with respect to the management of Technical Interfaces as laid out in Exhibit 3 of the *Contract Coordination Procedures*. This includes primary responsibility for managing their technical interfaces. In order to achieve this they are required to develop a technical interface management plan and shall implement systems and methodology for ensuring the identification of originators and responders, quality, accuracy and timeliness of interface information. The systems and methodology will provide for the incorporation of schedules for submittal of their deliverables, scheduling and participation in interface coordination meetings with Company and other organizations as required to properly manage interfaces, and regularly advise Company on the status of unresolved interface issues. Contractors shall promptly elevate unresolved interfaces and interface issues to Company for resolution.

Unless otherwise directed, Contractors shall submit Technical Interface Requests directly to the Company for processing. The Company will be responsible for determining whether other parties are to be engaged to provide input to the response (reference Section 7.4.3 Supplementary Technical Interfaces). It is important to recognize that although Contractors have primary responsibility for managing their technical interfaces, Company must be an active participant in the process, will have final say on the completion of, and ultimately is responsible for the closeout out of Technical Interface Agreements. See Figure 1 and Attachment 9.1. Also, it must be clearly understood that the Technical Interface Procedure does not displace the requirement for nor does it in any way represent a substitution for Change Management or Contract Management. Any changes being considered or addressed as a result of or in conjunction with Technical Interface Management must follow the relevant procedures.

7.3.5 Ad Hoc Interface Identification

Although workshops and coordination meetings are highly effective in identifying and establishing the technical interfaces on the Project, they are not the only means available. They will be complemented by the spontaneous identification and recording brought on during both preliminary and detailed design efforts. Ongoing engineering may result in formal

documentation of additional technical interfaces. These may have been initially overlooked or may have arisen due to new information coming to light or, as a result of changes in either design or package definition.

7.4 TECHNICAL INTERFACE RECORDS

As indicated above in Section 7.1, there are three types of records managed as *Technical Interfaces* with defined subject areas. The Technical Interface Request is used specifically for all hard or physical interfaces as well as certain soft interfaces. The same form is used whether the technical interface is internal, external, or engages one or more contractors. The intent of the request is to define design information associated with interface points which one party requires from another by a certain time to complete their work or issue design information (e.g. design specifications for a commitment package going to tender). Attachment 9.1 provides additional details on the process flow of a Technical Interface Request.

The Technical Query is used to submit a technical question to another party that typically does not require design details but may be around *softer* issues. When a request pertains only to the provision of data or documentation, generally pre-existing and typically relatively static (e.g. standards, records, reports, or electronic data sets) a Request for Information is the appropriate medium. The Technical Query and Request for Information described here are not intended for use by Contractors who have other means provided for requesting this type of information such as the Site Query (as per Technical Interface definition in Section 3). The following subsections will address all three of these record types / forms.

7.4.1 Initiating a Technical Interface

Upon identification of a technical interface (reference Section 7.3), the requesting technical contact shall take responsibility for completing the heading and Section 1 of the appropriate form (Reference Section 6 above) providing, at a minimum, the following:

1. Title (subject of the interface)
2. Record No. (obtained from the Register by the Interface Coordinator)
3. Revision No. (begin with 0)
4. Type (Internal, External, Contractor, Technical Query, Request for Information)
5. Operations Interface Group (Churchill Falls, NLH Stations, System Operations, Transmission Lines, N/A)
6. Critical (not defined or used)
7. Physical Component Code (reference Project Work Breakdown Structure and Code of Accounts LCP-PT-MD-0000-PC-LS-0001-01)
8. Interface Point*
9. Requesting Group (organization or Project area)
10. Request CP (requesting group commitment package number)
11. Technical Contact (Requesting Group)

12. Manager (Component / Area / Interface Manager)
13. Request Date
14. Responding Group (organization or Project area)
15. Response CP (requesting group commitment package number)
16. Technical Contact (Responding Group – if known)
17. Manager (Component / Area / Interface Manager)
18. Required by Date
19. Description / Background / Deliverables sections as per the appropriate form

* Where this is defined / available.

The completed request should be reviewed by the Technical Contact's manager for technical content including clarity, conciseness, supporting information, and validity. If found to be deficient in any area the request should be returned to the Originator who shall revise accordingly until such time as the manager approves the submission by endorsing and dating it. If submitting a Technical Interface Request, the manager shall sign and date in Section 2 of the form – otherwise at the bottom of Section 1. If the request includes requirements beyond the exchange of purely technical information, it may be rejected outright or altered to remove the other elements. This includes any suggestion or consideration of change which should be handled through other Project processes such as DANs, change requests, Site Queries, Concession Requests, etc. Any element with potential for commercial impact would require such alternative routing.

Upon successful completion of the request it shall be either submitted to the responsible Interface Coordinator / Manager or discussed with that individual so as to determine the requirement to progress to the required response. If the matter requires additional input from both the requesting and responding parties it may be necessary to call a meeting of the responsible stakeholders in order to agree to the requirements to resolve the matter. Whether a meeting is required or not a Technical Interface Request must be signed by both respective managers in order to formalize it as a Technical Interface *Agreement*. This will indicate an understanding of the deliverables, the requirements to provide them, and acceptance of the date by which they will be provided.

Although forms can be entered in the system prior to this point as drafts, at this point the form shall be used to either create a record in the Interface Register (Aconex) or if a draft has been created, to update the record. The record is entered or updated by the Interface Coordinator / Manager who shall:

1. populate the meta-data in Aconex from the fields completed on the form;
2. generate the record in the register (if not already created as a draft) ;
3. record the interface number and revision number on the form;
4. combine any associated files (including the native Word file to facilitate any revisions in the future) with the signed and scanned form in a zip file*;

5. attach a copy of the zip file to the record;
6. indicate the current status of the records; and
7. issue a notification to the response group and any other appropriate parties via a transmittal in the Aconex mail system (this will include the stakeholders requiring knowledge of the interface to either progress its resolution or be made aware of its status for monitoring purposes).

* This initial file is the seed from which the closeout package will develop.

Design details for a technical interface may be required for two different stages or dates (e.g. preliminary design for one deadline and detailed design for a different deadline). The recommended method for addressing this shall be to complete the first request in the system and revise the request for the second stage. When responding to the initial request, the Responding Party will return the reponse at "Responded" status and advise the Requesting Party that they should update the status to "Revise & Resubmit" via the transmittal indicating that the preliminary or currently existing details have been provided but that detailed/final design information is still pending. The Requesting Party shall then revise the Technical Interface Request accordingly, update the required fields in Aconex, change the status to "Revise & Resubmitt", and transmit back to the Responding Party to process further. This serves the purpose of maintaining the history of the Technical Interface within a single record. If for any reason this approach is deemed unsuitable the alternative shall be to produce two separate technical interfaces that shall contain information explaining the differences and the rationale for having them separated. These two technical interfaces should include references to each other to further enable an understanding of the differences and their separate purposes.

7.4.2 Responding to a Technical Interface

Upon receipt of a technical interface transmittal in Aconex (notices of Aconex transmittals are received in the party's standard e-mail system), the responding group's Interface Coordinator / Manager shall provide a copy of the record along with any associated supporting information and in the case of a Technical Interface Request, obtain manager approval (Technical Interface Agreement) to process the request. Any status change shall be indicated in the Aconex system by the Interface Coordinator including endorsement of the form as appropriate and updated record complete with Response Group Manager's signature shall be transmitted back to the Request Group. Upon receipt of the request either by transmittal or hard copy, the responding technical contact shall proceed to pursue resolution of the request by obtaining or developing the required information in the agreed format and providing it by the agreed date. Requirements may demand input from other sources such as Contractors or other parties engaged in the Project. See the next section for further details.

Issues with respect to deliverables or meeting the agreed to date should be brought to the attention of the technical contact's Area Manager or Interface Manager as appropriate at the earliest opportunity and any changes communicated to the Requesting Group via the Interface

Coordinator / Manager immediately. Such changes to requirements or agreed to deliverables should be documented by way of a revision to the original agreement on the interface form and endorsed and dated again by both parties. Although the record shall be updated to reflect any mutually agreed changes to the current forecast delivery date, this alone does not warrant a formal revision to the form or record. However, the basis of agreement to any such changes shall be indicated (e-mail instructions etc.) and maintained with the files (both electronic and hardcopy) for reference.

When the required deliverables (closeout package) have been obtained or developed by the Responding Group's Technical Contact the respective Area Manager or Interface Manager as appropriate shall be notified and the appropriate mechanism for transferring the deliverables shall be determined. Whether the information requires transmittal via the Project Document Control system or not will depend on the nature of the deliverables and current standards, regulations, and guidelines for transmission of information between organizations / Project scopes. Regardless of the method, the Interface Coordinators need to be engaged in order to facilitate the process of updating the Technical Interface form and the register in order to complete the formal response and initiate closeout. This applies regardless of whether the response documentation is submitted with the response form in Aconex *Interface Mgmt* or through other means (e.g. *Rev Controlled* module of Aconex).

7.4.3 Supplementary Technical Interface

When the Project Delivery Team as a responding party does not have the capacity to fully address the requirements of the Technical Interface, it may be necessary to seek input from other sources. When this is determined to be the case, a *Supplementary Technical Interface* should be raised and submitted to the third party. This may occur, for example, when a Contractor or other party submits a Technical Interface to the Project Delivery Team that requires input from a third party – typically the Contractor of the responding party. The resulting Supplementary Technical Interface should capture only the requirements not internally available and shall have the identical reference with respect to request and response commitment packages of the original interface. The respective Manager(s) and their responsible Package Leaders are accountable for determining the requirements and collaborating to prepare and issue the Supplementary Technical Interface while the Technical Interface Engineers will facilitate this process. Supplementary Technical Interfaces and their "parent" Technical Interface shall cross-reference each other. Typically the Supplementary Technical Interface shall remain open until such time as the "parent" Technical Interface has been accepted and closed.

7.4.4 Closing a Technical Interface

Provision of the agreed to deliverables should initiate the closeout process for any Technical Interface. In the case of Technical Queries and Requests for Information the Originator (Requesting Group) shall, upon receipt of the response or deliverables (closeout package),

review them for acceptability. If there are additional requirements or there is some clarity lacking the Responding Group should be contacted directly and efforts made to immediately resolve the matter to the satisfaction of the Originator. If this is unsuccessful the matter should be brought forward to the relevant manager for direction. When the Originator has been satisfied that what is available has been provided, the respective Interface Coordinator / Manager shall sign the form for closeout and update the record in the database.

With respect to Technical Interface Requests, the Responding Group shall provide a closeout package to the Interface Coordinator / Manager for transmittal to the Requesting Group. Upon successful transmittal of the deliverables to the Requesting Group, that group's Interface Coordinator shall obtain confirmation from the respective Technical Contact that the requested information has been provided by them endorsing and dating the *Response Acceptance* (Section 4) of the Technical Interface Request. If the Requesting Group is a Contractor, the Technical Contact will only confirm acceptance in a section provided for that and communicate this to the Company whose respective Area Managers will review before providing direction to close the Technical Interface to the Company Technical Interface Coordinator. LCP is responsible for final closeout and will require a closeout package for all Interfaces that it is party to.

In the event that a request is cancelled at any point, the rationale for cancellation shall be noted and the responsible manager shall sign and date the cancellation. The Technical Interface Coordinator (Company) shall be responsible for ensuring that the register is updated to reflect closeouts / cancellations and for maintaining records accurately in the system.

7.5 TECHNICAL INTERFACE MANAGEMENT

7.5.1 Change Management

Although Technical Interfaces are normally closed upon receipt of the requested information, there may be occasions when, due to subsequent changes, the information provided is no longer valid. Regardless of the cause or timing of the change, it is important to consider the impact upon any open or closed Technical Interfaces. Therefore it is necessary for Technical Interface Engineers and Managers to ensure that they have in place a means to monitor changes and their potential impacts upon both open and closed interfaces. This can be addressed by review processes and also by ensuring that the change management process includes actions to assess any implications on technical interfaces. However, as per the Scope of this procedure (Section 2) this is not in itself a mechanism for managing change.

7.5.2 Interface Coordination Groups

Due to the volume of Technical Interface issue with existing Nalcor assets, and particularly System Operations, it is necessary to have additional mechanisms in place to manage these

interfaces effectively. To this end a number of Interface Coordination Groups representing key Operational areas have been established to work the issues and facilitate the timely resolution of technical Interfaces. These groups, with representation from both the Lower Churchill Project and Nalcor Operations, shall meet as required to ensure that technical interfaces within their respective areas are identified, registered, and managed effectively.

7.5.3 Planning Interfaces

Project work involves many issues that could have impacts on planning and schedules. These may relate to construction and execution or may be contractual in nature. As well some technical interfaces may be critical in nature – that is they involve items that could impact the Projects' *critical path*. In any case the Interface Coordinators / Engineers / Managers are responsible for working closely with their respective Planning counterparts to ensure that the interfaces are managed and captured appropriately. This requires a close coordination effort by these individuals at the component level and continuous exchange of information.

7.5.4 Non-Technical Interfaces

There are many issues that might be perceived as interfaces that have no real technical element. They may reflect political, social, environmental or regulatory concerns. This procedure does not deal directly with non-technical interfaces but it is important to recognise that they exist and must also be managed. Frequently there may be common issues that include both technical and non-technical aspects. Knowledge of any such interfaces should be brought to the attention of those responsible for any associated coordination.

8 RECORDS & REPORTING

The Technical Interface Register is housed in the Aconex system. As records are created and updated the system is kept current with the latest copy of the form, any associated documentation, and changes to the metadata. The system allows for viewing of all versions that have been uploaded thereby creating an accurate history of the evolution of a particular record.

Status changes (see Attachment 9.2) and transmission of changes to stakeholders can also be displayed and tracked in the system. From these records reports can be generated indicating status, where current actions lay, delays and bottlenecks, and summaries of the overall system and associated entries. Such reports are developed, generated, and provided to the PMT as agreed with that group by the Technical Interface Management Lead and other members of the Technical Interface Team. A sample output of a report from the Aconex system is provided in Attachment 9.3. Such reports can be generated in the system and then exported to MS Excel for manipulation and presentation as required.

Fields provided in the register include:

1. Interface Number
2. Status
3. Request Group
4. Request Technical Contact
5. Request CP
6. Confidential
7. Print Size
8. Request Date
9. Response / Delivery Date
10. Request Comments / Documents
11. Request / Response Project Scope
12. Critical Interface
13. Revision
14. Type
15. Operations Interface Group
16. Response Group
17. Response Technical Contact
18. Response CP
19. File
20. Required by Date
21. Current Forecast Date
22. Date Closed
23. Response Comments / Documents
24. Physical Components

Reports and summaries will be extracted from the Technical Interface Register for weekly, monthly, and any other reporting requirements as they arise. These reports can be generated in a variety of ways to meet the needs of the audience whether at the LCP level, Component level, Commitment Package level or for the Contractors internal use. The system can also address Physical Component level reporting (reference LCP-PT-MD-0000-PC-LS-0001-01) in order to support commissioning and completion activities.

A management level reporting mechanism will be provided through the LCP Interface Management Dashboards to provide greater visibility at the Component / Sub-Project level as well as by the LCP-Operations interface groups. Two dashboards will be updated weekly and monthly to support the various teams in their efforts to manage their scopes as shown in the examples provided in Attachments 9.4 and 9.5.

Although Aconex maintains the masters of the technical interface information, in parallel, all hardcopies and associated attachments will be maintained by the respective coordinators as long as the need exists. However, these records are to be considered temporary and provide a

means of managing the files while still in development and quickly accessing information for the presentation to stakeholders as necessary.

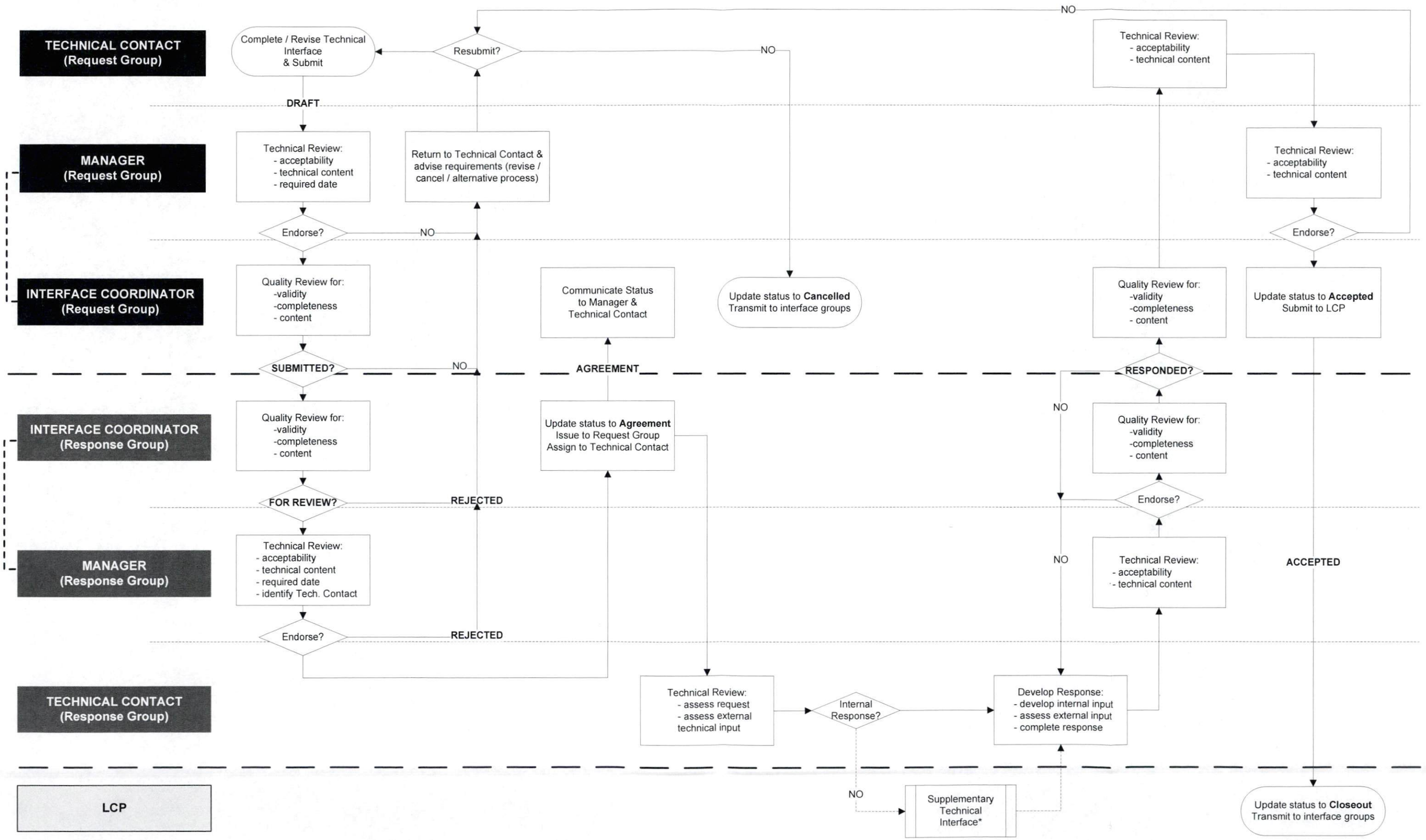
9 ATTACHMENTS

9.1 Technical Interface – Flow Diagram
9.2 ACONEX Status Definitions and Status Sequence Diagram
9.3 Sample Output from Technical Interface Management Register
9.4 Sample Output from LCP – Operations Dashboard
9.5 Sample Output of Open Interfaces by Group from The Current – Weekly Interface Management Report

ATTACHMENT 9.1

Technical Interface – Flow Diagram

Lower Churchill Project	LCP-PT-MD-0000-PM-PR-0004-01	Project Controls	**Technical Interface**	1 of 1	Revision	Date issued	Approved by



* The requirement for external input from a third party (e.g. contractor / separate branch of Nalcor) will be managed through the development of a Supplementary Technical Interface by LCP which will follow this same process flow.

ATTACHMENT 9.2

ACONEX Status Definitions and Status Sequence Diagram

Aconex Status Definitions for *LCP Interface Mgmt*
Technical Interface, Request for Information and Technical Query

Draft	TI/RFI/TQ has been prepared in Aconex but not submitted (may be used to reserve a number or upload a form for review but not to be processed).
Submitted	Requesting party has submitted the TI/RFI/TQ to Responding party for processing.
For Review	The Responding party's Coordinator/Administrator has received the TI/RFI/TQ for processing. This individual will determine if the TI/RFI/TQ is valid. A valid TI/RFI/TQ is then forwarded to the appropriate party for response. This status also includes the review by a manager to determine the appropriate *Technical Contact* to respond. For an invalid TI/RFI/TQ see Rejected.
Rejected	If the TI/RFI/TQ is Rejected it is returned to the Requesting party with an explanation for the rejection. Either the Responder or the Reviewer can Reject a notice but in either case an explanation must be provided to the Requesting party. Rejected is not a final status and the notice should be either Cancelled or resubmitted by the Requesting party. Comments fields in Aconex should be used to explain rejection.
Agreement*	This status is an indication that both the requesting group and the responding group have an understanding of the requirements of a Technical Interface Request and agree to those requirements and to the indicated date that they should be provided by. NOTE: Not to be used for other notice types. This implies that the Technical Interface Request is *in progress*.
In Progress**	When a valid RFI/TQ has been forwarded to the appropriate party for response and it has confirmed that responsibility for that response is understood it shall be updated as is *In progress* until such time as the response is prepared. This indicates that the Technical Contact has been assigned and is working the response. NOTE: Not to be used for TIs.
Responded	Responding party has provided the requested information and that information has been updated in Aconex and submitted back to Requesting party to review.
Revise & Resubmit*	When responding to the request, if the information provided is expected to change or be revised in the future the Responding Party must notify the Requesting Party in the transmittal that the preliminary or currently existing details have been provided but that detailed/final design information is still pending. If the Requesting Party will require the updated information they should then update the status to Revise & Resubmit.
Accepted*	When the requesting group of a Technical Interface Request has received the response and accepts the contents of that response as fulfillment of the final requested information, the party will indicate that it has been Accepted. NOTE: Not to be used for other notice types.
Closeout	The Requesting party is satisfied with the response, has signed the form and uploaded it in Aconex, officially closing the TI/RFI/TQ. With Contractor Technical Interface this is managed by the Company based upon the Requesting party first accepting the response.
Cancelled	Cancellation can be invoked at any time by the Requesting party but not by the Responding party. It may be as a result of Rejection, incorrect process, information requested is not required, or any other reason deemed appropriate by the Requesting party. However, the rationale for cancellation shall be indicated in some fashion and uploaded as an attachment either on the RFI/TQ form or other form such as an e-mail.

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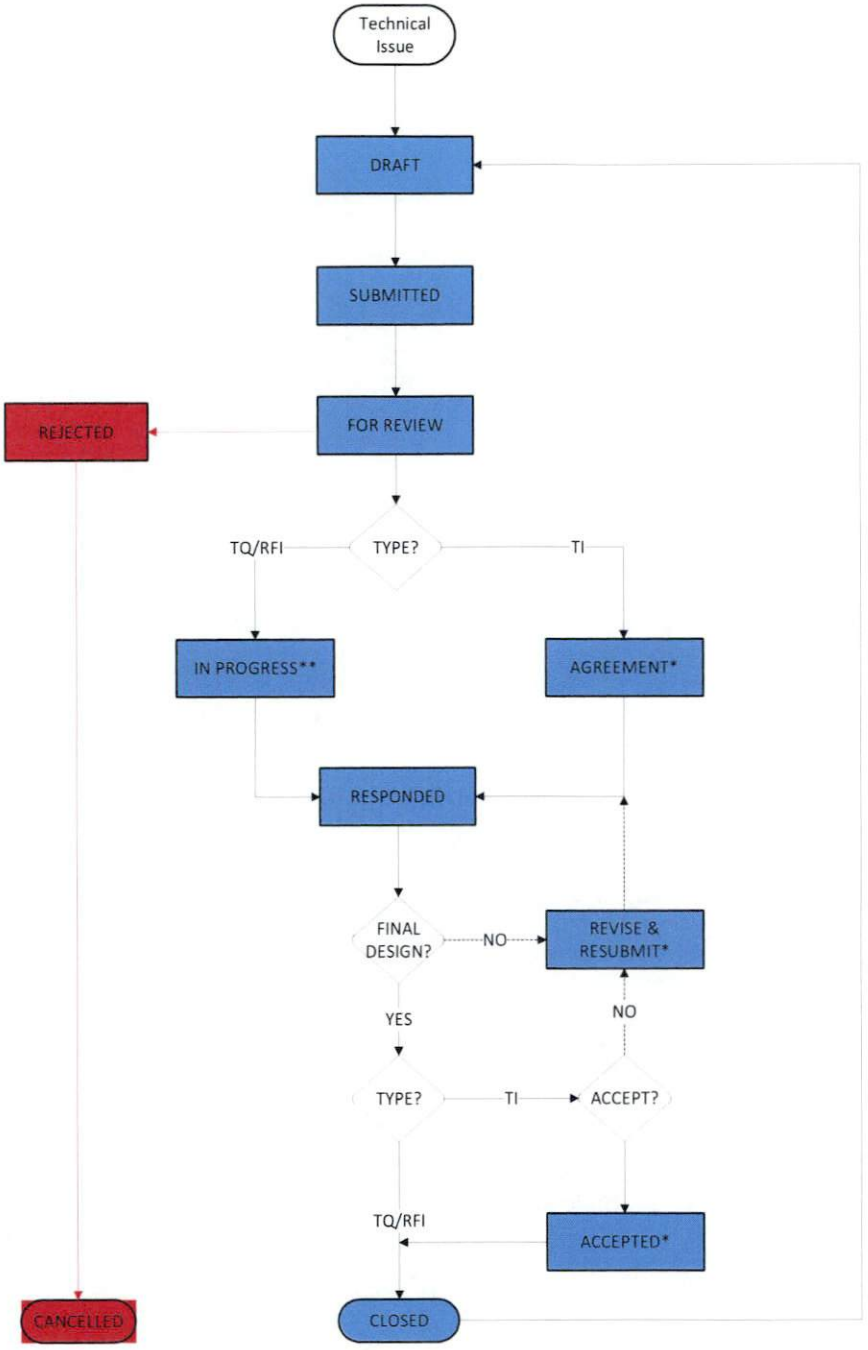
Status Sequence Diagram for Technical Interfaces, Technical Queries, and Requests for Information



* This status is only valid for Technical Interface Requests and is not to be used for Technical Queries or Requests for Information.
** This status is only valid for Technical Queries and Requests for Information and is not to be used for Technical Interface Requests.

ATTACHMENT 9.3

Sample Output from Technical Interface Management Register

LCP Interface Mgmt Nalcor Energy

Search Export To Excel

Project: **LCP Interface Mgmt**
Generated By: Mr Scott Gillis, Nalcor Energy
Generated On: Monday, 23 March 2015 1:31:57 PM

Number of Results:1004
Showing Result 1 to 1004

Interface No	Title	Status	Critical Interface	Request - Response Project Scope	Request CP	Request Technical Contact	Response CP	Response Technical Contact	Request Date	Required by Date	Current Forecast Date	Type
RFI-MFL-NCF-0006	Churchill Falls ITS for MF Vista Inflow Model	Draft	No	Component 1 - N/A	N/A	Julia Hiscock	N/A	Chad Wiseman	23-Mar-2015	3-Apr-2015	3-Apr-2015	Request for Information -RFI
RFI-ENL-NLH-0091	Culvert Design Information - Millertown to Victoria Control Road	Responded	No	Maritime Link - Maritime Link	N/A	Craig Snelgrove	N/A	Gerard Piercy	20-Mar-2015	26-Mar-2015	26-Mar-2015	Request for Information -RFI
RFI-MFL-NCF-0005	Request for Busbar Protection Drawings	Draft	No	Component 3 - N/A	CD0502	Steven Crane	N/A	Chad Wiseman	20-Mar-2015	3-Apr-2015	3-Apr-2015	Request for Information -RFI
TIE-MFL-NLH-0048	North Spur Diesel Generator	Cancelled	No	Component 1 - N/A	CH0068	Gord Haines	N/A		20-Mar-2015	27-Mar-2015	27-Mar-2015	External Interface
TQ-MFL-NLH-0066	North Spur Diesel Generator	Submitted	No	Component 1 - N/A	CH0068	Gord Haines	N/A		20-Mar-2015	27-Mar-2015	27-Mar-2015	Technical Query
TIC-AGS-MFL-0010	IP799 - CCTV, SACS, Voice data and PA/GA systems in Converter buildings	Submitted	No	Component 3 - Component 3	CD0501	François Guay	CD0501	Keith Wareham	18-Mar-2015	3-Apr-2015		Contractor Technical Interface
TIC-AGS-MFL-0011	IP799 - CCTV, SACS, Voice data and PA/GA systems in Converter yards	Submitted	No	Component 3 - Component 3	CD0501	François Guay	CD0501	Keith Wareham	18-Mar-2015	3-Apr-2015		Contractor Technical Interface
TIC-AST-AND-0008	Request for CAD Files - Foundation Anchors	Submitted	No	Component 1 - Component 1	CH0007	Joanna Drake	CH0030	Marygrace Balenzano	17-Mar-2015	24-Mar-2015	24-Mar-2015	Contractor Technical Interface
RFI-ENL-NLH-0089	Review of P&C OLD and Station Automation Document	Closed	No	Maritime Link - Maritime Link	N/A	Baron Young	N/A	Chris Collins	16-Mar-2015	17-Mar-2015	17-Mar-2015	Request for Information -RFI
RFI-ENL-NLH-0090	BBK and GCL Handing Over of Equipment (HOE)	In Progress	No	Maritime Link - Maritime Link	N/A	Baron Young	N/A	Chris Collins	16-Mar-2015	31-Mar-2015	31-Mar-2015	Request for Information -RFI
TIC-MFL-AGS-0003	IP392A Muskrat Falls Gantry Locations - HVdc, OPGW & Electrode Line	Submitted	No	Component 3 - Component 3	CD0501	Jeff Coady	CD0501	François Guay	16-Mar-2015	24-Apr-2015	24-Apr-2015	Contractor Technical Interface
TIC-MFL-AGS-0004	IP592 Soldiers Pond Gantry Locations - HVdc, OPGW & Electrode Line	Submitted	No	Component 3 - Component 3	CD0501	Jeff Coady	CD0501	François Guay	16-Mar-2015	24-Apr-2015	24-Apr-2015	Contractor Technical Interface
TIC-MFL-AGS-0005	IP771 / IP772 Forteau Point Gantry Locations - HVdc & OPGW	Submitted	No	Component 3 - Component 3	CD0501	Jeff Coady	CD0501	François Guay	16-Mar-2015	24-Apr-2015	24-Apr-2015	Contractor Technical Interface

ATTACHMENT 9.4

Sample Output from LCP – Operations Dashboard

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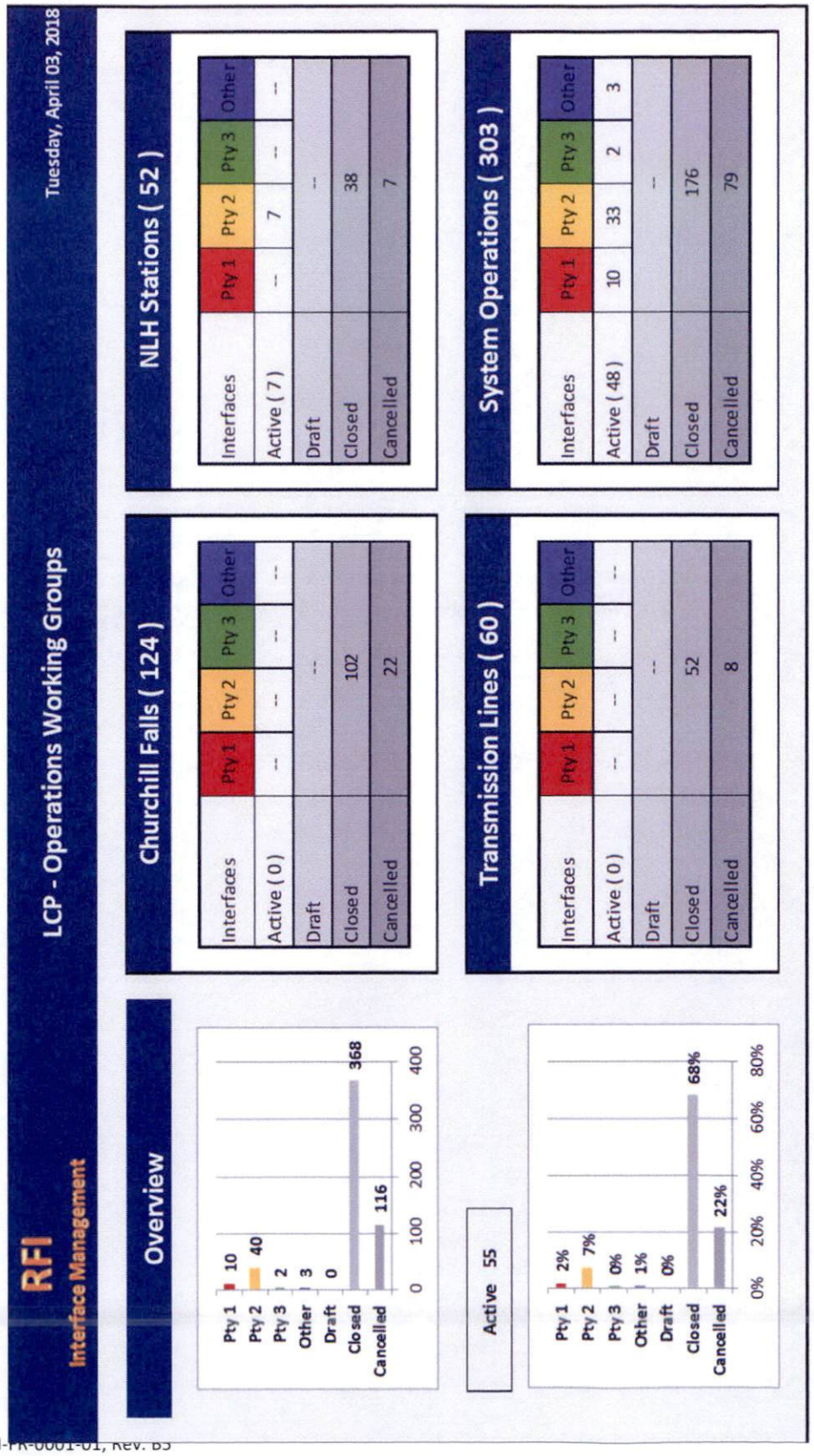

ATTACHMENT 9.5

Sample Output of *Open Interfaces by Group* from
The Current – Weekly Interface Management Report

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Open Interfaces by Group