
From: Stan marshall [REDACTED]
Sent: Thursday, June 23, 2016 10:04 AM
To: cathyghaney@nalconenergy.com
Subject: Fwd: Note from Mark Turpin
Attachments: SM LCP Letter.pdf; Note Of Appreciation.pdf; NS Progress Report.pdf; Memo RCC Trial Mix Scott Obrien.pdf

----- Forwarded message -----

From: Mark Turpin [REDACTED]
Date: Sunday, 22 May 2016
Subject: Note from Mark Turpin
To: [REDACTED]
Cc: Markturpin [REDACTED]

Mr Marshall

My name is Mark Turpin, I was the Area Manager on the North Spur. I have prepared the following outline of some of the issues at Muskrat Falls. I have spoken with Gord Oldford and he has suggested as a matter of confidentiality I send it to your private Email address, (I hope you don't mind).

By sending this email I run the risk of being perceived as a disgruntled employee. I assure you I am not. I have been in the business for 25 years and know the risks of working on a Mega Project. I have seen this

type of behavior before however, this is the first time it has been focused on me.

I have included 4 files for your review:

1. 4 Page letter outlining my 25 year professional opinion of just a few of the issues at Muskrat Falls
2. Note of Appreciation to myself from LCP Project Director Paul Harrington
3. North Spur Progress Curve December - 2015
4. MEMO: RCC Mix design to Scott O'Brien

I just want to enlighten you so you are aware of a few of the issues and current situation at LCP to aid you in your Decision making process. I am a proud Newfoundland & Labradorian who is excited about the project and if you should need any addition information or insight please do not hesitate to contact me.

In Confidence

Mark Turpin



My name is Mark Turpin, I was the Area Manager for the CH-0008 North Spur Stabilization works up until Friday May 13, 2016. I have been involved in the Lower Churchill Project for the past 5 years holding previous roles as Estimator within the Project Controls Group during the Sanctioning DG3 estimate, moving to Area Manager for the CH-0006 Bulk Excavation Contract (Contract completed within the base line schedule and AFE Budget Allocation). Where upon completion in 2013, I was then re-assigned to Area Manager of CH-0009 North and South Dams Contract to finalize the Engineering and Procurement Package. The procurement package was tendered and an Award Recommendation was presented to Management in April 2015. It was during this time (April 2015) the Management Team requested, after successfully executing the Bulk Excavation Contract and an award recommendation for the North and South Dams that I travel to Goose Bay to manage the North Spur and "Put the Job Back on the Right Track" as the early start of the North Spur Stabilization project was troublesome at least. I was specifically asked to manage the North Spur separate from the main powerhouse site, as the management team didn't want the troubles associated with the main site to hinder production on the North Spur.

We (collectively the North Spur Construction Team of 15 professionals plus Contractor) during the 2015 season executed over 43% of the work with the best Safety Record of all LCP contracts, no quality issues, and zero grievances with any of the Building Trades labor unions. The North Spur at the end of the 2015 season, was 4% above current Baseline schedule and executing the work with a cost performance in the range of 1.15 (every \$1.00 spent we get \$1.15 value of work). This was well recognized with-in the LCP management team at the time as per the note below for Project Director Paul Harrington. Also please see December's Progress Curve attached showing actual progress against planned progress. (Please note this is an earned value progress curve where 50 of 100 units installed is 50%...not a Cash spent curve like some of the recent reports on this project I have seen)

As a Construction Manager I have to be aggressive and relentless in all aspects of the Project including; Safety, Environment, Labor Relations, Quality, Physical and Cost Performance. On site my Diplomatic style within the North Spur Team (Nalcor Members and Contractor) may not be appreciated to the Management Team in St John's who have never been on a Heavy Civil Construction Site. I feel it is most important to work with the entire Team to aggressively "push" to achieve project milestones yet not sacrificing the core traits of any exceptional Construction Manager, Respect and Integrity, which are traits that I have gained from both those who have worked directly for me and the contractors that I have overseen.

It was during the last months of 2015 that the C1 Component Manager felt the need to exercise his perceived rights within the contract and suspend the contractor prior to the date specified in the Contractors Baseline Schedule, thus effecting the overall production for 2015. Attached Progress Curve ventures The Spur could have been in excess of 6% above the approved Baseline Schedule if allowed to work through to the end of the 2015 season (note the drop in progress for the month of December). The operation that was

suspended in 2015 was being executed in ideal winter frozen conditions with production 10% above planned. This same work is currently being executed, due to the premature shut down in 2015, in spring thaw conditions where the project can expect to see a decrease of approximately -20% below planned. The North Spur contractor is currently in dispute with Nalcor over this issue and is currently in Step 2 of the dispute resolution process as per the contract articles. Currently the contractor has 4 issues in various stages of dispute resolution, none of which have yet to be resolved.

Its decisions like this from the C1 Component Manager that are stestimic to the overall problems associated with the entire C1 construction program at Muskrat falls. His lack of "Boots on the Ground" construction experience has stifled the execution progress with site decisions having to be vetted through an inexperienced St John's management team leading to incorrect and late decisions. The lack of team approach and failing to listen to opinions and suggestions from other more experienced professionals will continue to plague the project. As an example, as the engineering package was being compiled for CH-0009 North and South Dams it was the teams approach to have the Roller Compacted Concrete (RCC) mix design executed by the owner and then given to the successful contractor. This decision was based on reducing project risk with such a complex mix design and the timing required to determine the proper Ceminitious and Flyash suppliers to secure production and procurement of such materials. The Component Manager would not agree to the approach and wanted the successful contractor to own the program despite the timing risk and potential delivery delays. As no RCC Dam of this size has been constructed in Canada Nalcor engaged the services of Dr. Malcolm Dunstan a world renowned RCC expert out of the UK, along with Brian Forbes an RCC expert who was already engaged on the project as part of the Independent Engineer Review Team to advise on Engineering matters. As a last ditch effort to convince the component manager to change his mind we prepared the attached memo as signed by all members of the design team, myself CH-0009 Area Manager, SNC Engineering Manager - Greg Snyder, Third Party Subject Matter Expert - Dr. Malcolm Dunstan and Advisory Board Member - Brian Forbes. The memo was ripped up in front of us with a warning if it ever surfaced all members who signed the Document would be fired. As of last week the RCC mix design program is still the responsibility of the contractor and is still not finalized, no flyash supplier has been confirmed (Malcolm is currently investigating a Turkey Supplier for flyash) and the lack of results from the mix design could possibly push the installation schedule of the North Dam. In fact the CH-0009 North Dam evaluation took so long the design team recommended Nalcor proceed with securing the supply of Ceminitious Materials and Flyash as a Frame agreement, and assign to the successful bidder, however, the component manager abandoned this option as well.

Another topic that needs to be investigated is the actual award of CH-0009 North and South Dams itself. As the Area Manager, I was the lead team member responsible for the tabulation of the award recommendation to LCP Management. After a year of technically reviewing the proposals both technical and commercial scores, an award recommendation was made promoting HJOC / Dragadoss JV. This was a unit rate contract with no labor risk for Nalcor. After I was assigned to the North Spur in April of 2015, I was surprised to learn that the award went to Barnard Pennecon JV with a

contracting strategy that assigned all labor productivity risk to Nalcor (similar to the current Astaldi contracting strategy except with an even greater risk of No Labor Cap) with a Contract Value greater than the HJOC Dragados JV proposal with no labor risk.

One would ask how is this allowed and possible too happen. That's a question I and many more people involved in the Lower Churchill Project have been struggling with for the past few years. I suspect it stems from lack of experience in the management team running a mega project. In my past 25 years I have seen it before on several projects. It takes a certain type of Management to take a project through the early stages of Feed Engineering, Preliminary Design, and Detail Design to a project sanction decision. This involves countless board room meetings, optimization sessions, review cycles and it takes a certain type of engineer to get that done and I commend the current LCP Management team for that effort. However, once a project enters the construction phase a different type person/engineer is required. Construction requires on the spot management with a knowledgeable team able to work with all involved to get the job done. I recently spent 2 hours with 20-25 senior level management personnel in a St. John's boardroom reviewing change processes, deviation alerts, safety procedures and ensuring issues like the newly revised site access forms were being used correctly. After 1 hour and 45 minutes I asked the team "Does anybody know how much concrete Astaldi poured yesterday?" "How much last week?" Nobody could answer me.... I was amazed and shocked. It should be the #1 priority on everybody minds ...how much was poured...how much was planned ...and if the target was not achieved WHY? And people need to be held accountable. Accountability doesn't exist within the current LCP management team.

I had brought these issues to my superior at the time, Ron Power with no results, it appeared that he didn't want to discuss them. I then requested a meeting with both Ron Power and Jason Kean at the office prior to Christmas 2015 to outline my concerns. This was handled with a "you guys are going to have to work it out" response, which speaks volumes to their "Conflict Resolution Skills". Not what I was expecting from senior members of the LCP Management Team. Following the resignation of Ed Martin, the LCP Management Team went into a frenzy with "circling the wagons" and "we all got to stick together" to get through this and protect our hefty "Day Rates". I suspect the main reason I was removed from the project (could not have been for the performance on the North Spur) is that the management team would like to silence me from speaking with any Transition Team you may install on the project.

The North Spur project is the Pinnacle Project so far in my 25-year career. I am very proud to support and be part of The Lower Churchill Project. I take pride in my position and I am confident in my decisions because I base them on my experience and the experience of proven professionals. If it was the right decision to sanction the project in the first place, only time can answer that. Continuing the project is the only option. To move forward what is needed, is a re-focus in the right direction. In my opinion the Project needs to be "grabbed by the guts and squeezed" with a leaner more aggressive Construction Management Group located at site to make timely decisions. Each "Project

Delay Decision” needs a “Lost Revenue Calculation” in the decision making process. The sooner NL Hydro is able to start selling 824 mega watts of power the better.

You have a major task ahead of you. I am sure, as with any complex situation the deeper you dig the bigger the challenge can become. In the political arena of Mega Projects, finding the actual truth can be difficult. I wish you luck.

I am available to discuss any of the above if you choose to do so.

In Confidence

Mark Turpin


Attachments:

1. Note of Appreciation E-Mail from LCP Project Director Paul Harrington
2. December 2015 – North Spur Progress Curve
3. Memo: CH-0009 Design Team to Scott O’Brien re: Mix Design Philosophy

From: Mark Turpin [REDACTED]
Subject: **Fwd: A Note of appreciation**
Date: May 21, 2016 12:51:55 PM NDT



From: Paul Harrington/NLHydro
To: Scott O'Brien/NLHydro@NLHYDRO, Mark Turpin/NLHydro@NLHYDRO
Cc: Ren Power/NLHydro@NLHydro, Gilbert Bennett/NLHydro@NLHydro
Date: 08/09/2015 02:05 PM
Subject: A Note of appreciation

I would like to acknowledge the good work that is being carried out on the North Spur and the hard work that Mark Turpin is putting in to ensure that continues. Both Gilbert and I report to the Excom, The Oversight Committee and the Leadership Team on a regular basis and we have both made specific reference to the good progress that is being made on the North Spur and the much improved productivity as compared to the MF site. We know that performance does not come easily and requires constant attention and management- We will make sure senior management know that we have an excellent team with solid leadership that is making that happen.

The handling of the Jim Learning Vigil and site intrusion was very well handled and Nalcor came out of that in a very positive light. So well done in that regard also

Many Thanks - keep up the good work

Paul

Paul Harrington
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LOWER CHURCHILL PROJECT

NORTH SPUR

4.0 Progress Table

North Spur - Overall Construction Progress

December-2015 Reporting Period (Week Ending - 26-Dec-2015)

WBS	WBS Description	Period (Dec-2015)			Cumulative			Comments
		Baseline	Actual	Variance	Baseline	Actual	Variance	
1110	Permanent Roads	0.0%		0.0%	0.0%		0.0%	Not Scheduled to begin until 2016.
2810	Upstream Embankments	5.2%	0.0%	-5.2%	65.4%	56.6%	-8.8%	Till Backfill stopped in Early Nov, Frost Cap in Place.
2815	Upstream Cement-Bentonite Cut-Off Wall	N/A	N/A	N/A	100%	100%	0.0%	US Cut-Off Wall Completed in Oct-2015.
2820	Downstream Embankments	0.5%	1.5%	1.0%	20.6%	40.5%	19.9%	Backfill stopped in Nov, OB Excav in Early Dec.
2845	Northwest Cement-Bentonite Cut-Off Wall	0.0%	0.0%	0.0%	9.8%	15.6%	5.8%	Transition Wall Completed. Restart in May 2016.
2850	Kettle Lakes Outflow Reconstruction	0.0%		0.0%	0.0%		0.0%	Not Scheduled to begin until 2016.
2860	Site Clearing	N/A	N/A	N/A	100%	100%	0.0%	Clearing Completed in May-2015.
2870	Hydroseeding - Embankments	0.0%		0.0%	0.0%		0.0%	Not Scheduled to begin until 2016.
2880	Instrumentation - Geotechnical	0.0%		0.0%	0.0%		0.0%	Not Scheduled to begin until 2016.
		2.2%	0.3%	-1.9%	39.2%	43.6%	4.4%	

Figure 2 – North Spur Progress Table

Notes: Due to the onset of winter conditions Upstream Embankment backfill work stopped in Early November (minor RipRap placement continued to Mid-November). A 2 m thick Winter Protection Blanket of Sand (2G) was placed over the Till in early November to prevent or minimize the depth of Frost in the Till Layer. This will allow Backfilling work to start earlier in the spring of 2016. GNLC has also installed Snow Fencing to collect drifting snow as additionally frost protection. Planned progress this month was 2.2 % but GNLC stopped work earlier than previously planned (Dec 2nd vs. Dec 15th) resulting in only 0.3 % period progress. The Baseline Curve and Associated Quantities and Progress contained an error in showing major backfill in Nov & Dec, only minor Rock or Riprap placement will take place during this period (see ACM summary for more details). Major Recovery on Backfill is expected in May/June of 2016.

LOWER CHURCHILL PROJECT

NORTH SPUR

5.0 Progress Curves

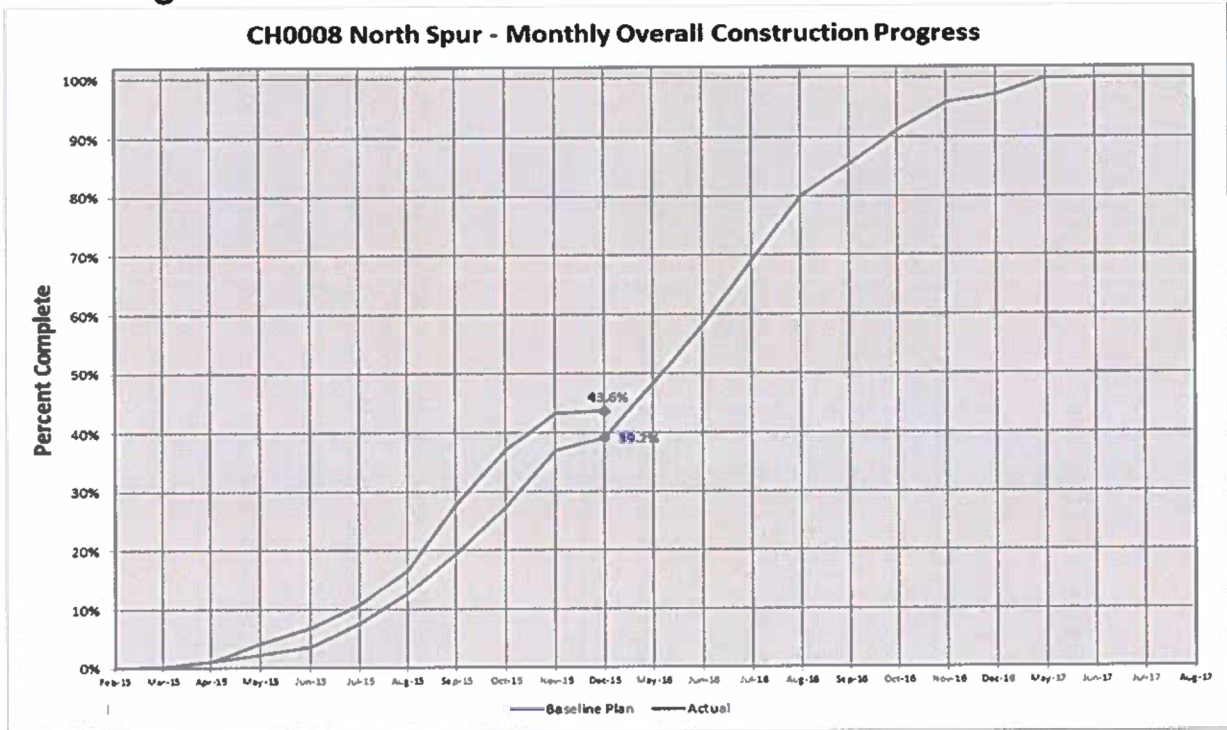


Figure 3 – North Spur Progress ‘Overall S-Curve’

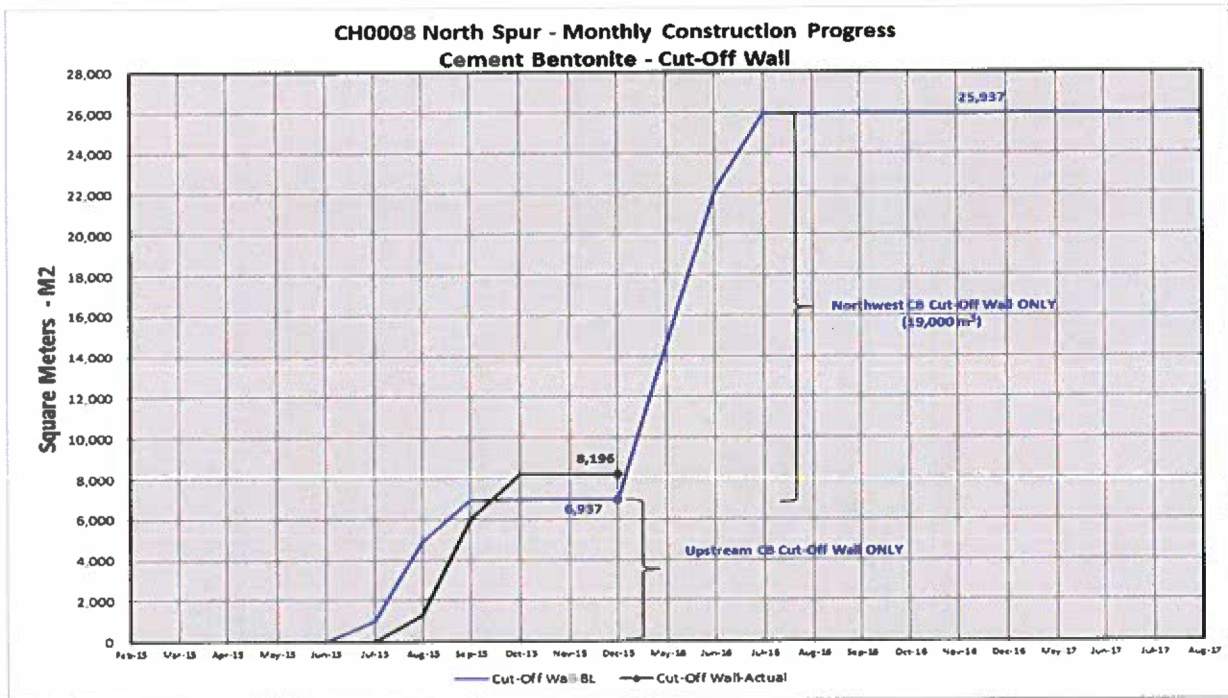


Figure 4 – North Spur Progress ‘CB Cutoff Wall S-Curve’

COMPARISON OF POSSIBLE WAYS FORWARD FOR THE DESIGN OF THE MIXTURE PROPORTIONS OF THE RCC FOR THE NORTH DAM

1. INTRODUCTION

Although the North Dam is a relatively small RCC structure, it is absolutely critical for the completion of the Muskrat Falls Hydropower Project. In order to conform to the existing programme, the 225 000 m³ of RCC has to be placed in five to five and a half months, i.e. at an average rate of circa 43 000 m³/month. There are some 120 completed RCC dams of a similar size (i.e. with a volume between 150 000 and 300 000 m³) to the North Dam and only one, Cenza in Spain, has been completed with a similar average rate of placement and only seven of the 120 have had an average rate of placement in excess of 30 000 m³/month (i.e. 70% of that required from the North Dam). Thus, although it is quite possible to complete the North Dam within the time required, all aspects of the design and construction will have to be right, and it will not be possible to make 'theoretical' savings by not having exactly the right equipment and procedures. One of the most important factors will be the design of a 'Contractor-friendly' RCC that is cohesive, does not segregate and that can be placed rapidly without the need for joint treatment, etc.. The cost of the North Dam itself compared to the overall cost of the Muskrat Falls Project is relatively small and therefore minor changes to the cost of the dam would not really impact on the overall costs, however any changes to the construction programme certainly will have a major impact.

The Contractor's expertise is the procurement of equipment, material and labour and the development of procedures and methodologies for the construction of Projects. Usually, particularly in the case of RCC, he does not have the expertise or experience needed for the optimisation of the mixture proportions of an RCC. This is particularly because of the long-term design age for RCC that are usually 182, 365 or in extreme cases 720 days (NB. at the North Dam it is 182 days) and because of the high proportions of flyash within the cementitious materials this leads to a completely different pattern of development of strength from that of a traditional immersion-vibrated concrete. There have been extreme cases of RCCs with very unusual developments of strength, for example the New Victoria Dam in Australia in 1991 (NB. both the RCC Consultant and the RCC Expert were involved with this Project) where the average 28-day strength was 11.6 MPa and the average 91-day strength 14.5 MPa. However the average strength at one year was 38.7 MPa, at three years was just under 50 MPa and recently it has been found that the in-situ strength is circa 60 MPa, i.e. over five times the 28-day strength.

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2. PRESENT STRATEGY FOR THE TRIAL MIX PROGRAMMES AND FULL-SCALE TRIALS

The present Trial Mix Programme has been designed to have three Stages followed by two Full-Scale Trials. These have been planned as follows:-

- Stage 1 TMP - essentially to train the staff in the laboratory, assess the performance of the cementitious materials and to choose suitable retarders;
- Stage 2 TMP – to develop the air-entrainment of the potential forms of facing for the dam, the design of a levelling concrete and the measurement of the thermal properties (required urgently for the thermal design of the dam);
- Stage 3 TMP – both the Stage-1 and Stage-2 programmes will use the aggregate from CH007, the Stage-3 Programme will refine the mixture proportions of the RCC, facing and levelling concretes using the aggregates from the CH009 Contract;
- Main Full-Scale Trial – this Trial will be used for the development of the Contractor's construction methodology and the training of the operatives for the construction of the dam. A further objective will be the refinement of the exposure times required for each form of joint treatment for the Specification. The Trial is likely to take place in the early part of the 2016 Construction season;
- Secondary Full-Scale Trial – the objective of this Trial is to finalise the training of the operatives in each shift just prior to the start of placement.

3. ALTERNATIVE WAY FORWARD PROPOSED BY THE DESIGNER, NALCOR'S RCC CONSULTANT AND THE BOARD OF CONSULTANT'S RCC EXPERT**3.1. PROPOSED PROGRAMME**

The Stage-1 Trial Mix Programme was completed in November/December 2014 and was extremely successful except that only two of the five retarders chosen by various Suppliers were deemed to be satisfactory.

The Stage-2 Trial Mix Programme should be conducted as soon as possible (save 5 to 18 April 2015) under the auspices of NALCOR so that the air-entrainment can be proved and so that the thermal properties can be obtained so in turn the thermal design of the dam can be completed and the joint spacing and maximum placing temperatures defined (ideally before the final Contract is signed for the construction of the dam).

The Stage-3 Trial Mix Programme will be constructed in the fall of 2015 after the chosen Contractor has provided sufficient satisfactory aggregates and after the final choice of the primary and secondary Portland cements and flyashes has been made. At this point, the Contractor would be involved with the laboratory trials and would be able to make a contribution to those trials, although they would still be under the control of NALCOR.

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The Main Full-Scale Trial would then be completed in the early part of the 2016 Construction Season after the 365-day results are available from the Stage-1 TMP.

The Secondary Full-Scale Trial would be undertaken a few days before the start of the actual placement of the RCC in the body of the North Dam.

3.2. ADVANTAGES

The main advantage of this approach is that the design of the mixture proportions of the RCC is kept under the control of NALCOR where the main expertise is held. Therefore at least this aspect of the design and construction methodology will be optimized.

3.3. DISADVANTAGES

A possible disadvantage of this approach is that the Contractor may not feel totally involved with the process, although this has never proved to be a problem before.

3.4. RISKS

The approach above is the 'standard' procedure that has been used in various forms by both the RCC Consultant and the RCC Expert for the past 30 to 40 years on well over 100 RCC dams. During the whole of this time no Claim has ever been paid associated with the design of the RCC mixture proportions. The risks associated with this approach can therefore be considered to be negligible.

3.5. PROGRAMME

A programme of the main activities with this approach is shown in Figure 1.

4. ALTERNATIVE WAY FORWARD PROPOSED BY NALCOR**4.1. PROPOSED PROGRAMME**

The Stage-1 Trial Mix Programme was completed in November/December 2014 and the results from this Programme form an excellent 'base' for the rest of the Programme.

The Stage-2 Trial Mix Programme should be conducted by each of the three potential Contractors, either in their own lab (that might or might not have the necessary equipment) or in the NALCOR site laboratory. In this way it is felt that the Contractor can take responsibility for their own RCC. Given the precedent of the design of the RCC for the Riverside Cofferdam and the design of the concretes for the CH007 Contract, these programmes will have to be strongly supervised by NALCOR to make sure that the RCC is within the boundaries of the Specification.

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If the first of the Contractors could start their programme in mid-April, it is probable that the whole process would take at least four and a half months (NB. the capacity of the

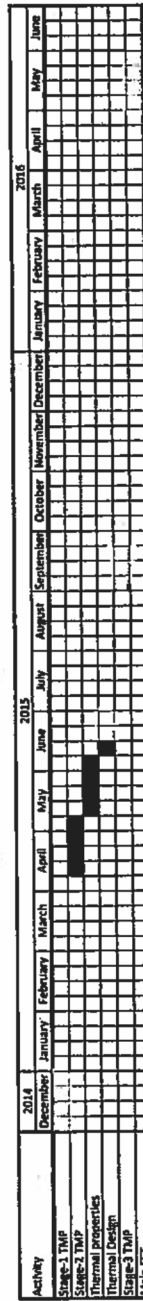


Figure 1: Possible programme for the Way Forward (Version 1)

accelerated-curing tanks will be the limiting factor). The third Stage-2 Programme would thus be completed towards the end of August. It will be some two months after this that the final thermal properties would be available. It is possible that there could be three different sets of thermal properties but more likely three different adiabatic

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temperature rises leading to the determination of the joint spacing and maximum placing temperatures having to be made for the worst-case scenario rather than for the optimum solution.

The Stage-3 Programme cannot be started until at least three months after the end of the last Stage-2 Programme, i.e. in December 2015 at the earliest. Again the Contractor's Programme will have to be strongly supervised by NALCOR.

The Full-Scale Trials would follow the same pattern as proposed in the other Alternative as they have to conform to the tasks defined in the Specification.

4.2. ADVANTAGES

The advantage of this programme is that the Contractor takes ownership of the design of the mixture proportions and thus the responsibility for them.

4.3. DISADVANTAGES

To date the design of the mixture proportions of the concretes in the Muskrat Falls Project have been less than successful both of the RCC in the Riverside Cofferdam and of the concretes for the CH0007 Contract. The former produced an RCC that was anything but the required 'Contractor-friendly' product and this led, amongst other factors, to the RCC being placed extremely slowly and inefficiently. The design of the concretes for the CH007 Contract took far too long and more than a year after the start of the process not all the mixture proportions had been approved. Consequently there is a significant risk, with at least some of the Contractors, that there will be problems with the design of the mixture proportions of the RCC and thus all the programmes will have to be strongly supervised by NALCOR's RCC Consultant to try to reduce this potential risk. There will also be additional costs associated with undertaking three Stage-2 Programmes rather than one and there could be a delay to the programme if the Contractors were to undertake the trials in their own laboratory due to the need to obtain the necessary equipment and the training that will be required.

4.4. RISKS

The risks associated with this approach have been clearly shown in the disadvantages above. There is also the additional risk because the Thermal Design will almost certainly not be completed until after the award of the Contract and any changes to the Specification due to that Design will probably lead to further cost increases. There is the further risk that the joint spacing and maximum placing temperature may not be the most economic solution because of the different approaches by the different Contractors. If the trials were to be undertaken in the Contractor's laboratory, there is the high risk that they will not have all the necessary equipment (e.g. large laboratory twin-shaft mixer, accelerated curing tanks, etc.). All these risks far outweigh any perceived risks associated with the approach defined in Section 3 of this Note.

MUSKRAT FALLS HYDROPOWER PROJECT

4.5. PROGRAMME

A programme of the main activities with this approach is shown in Figure 2.

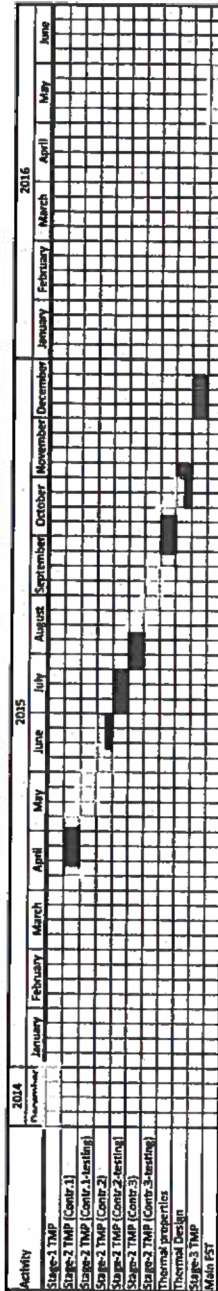
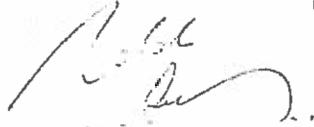
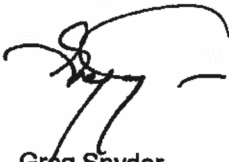


Figure 2: Possible programme for the Way Forward (Version 2)

MUSKRAT FALLS HYDROPOWER PROJECT



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