SUPREME COURT OF YUKON

Citation: *Yukon (Government of) v Norcope Enterprises Ltd,* 2022 YKSC 57

Date: 20221114
S.C. No. 16-A0180
Registry: Whitehorse

BETWEEN:

GOVERNMENT OF YUKON

PLAINTIFF

AND

NORCOPE ENTERPRISES LTD. and
INTACT INSURANCE COMPANY

DEFENDANTS

AND

TETRA TECH EBA INC.

THIRD PARTY

AND

NORCOPE ENTERPRISES LTD.
NORCON CONCRETE PRODUCTS INC.,
YUCAL PROPERTIES INC., and
DOUGLAS L. GONDER

FURTHER THIRD PARTIES

Before Justice A. Kent

Counsel for the Plaintiff Government of Yukon and the Third Party Tetra Tech EBA Inc.	I.H. Fraser and Lesley Banton
Counsel for the Defendant Norcope Enterprises Ltd., and the Further Third Parties Norcon Concrete Products Inc., Yucal Properties Inc., and Douglas L. Gonder	James R. Tucker
Counsel for the Defendant Intact Insurance Company	R. Nigel Beckmann

REASONS FOR DECISION

The Parties

[1] The Government of Yukon ("Yukon") operates the Erik Nielsen Whitehorse International Airport ("the airport"). Norcope Enterprises Ltd. ("Norcope"), a general contractor, signed a contract with Yukon to remove and replace the apron at the airport.

Intact Insurance Company ("Intact") provided a performance bond under which it had certain obligations, should Norcope default under its contract. Tetra Tech EBA ("Tetra Tech"), an engineering firm, had contracts with Norcope to provide quality control ("QC") and provide the concrete mix design and a contract with Yukon to provide quality assurance ("QA").

The Claims

[2] Work on the apron began in April 2014. On July 29, 2015, Yukon advised Norcope there were major deficiencies in the work done on the apron. As a result, Yukon declared Norcope in default under the contract and made a claim under the Intact bond. Yukon claims $13,460,400 in damages for breach of contract and up to $1,781,103.03 from Intact. Norcope denies there were deficiencies in the work.

[3] Norcope says if there are any deficiencies they result from outside forces or the actions of Yukon. In a counterclaim, Norcope claims Yukon breached its duty by providing representations and information about the project that were false or negligent. Further, when Norcope advised Yukon about problems arising because the ground under the apron was unstable, settling and moving, Yukon ignored that advice. Some of the problems caused delay in work such that Norcope makes a claim for delay. In addition, Yukon altered the work to be performed which increased costs for Norcope, which it claims. Norcope claims further when the work was first disputed, a representative of Yukon made false or misleading statements to the press, which have caused damage to Norcope's reputation. It also claims that Yukon acted in bad faith. Intact denies Norcope is in default under the contract and therefore, Yukon has suffered no damages.

[4] Norcope issued a Third Party Notice to Tetra Tech, which claims that it breached both its contract to provide the mix design to Norcope and its contract to provide QC services to Norcope. It also claims that Tetra Tech intentionally interfered with the contractual relationship with Yukon by producing the July 27, 2015 report (the "Final Report") which, Norcope alleges, was deliberately drafted to attribute responsibility to Norcope for the deficiencies in the apron. Norcope also claims Tetra Tech was negligent in its QA work for Yukon, which in turn caused loss to Norcope. Norcope also claims Tetra Tech owed a duty of care to Norcope and it breached that duty in issuing a report to Yukon which was wrong and misleading.

[5] Yukon entered into a Pierringer Agreement with Tetra Tech, which provided in part that Yukon assumed the defence of Tetra Tech.

The Contracts

The Norcope Contract

[6] Norcope was advised it was awarded the contract for the replacement of the apron on February 14, 2014. The contract price was $3,562,206.05. Norcope was the lowest bidder. On February 27, 2014, in the tender review meeting between Yukon and Norcope, the following was noted by the parties:

- Norcope would engage Tetra Tech to design the Portland Cement Concrete ("PCC") mix and perform QC.
- Mr. Beecher, working under Norcope, would oversee the formwork and the paving operations.
- Mr. Gonder confirmed that Norcope was satisfied with its bid.

- Mr. Gonder raised the issue of the suitability of the sub-base ("…as he is concerned from past-history on other projects at the airport." In response, Mr. Jansson said "the only information they had was the geotechnical information provided in the tender viewing package" and "… if there are issues, that they be addressed on a case-by-case basis").
- Mr. Lasker, the Norcope project manager, proposed using a lean mix concrete for the cement stabilization base.

[7] The contract between Yukon and Norcope was signed on March 18, 2014. The Articles of Agreement attached detailed conditions and specifications the way the contract was to be performed. The relevant sections are:

- The Articles state that Norcope will by August 15, 2014, rehabilitate the airport apron in a careful and professional manner and complete the work in accordance with the plans and specifications.
- The General Conditions provide that:
    a. The Engineer is the engineer designated by Yukon who carries out the functions designated to 'the Engineer' under the contract, and his role is to ensure that the work is performed in accordance with the contract.
    b. Yukon may appoint an expert to examine the work if the Engineer has reason to believe that the work is not being performed in accordance with the contract, and Norcope may be responsible for paying the costs of that examination.

c. The Engineer makes the final decision on any question about whether anything has been done under the contract, including the meaning and interpretation of the Plans And Specifications, the quality or quantity of any material or workmanship; whether the materials or labour are adequate to carry out the work, and the timing and scheduling of various phases.

d. Norcope will make good any defects within 12 months from the date of the certificate of Substantial Completion.

e. If Norcope fails to comply with a decision or direction of the Engineer, the Engineer may use whatever methods he deems advisable to do what Norcope has failed to do and Norcope will pay all costs and damages incurred by Yukon.

f. Norcope may protest decisions of Yukon about changes in work or a decision by the Engineer by providing written notice of that protest.

- Norcope agrees not to disrupt airport operations other than is as permitted by the Engineer and agrees to ensure safety of the public and personnel.
- The process for doing the rehabilitation is also specified and described in the section of these reasons on How to Build an Airport Apron.
- Defective PCC is defined by a list, which includes honeycombing, uncontrolled shrinkage cracking, other surface defects, damage by freezing, air content above or below specifications, a slab containing full-depth cracks, or if the joints are spalled.

- Repair and restoration of defective concrete is to be directed by the Engineer and includes removal of defective slabs where appropriate.
- Sawcutting and sealing of joints is particularized.

The June 11 Warranty Letter to Norcope

[8] On June 11, 2014, Yukon sent Norcope a letter with respect to apparent settlement in the apron lean mix concrete. As a result, Yukon stated that Norcope was not responsible for subsurface conditions The letter provided Norcope would not be responsible for any vertical shifts due to seasonal fluctuations; and both Norcope and Yukon would investigate any cracking in the concrete panels. If a crack was shown to be caused by differential settlement, it would not be covered by the Norcope warranty to repair damage.

[9] Mr. Jansson testified the letter was intended to indicate Norcope would not be responsible for cracking caused by lifting. At the time the warranty letter to Norcope was signed, he said they knew the settlement was in the southwest area and that the lean mix had cracked.

[10] Mr. Gonder testified he thought if Norcope met the specifications of the tender, then anything else that damaged the work would not be Norcope's responsibility. He said he thought the letter was good enough to protect Norcope.

The Norcope/Tetra Tech Contracts

[11] Tetra Tech contracted with Norcope to provide the mix design for the PCC on February 14, 2014. Tetra Tech also contracted to provide QC testing during construction to Norcope. That contract is dated May 9, 2014.

The Yukon/Tetra Tech Contract

[12] Tetra Tech contracted with Yukon to provide project inspection, material testing and quantity calculation services for the project, collectively referred to as QA. That contract is dated April 13, 2014. (The contract was amended throughout the next year to include additional work because of the problems that arose with the project.)

The Indemnity Agreement between Norcope and Intact

[13] Norcope and Intact had an indemnity agreement whereby Norcope agreed to indemnify Intact from any claim made against it in an action.

The Witnesses

[14] Yukon called nine witnesses:

- Geoffrey Petzold – Mr. Petzold graduated in engineering in 2006 from the University of Alberta and is currently pursuing his Masters Degree in engineering. After graduating, Mr. Petzold worked for a number of engineering firms, primarily on airport projects. He has worked on several airports in British Columbia, Alberta, Northwest Territories, and Nunavut. He currently works for CIMA, an engineering consulting firm. He joined CIMA in 2016. During the apron project, he was the project manager for Tetra Tech.
- Brian Crist – Mr. Crist works for the Yukon Transportation and Engineering Branch (“TEB”). He is a civil engineer. He began his career in the lower mainland of British Columbia, worked in Inuvik, NWT, for 10 years, and then moved to Whitehorse where he first worked with the City of

Whitehorse as manager of public works and then acting City Manager. He left the City to join TEB on April 21, 2015.

- Kyle Jansson – Mr. Jansson has both a Bachelor of Engineering degree and Masters of Engineering degree. He now works for Public Works and Procurement Canada. He began working with Yukon in 2013 and reported to Terry Bidniak. Mr. Jansson was the project engineer on the Norcope contract.
- Michael McFarlane – Mr. McFarlane works for Tetra Tech. He was assigned to do the QA on the apron project. He prepared site observation reports ("SOR") each day.
- Terry Bidniak – Mr. Bidniak is a retired civil engineer. His last position was Manager of Highway and Airport design and Construction for the Yukon government. In this position, he reported to Paul Murchison. Until his retirement in April 2015, he was the Engineer of Record for the apron project.
- Dr. Bozena Czarnecki – Dr. Czarnecki earned a degree in engineering geology and hydrology in Poland before moving to Canada in 1981. She obtained a job at the University of Calgary in the Civil Engineering Department. She subsequently obtained her Masters and PhD at the University of Calgary. Her doctoral thesis was on concrete. Dr. Czarnecki began working for EBA Consulting in 1992. EBA eventually became part of Tetra Tech, where Dr. Czarnecki continues to work.

- Gordon Leaman – Mr. Leaman was qualified to give opinion evidence on all aspects of the specification, construction, and testing of PCC pavements, including airport aprons.
- David Anderson – Mr. Anderson was qualified to give opinion evidence on all aspects of the design, costing, and construction of projects involving the rehabilitation of airport pavements, including the initial evaluation of pavement conditions. Mr. Anderson works for Associated Engineering, the company that designed the apron.
- Steven Bartsch – Mr. Bartsch was qualified to give opinion evidence on all aspect of the design and construction of projects involving the rehabilitation of airport pavements, including the initial evaluation of pavement condition, as well as on the costing of concrete pavement projects in Yukon. Mr. Bartsch also gave evidence on his role in the apron design. Mr. Bartsch works of Associated Engineering.

[15] Norcope called seven witnesses and joined with Intact for its witness:

- Dr. Amgad Hussein – Dr. Hussein was qualified to give expert evidence on good engineering practices in conducting investigations of failure analysis and preparing reports regarding investigations of failure analysis.
- Jon Schmidt – Mr. Schmidt was qualified to give expert evidence regarding construction cost estimation including estimating costs of construction using concrete materials and airport pavement construction.
- Chadwyck Cowan – Mr. Cowan is a professional engineer, having obtained his engineering degree in Geological/Geophysical Engineering in

1998. Mr. Cowan is the manager of the Tetra Tech office in Whitehorse. He appeared by way of subpoena and was cross-examined by Norcope. He was also called in rebuttal by Yukon.

- Terry Hauff – Mr. Hauff, an experienced surveyor, worked with Challenger Geomatics Ltd. in Whitehorse.
- Wayne Schofield – Before retiring, he was a self-employed contractor, including time in Whitehorse as president of Caniwi Enterprises. Caniwi was the general contractor for the rehabilitation of the apron in 1985.
- Douglas Gonder – Mr. Gonder moved to the Yukon with his family when he was a child and has lived in the Yukon for all of his life. He reached Grade 10 at school and then began working with his father. His father's company grew, obtaining construction contracts with the city and the territorial government. After his father's company failed, Mr. Gonder worked in mining for several years as well as working for himself in construction. He started doing shallow utilities projects such as street lighting. He then switched to deep utilities. In 1985, he started Norcope. Since its inception, Norcope has been involved in every type of earth excavation. Norcope had done numerous jobs placing concrete. Norcope did the airport parking lot and the international extension to the airport building. Mr. Gonder testified that this is the only airport apron that Norcope has worked on.

- John Beecher – Mr. Beecher is with General Enterprises. It is a concrete supply company. He does their sales and bidding work and manages placing and finishing the concrete. Mr. Gonder is his stepfather.

[16] Intact called one witness and joined with Norcope for all witnesses except Dr. Hussein.

- Scott Cumming – Mr. Cumming was qualified to give expert opinion evidence regarding concrete and concrete construction, materials engineering, including airport pavement constructions, and quality control, quality assurance, concrete rehabilitation and troubleshooting for airport apron construction. The first report prepared for Intact was done by Mr.Russ Riffel. Between the preparation of that report and trial, Mr. Riffel retired, and Mr. Cumming took over. The Riffel report was attached to Mr. Cumming's report and except for one small area of disagreement, Mr. Cumming adopted that report.

[17] Two individuals whose names are mentioned frequently throughout the testimony and documents are Miles Plaunt and Malik Lasker. Neither were called as witnesses. Mr. Plaunt was employed at Tetra Tech at the relevant times and did the mix design. Mr. Malik was employed by Norcope as the project manager for this project. One read-in from Daniel Qian will be referenced. Mr. Qian was employed by Tetra Tech.

Reliability and Credibility of the Non-expert Witnesses

[18] The balance of these reasons deals with the issues raised by all parties. For the most part, I have incorporated the evidence of witnesses into the specific issue being addressed rather than going through a serial summary of each witness's evidence. In

this section are my impressions on the reliability and credibility generally of key witnesses, excluding the experts whose evidence is addressed separately. In the balance of these reasons, where reliability or credibility is key to a specific issue, it will be specifically dealt with. First, the Yukon witnesses:

- Mr. Petzold was generally an honest witness. He did not recall many of the details about the project, but when taken to emails and other documents, he gave straightforward evidence. I was left with the impression that Mr. Petzold was relying on others to ensure things were done properly and that may have been part of the reasons for the failings of Tetra Tech, which I discuss below. Although he was not qualified as an expert, I will address his evidence about some of the specific issues when I deal with expert testimony and the conflict-of-interest issue.
- Dr. Czarnecki testified under a cloud of allegations made by Norcope that she had acted untruthfully, made false statements, and intentionally acted to blame Norcope for the failings of the apron. There were times during her evidence when Dr. Czarnecki appeared defensive about what she had done and what she had written. Given the allegations, that reaction is not surprising nor did it interfere with her credibility. She admitted to some mistakes that she made in her analyses. Generally, she was a reliable witness in terms of giving straightforward answers to the questions that were truthful. As with Mr. Petzold, I will address her evidence when dealing with specific issues and the conflict-of-interest issue.

- Kyle Jansson has a poor memory of events, so I relied very little on his evidence.
- Mr. Cowan was central to the Tetra Tech's conflict of interest so what he did during the construction of the apron is in issue. However, he was reliable. Mr. Cowan did acknowledge that his opinion was that Norcope was a contractor that did not have the knowledge or experience for apron panel replacement work. Mr. Cowan and Mr. Beecher gave starkly different evidence on exchanges between the two about the payment of Mr. Beecher's company's invoices. That issue is not key to the liability issues but assists in otherwise assessing their credibility. I accept Mr. Cowan's evidence on that issue.
- Mr. Crist arrived on the scene in April 2015, so he was not involved in the construction of the apron, but was central to drafting the Final Report. During his cross-examination, he was accused, by counsel for Norcope, of swearing a false statement, namely the declaration to Transport Canada that the apron was substantially complete. In re-examination, it was abundantly clear that everyone knew that declaration was made subject to the construction issues that are central to this action. The attack on his character by Norcope counsel was unfounded.
- The balance of the witnesses provided generally reliable evidence.

[19] The Norcope witnesses:

- Mr. Gonder gave evidence at two different times during the trial. On the first day of evidence, he was cross-examined by counsel for Yukon

pursuant to Rule 18. He also testified during Norcope's case. The fact that he testified at two stages of the trial is, itself, telling. During the cross-examination at the beginning of the trial, he not only attempted to avoid answering reasonably direct questions, but the impression he attempted to leave was that nothing that went wrong with the apron construction was Norcope's fault, even insofar as it may have been work done by one of Norcope's subcontractors. When he testified as part of Norcope's case, the theme was different. Essentially, Mr. Gonder's evidence was that this project was doomed to fail from the start, not only because of the failure to remove the frost-susceptible subsoil, but also because of a bad mix design provided by Tetra Tech. The subsoil issue was addressed in the warranty letter, but it left unexplained why Norcope continued to work when according to Mr. Gonder, the concrete mix was faulty because of Tetra Tech's bad design. Mr. Gonder also attempted to leave the impression that Norcope had an otherwise stellar reputation and had no previous problems with its construction projects. However, under cross-examination, Mr. Gonder acknowledged that in 2011, Norcope sued Yukon, and Yukon counterclaimed, on a project called Whistle Bend. Apparently, Norcope had parked several pieces of heavy equipment around the Yukon Legislative Assembly to block access, in protest of how Yukon was handling the project. Eventually the claims by Norcope and the Yukon counterclaim were settled. Mr. Gonder was an unreliable witness. In many instances, things he said or wrote that were clearly untrue were

not, in my view, cases of lying. Rather, he seemed to come to a view of what was happening, or ought to be happening, was clouded by his temperament and his desire to do the job quickly so Norcope could receive the early completion bonus. During his evidence, at times he seemed to have detailed complaints about Yukon and Tetra Tech but then when pushed on an issue, suggested that he only had a high-level knowledge about what was going on. His several threats to stop work or commence litigation belie any claim that Norcope was entirely an innocent victim of Yukon and Tetra Tech. Additionally, his hyperbolic description of how the project was doomed from the start again attests to his unreliability.

- Mr. Beecher exaggerated in the same fashion as Mr. Gonder. In one case, in terms of his dealings with Mr. Cowan, he lied. He was an unreliable witness.

Reliability and Credibility of the Expert Witnesses

[20] These comments relate to some of the expert witnesses who were key witnesses with regards to the liability issues only. For Yukon, that would be Mr. Leaman, Mr. Bartsch, and Mr. Anderson. The latter two gave evidence with respect to the design of the apron in 2014 and 2021. They were reliable witnesses who held strongly to their opinion regarding the design. Mr. Leaman gave solid, reliable evidence on the general issues about the construction of an airport apron. I found his explanations of ‘how things were supposed to happen’ valuable in my overall understanding of the case. However, his evidence suffered from the fact he had not examined the apron and its deficiencies.

His evidence was weak when he was challenged in some areas, which I attribute to the fact he only did a paper-based review of the issues. On occasion, his conviction regarding his opinion seemed unsure. In at least one case, he reversed his opinion completely. As a result, I have taken care when considering his evidence.

[21] Yukon proposed Dr. Czarnecki as a litigant expert. Dr. Czarnecki was the principal drafter of the report which Yukon relied upon to make a claim against Norcope. Yukon had planned to qualify Dr. Czarnecki as an expert witness but chose not to because of objections about her impartiality. No one disputes that Dr. Czarnecki has expertise in concrete, but the defendants argued that as an employee of Tetra Tech, she was not impartial as required by *White Burgess Langille Inman v Abbott and Haliburton Co*, 2015 SCC 23. Yukon said it would be difficult to meet the *White Burgess* test given the attacks upon Dr. Czarnecki by the defendants. As a result, Dr. Czarnecki gave evidence as a litigant expert. The question is what I can do with that expert evidence.

[22] *Kon Construction Ltd v Terranova Developments Ltd*, 2015 ABCA 249 ("*Kon*"), sets out three categories of witnesses with expertise at para. 35. They are independent experts who are retained to provide opinions about the litigation but are not otherwise involved in the litigation (*White Burgess* experts); witnesses with expertise who were involved in the events underlying the litigation but not litigants; and litigants who were involved in the events, but also have expertise. Dr. Czarnecki falls into the last category as she is employed by one of the parties, Tetra Tech. The case also confirms that it is not necessary for a litigant expert to provide notice of his or her opinion, as is required with *White Burgess* experts, since as litigants they would be available for pre-trial

examination. In this case, the lack of a requirement for some sort of pre-trial notice is even stronger. The report, and therefore Dr. Czarnecki's opinions, have been available to the defendants since July 2015.

[23] No one disputes that Dr. Czarnecki could give opinion evidence to defend the allegations made about her. The issue is whether I can consider those opinions when deciding the underlying issues involving the work done on the apron. In *Kon*, one of the litigant experts was Mr. Klaver. Mr. Klaver provided opinions about the amount of material moved by the contractor. The trial judge relied on that evidence. The Court of Appeal did not interfere with the trial judge's decision on that point.

[24] In *Newfoundland and Labrador (Indigenous Affairs and Reconciliation) v Newfoundland and Labrador (Information and Privacy Commissioner)*, 2021 NLSC 79, Justice Boone was faced with an objection to affidavit evidence of two public servants that contained opinion evidence. After reviewing the *Kon* decision at length, Justice Boone said the following at para. 50:

> The exceptions from the *Mohan* analysis for litigant and participant experts developed because these categories of experts do not present the same perils as do experts retained to provide opinion in respect of the litigation: *Westerhof,* at paras. 74-86. Litigant and participant experts do not develop their opinions after the litigation has started, and therefore they come to Court without the same inherent credibility problems as experts retained only to testify. There is no concern with the proliferation of an industry of experts who could potentially overwhelm the trial process. The exclusion of these witnesses or the requirement that they be tested in accordance with *Mohan* criteria before testifying as to their opinion, could actually exacerbate, rather than reduce, the cost and time involved in trying cases.

[25] In *Saskatchewan v Racette*, 2020 SKCA 2, the court cautioned about the breadth of the participant witness exception. The court stated the evidence should not be

accepted without proper notice and formal qualification if "the testimony of such witness goes beyond his or her observations and involvement in the underlying facts, and beyond the *opinions formed* as part of the ordinary exercise of his or her skill, knowledge, training and experiences, *while observing or participating in such events"* (para. 61) [emphasis already added].

[26] Norcope argues the report of Dr. Czarnecki was prepared in anticipation of this litigation and relying upon it other than to defend the claim against her would essentially be circumventing the *Mohan* process. It would "allow a pathway for *prima facie* inadmissible opinion evidence to be tendered and used without subjecting the author to the scrutiny necessary to [sic] they are a properly qualified expert" (Norcope brief). Additionally, they argue there are facts that are not true or exaggerated, not contained in any official record and conclusions are reached with no scientific basis.

[27] I accept that Dr. Czarnecki can be a litigant expert and that I can weigh her opinions when considering the issues in dispute. I do not accept the argument that accepting Dr. Czarnecki's argument circumvents the *Mohan* process. Whether there are untruths or exaggerations or whether her opinions lack scientific basis will be dealt with below. The real difficulty I have with Dr. Czarnecki's opinions is the conflict of issue that she and her colleagues at Tetra Tech were in. I have decided I must caution myself before accepting any evidence from Dr. Czarnecki because of the appearance of a conflict. Therefore, when I do accept what she has said, it is done after a healthy period of reflection about how that conflict may affect the testimony.

[28] Even though Mr. Petzold was not qualified as an expert, for the reasons immediately above regarding conflict of interest, I will be equally as cautious.

An Overview of the Project

[29] Tenders for the project were closed in January 2014. As the lowest bidder, Norcope had a tender review meeting with Yukon, after which the contract was executed. In March, there were emails regarding the potential for a conflict of interest by Tetra Tech if they took on both the mix design and QA responsibilities for Norcope and the QC role for Yukon. Notwithstanding the concerns, the contracts identified above were concluded. Work on the project began with the removal of the old apron, levelling and pouring of the lean mix. In early June, the lean mix began to sink. As a result, Norcope and its subcontractors stopped work until a solution was found because of a concern they would be liable if the settlement of the lean mix contributed to other problems on the project. On June 6, a meeting was held to address the lean mix settlement and on June 11, the Warranty letter was issued.

[30] Pouring of the lanes began a few days later and continued into July. Mr. Gonder testified that as early as June 21, he had concerns about the way testing was done but did not say whether that was the QC or QA testing. No issue was raised about the quality of testing until late August and September 2014 in emails between Mr. Gonder and both Mr. McFarlane and Mr. Petzold. In late July, Dr. Czarnecki emailed Mr. Petzold to indicate the cores tested showed the concrete was not freeze-thaw durable. All the concrete was poured by August 24, 2014. The contractual warranty period was one year so that Yukon needed to give notice to Norcope about deficiencies by August 24, 2015.

[31] On August 23, Norcope submitted a claim for a progress payment. Mr. Petzold advised that payment would be withheld for 13 panels. Mr. Gonder told Mr. Petzold if

one dollar was deducted from the invoice, he would start digging up the apron. On September 5, 2014, Mr. Gonder raised the conflict-of-interest issue regarding Tetra Tech making fair decisions. In an email exchange between Tetra Tech employees on this topic, Mr. Petzold referred to Mr. Gonder as a 'hot-headed contractor'. On September 11, 2014, Mr. Bidniak directed the replacement of 13 panels and said they would continue to investigate to determine if the cracking was due to sub-surface settlement. Mr. Gonder suggested drilling some core hole and asked to be present when the cores were drilled. Yukon did drill the holes, but Norcope was not present. Mr. Gonder testified the process was therefore unfair. Mr. Gonder said he offered to repair the cracks and did so. Yukon's position at this time was set out in an email from Mr. Bidniak dated September 15, 2014, which said in part:

> Government of Yukon acknowledge that there is still disagreement between us as to the cause of the cracking. Further deliberations will ensue in order to settle that matter. As stated previously, our position remains that the cracked panels must be replaced. In the interim, we have no objection to your sealing the cracks at your own risk and cost. …

[32] Mr. Gonder testified he thought the repair work Norcope did solved the problem.

[33] Discussions continued into the fall and winter of 2014-2015 about the possibility of a joint Yukon/Norcope expert reviewing the project to provide an opinion about the causes for the failures. Ultimately, there was no such review. Norcope wanted to use the expert it previously had investigate and Yukon wanted someone newly appointed by both. Through this time there were also emails discussing the failures between Yukon and Tetra Tech. On November 5, 2014, Mr. Bidniak wrote to Mr. Petzold about the new geotechnical data. In that email, he said in part:

> The main thing I am hoping we can project is that we have considered all possibilities for cracking before drawing our conclusion. We will certainly be perceived (perhaps even by a Judge) as being fixed on late cutting, etc without adequately considering the contractor's position (of settlement) if we don't present both sides of the case. …

[34] When Mr. Hauff sent the draft of the survey comparison between September, 2014 and April, 2015, Mr. Petzold replied that Mr. Hauff should not provide any interpretation about the cause of cracking because the matter may go to arbitration. Mr. Crist asked Mr. Petzold for comment on his draft letter to Norcope that was sent on July 29, 2014. Mr. Petzold's opinion then, and as it has remained, was that full replacement of the panels was 'the way to go'.

[35] On December 16, 2014, Mr. Bidniak sent the December Report to Mr. Gonder. Mr. Gonder challenged the results of that report. He said the concrete from the plant continually tested inaccurately, and nothing was done by Yukon or Tetra Tech.

The Condition of the Apron

[36] On the first day of trial, I viewed the apron. At the time, my knowledge of the issues was limited to the pleadings and a review of some expert reports in connection with some pre-trial procedural issues regarding their admissibility. Even to an untrained eye such as mine, the cracking in the concrete was obvious.

[37] There are different kinds of cracks, which will be addressed below, but here are the types of cracks relevant here:

- Reflective cracks are cracks that exist in the top layer of concrete (the PCC layer) because of a crack in a subsurface layer (here the lean mix). The crack below reflects up and causes cracking above.

- Dry shrinkage cracking occurs when water in the concrete evaporates from the concrete before the concrete is cured and joints are cut, the concrete shrinks and cracks result.
- Other cracking can result from poor consolidation of the concrete. Consolidation is the process of vibrating the concrete after pouring to eliminate entrapped air.

How to Build an Airport Apron

[38] The plans and specifications detailed how the work was to be done. During construction, there were changes to the specifications, and some of those changes are matters at issue. What follows is a description of how to construct an airport apron, and where relevant, indicate where changes were permitted. The issues regarding those changes are dealt with further on in these reasons.

[39] After removing the old apron, the subsurface needs to be levelled. One of the most significant issues is whether frost-susceptible material should have been removed. That procedure was not in the specifications. After levelling the ground, a cement stabilizing base is installed. Yukon agreed to a request by Norcope to change this specification to use a lean mix base.

[40] Once the lean mix is poured, a bond breaker is applied. The bond breaker ensures that the PCC is able to move free of the lean mix, which in turn prevents stresses on the PCC which could cause cracking. There is an issue about the material chosen to be the bond breaker and whether it was applied as instructed.

[41] After the bond breaker is applied, the frames are constructed for the PCC lanes. The specification called for steel frames, but after some debate and discussion, Yukon

agreed to a request by Norcope to use wood frames. Dowels are inserted. The purpose of dowels is to assist with load transfer, allowing the concrete to transfer load from one panel to another. There are two ways to insert the dowels. One is to place them before the PCC is poured. The other is to drill holes after the PCC is poured and insert the dowels. Although the latter process was specified, Norcope used the former which was ultimately agreed to by Yukon.

[42] The mix design is critical to ensuring a good PCC. The mix is first made at the plant, transported to the site, tested at the site, and then poured. The mix must pass three tests to be appropriate: a flexural strength test, an air content test and, on site, a slump test. Flexural strength measures the strength of the unreinforced concrete to resist cracking under pressure. The air content must be tested to ensure the concrete does not crack when frozen. These tests are done as part of the mix design process.

[43] Once the concrete arrives on-site, a slump test in performed. That will tell how fluid the concrete is. The test involves pouring some concrete into a cone-like structure and observing how much it slumps. If it is determined that the concrete is not fluid enough, admixtures (also called plasticizers) can be added. Adding water is not an acceptable method to increase fluidity.

[44] Once the concrete is poured, it is consolidated. The equipment used to consolidate the concrete is called a screed. The choice of screed used by Norcope became an issue. Tetra Tech was consulted about Norcope's request to use the specific piece of equipment that was eventually approved. Dr. Czarnecki was concerned about its suitability but indicated that a test panel could be tried. There was no evidence before me that such a test was performed, but Yukon did approve its use. Once the

concrete is consolidated, it is finished with a broom, textured, cured, and the joints are cut. It is important to cut the joints in a timely fashion so that the cracking is controlled. The joints are sealed. The timing of these post-pour processes and the joint sealing are in issue.

[45] The apron layout consisted of rows (sometimes called lanes), labelled from A to J in generally a south to north direction with A at the terminal side and J at the runway side. The panels along the row are numbered from 1 to 25, with 1 generally on the west side and 25 to the east. In several iterations of diagrams prepared at the time of the construction, and as a result of this litigation, cracks are evident in the southwest quadrant, along Row H in the northeast quadrant, a continuous crack through Row B from 13 to 25, a continuous crack through Row I from 1 to 5 and then some small bits and pieces elsewhere.

[46] Finally, during the construction of the apron, it is important to keep the area clear of foreign object debris (FOD) since FOD can damage the aircraft which can be expensive and create a risk to human safety. Once the apron is completed, any failure of the concrete also can create a risk of FOD.

The Subsoil and Geotechnical Data

[47] A key issue is the state of the material below the apron. Under the contract, Norcope was not required to remove frost-susceptible material. There was no dispute that the soil was subject to movement. The issue is whether the apron as designed was able to withstand any such movement.

[48] In 2010, Tetra Tech provided a geotechnical report regarding subsurface conditions of the apron. The depth of silt varied across the six boreholes. The minimum

depth of silt was in a borehole in panel C3 which is in the southwest corner of the apron. The silt was at 1.5-2.1 metres. Silt is frost-susceptible material.

[49] In September 2014, a second set of four boreholes were taken. The minimum depth of silt was in panel A1 which is in the southwest corner. The silt was at 2.1-4.4 metres. Tetra Tech concluded the subsoil surface conditions encountered in 2014 were very similar to those encountered in 2010. The report was prepared by Chadwyck Cowan. Mr. Cowan admitted in cross-examination that a conclusion in the geotechnical report of September 26, 2014, was in error when it indicated that there would only be minimal movement under panel C given that the silt was in fact shallow under that panel.

[50] Wayne Schofield testified that for the former project the engineers required the removal of a thick layer of blue clay, which was then replaced and compacted. Mr. Schofield said they were about 70% through that process when the owners decided, for budgetary reasons, to cease the removal of blue clay. Ketza Pacific Contracting, Mr. Scofield's new company, also bid on the 2014 project. Mr. Schofield raised his concerns with Mr. Bartsch about the fact the tender did not require the removal of subsoil. Ketza was the second lowest bidder. In cross-examination he said in submitting the bid, he intended on fulfilling all the obligations under the contract, but also said he would be very vocal about the failure to remove the subsoil. He said without the removal of the subsoil he would have expected the project would fail.

The Survey Results

[51] Terry Hauff, now retired, was a survey engineer with Challenger Geomatics Ltd. in 2014. Challenger had a contract with Tetra Tech to do survey work on the apron.

Their job was to ensure the contractor had done the work properly as the work proceeded.

[52] Once the work was complete, Challenger did a survey in September 2014. As Yukon wanted to monitor the movement, they did a second survey in April 2015, and a third in October 2015. The movement from September to April varied throughout the apron from a rise of 1 centimetre over a large part of the apron to 11 centimetres in the south westerly portion. The comparison from April 2015 to October 2015 showed the portions with the largest rise had fallen the most, again around an 11-centimetre drop. Essentially, from September 2014 to October 2015 the apron had moved up in the spring and moved back to as-built in the fall. Mr. Hauff's survey charts show the location of cracking. Most of the cracking is in the south-westerly portion of the apron, but there is one long crack that starts at the northwest corner and goes straight through Row B from panel 25 to 14 and then proceeds in a diagonal direction through panels 13-10. There is also a horizontal crack through panels 5-1 in Row I and a mostly horizontal crack in Row B from panel 12 through to 6. All of the other cracks are contained in individual panels.

The Conflict-of-Interest Issue

[53] Tetra Tech was the sole bidder for Yukon's QA contract. In a tender review meeting on March 20, 2014, between Mr. Jansson for Yukon and Mr. Petzold for Tetra Tech, Mr. Jansson noted Tetra Tech also had a contract with Norcope for QC. As a result, to receive the Yukon QA contract, Tetra Tech would need to provide independent teams with reporting and testing kept separate "as much as possible". Mr. Petzold indicated the teams would be separate with different field technicians and senior

reviewers. Mr. Jansson requested a letter "to demonstrate the two separate teams and describe the testing and reporting procedures".

[54] On March 24, 2014, Tetra Tech provided the letter requested by Mr. Jansson, stating it acknowledged that "…there are perceived conflicts associated with providing QC testing services for the general contractor … while also being relied upon to provide QA testing services to Tetra Tech EBA's Airports Group as part of their inspection contract." It goes on to itemize the work Tetra Tech would be doing in its QA role. It states the testing would be performed by technical staff at the Whitehorse office and there would be "…no overlap of personnel during testing (the same technician will not be performing QC and QA testing). …" The letter acknowledges that during construction, there would be equipment and staff overlap between the QC testing and QA testing, but assures Yukon of the rigour of its testing requirements. The letter states Tetra Tech would isolate the QA flexural strength beams and compressive strength cylinders from the QC concrete samples during the curing stage. The numbering systems would be different. The letter concludes by saying: "It should be stated that if the lines of communication are open to all parties working on this project, the more transparent the QC/QA testing programs will become and hopefully a higher level of trust will be quickly established."

[55] Mr. Bidniak testified that he was concerned about the conflict of interest. However, Tetra Tech was the only firm with local testing facilities. He concluded there was no other option. He had Mr. Jansson inform Mr. Cowan that personnel and testing facilities were to be kept separate and that the operation of each unit was to be

separate. Mr. Gonder testified he knew that Tetra Tech would be providing QA services for Yukon, but no one asked Norcope for their consent.

The Site Observation Reports ("SORs")

[56] Mr. McFarlane was the resident inspector for Tetra Tech performing its QA function for Yukon. Mr. McFarlane prepared the SORs each day. The SORs recorded what was going on on-site. The only documents that he was referred to during the trial were the SORs. They are clean, well-typed documents that would have been prepared on a computer. Sometimes there are photos appended to the SORs. Mr. McFarlane was asked if he had notes that he took while he was observing the work but did not produce any. Mr. Jansson, as Yukon's project engineer, received the SORs from Mr. McFarlane. Mr. Jansson said he would also receive information by phone and at construction process meetings. He would be on the site, sometimes daily and sometimes only once per week.

[57] At the end of trial, on one of the days set for argument, counsel for Yukon advised Mr. McFarlane had just contacted him and told him that he had come across a notebook containing notes from the time he was working on the apron. The book is entitled 'Field Borehole Logs and Field Notes'. The dates of the notes are from July 15, 2014, to August 12, 2014. The book is handwritten and contains times, notes, and figures of various activities which happened on each day. Yukon and Norcope both created charts to show what was and was not transferred to the SORs. These charts show there are additional notes in the field book such as temperatures and times for curing and cutting. For example, on July 15, 2014, it notes: "At 2:40 p.m., the workers had cured to C20 and textured to C18. At 3:50 p.m., the workers had cured to C14 and

textured to C18." On July 16, 2014, it notes "bleed water was seen at panel F21 at 12:40 p.m." On July 20, it notes "Row "c", no curing compound as of 8 am July 21". On July 22, 2014, it notes "At 7:00 p.m. cut J23/J22". One of the issues is the fact the Final Report and its drafts contain times for certain processes like texturing and curing that are not contained in the SORs.

[58] Counsel for the Defendants objected to any evidence from Mr. McFarlane about this notebook other than an affidavit which stated he had just found the notebook and which attached the notebook as an exhibit. They did not object to me making a reasonable inference that there were other notebooks used by Mr. McFarlane during the project, and they were now lost.

[59] Mr. McFarlane was asked about times for certain activities that were not noted in the July 8 technical memo. He could not recall whether he told Mr. Cowan about times that were not noted in the SORs.

[60] In early July, after Row E was poured, cracks were identified in the row. Yukon asserted the cracks were identified prior to the start of joint cutting. The SORs for the relevant days state that Row E was poured (June 30 and July 1, 2014) and cutting in Row E (July 2, 2014). The first note in an SOR that referenced the cracks was on July 4 when Mr. McFarlane noted "I talked with Geoff (Tt EBA) about cracks in panels E24, E22 and some surface cracking in panel E1. I told him it was hot the day it was poured and that it was sometime after texturing that the curing compound was applied". In cross-examination, Mr. McFarlane was challenged about the fact that uncontrolled cracking was identified prior to starting the contraction joint cutting, according to the

technical memo (2.2.4) but the SOR dated July 7 did not say the cracks were identified before cutting. Mr. McFarlane testified he did identify those cracks before cutting.

[61] Counsel for both Yukon and Norcope directed Mr. McFarlane to SORs to note specific things, including:

- Norcope began to use wood forms and Mr. McFarlane requested more QC testing because of rain;
- the lean mix had been poured too high in Row G and 18 cracks in lean mix needed to be reinforced;
- confirmed that Norcope was cleaning up FOD, instructions to Norcope regarding the application of bond breaker to dowels;
- difficulties with the high slump;
- dowels too close to construction joints;
- testing each truck of PCC;
- slump too high, but added water rather than plasticizer;
- concrete out of spec because of high slump and low air content;
- refusal to put in a bulkhead where pouring had to stop because of a power outage;
- sides of PCC rows not sprayed with curing compound;
- out of tolerance dowel bars, respraying bond breaker;
- E2 and E3 were not straight so panel had a bow in it; and
- the first day that he noted cracking in row E was July 4th, when the pour and cutting had been done on July 1st.

[62] Mr. McFarlane said some of the issues noted above were corrected by Norcope. He was not on the site 24 hours a day so did not see that bond breaker was sprayed twice. He was told it had been and had no reason to not believe what he was told.

Meetings

[63] Throughout the project, there were construction progress meetings. The points of note are:

1. Preconstruction meeting (April 24, 2014) – Norcope proposed an alternate kind of bond breaker.
2. Construction Meeting (May 7, 2014) – Tetra Tech was testing for vapour content of the soil but found no high concentrations.
3. Construction meeting (May 14, 2014) – Mike Lasker asked that QA and QC surveys be done at the same time. Mr. McFarlane reported that he noted a soft spot on May 12 under panels 17-20 in Row A. By May 13, the area was retested and passed.
4. Construction Meeting (May 21, 2014) – There was discussion about replacing the steel form work with wooden forms. Wooden forms had been used and Mr. McFarlane noted that some of the forms had begun to twist.
5. Construction Meeting (May 26, 2014) –
    a. There was a discussion about the two methods of inserting the dowels (explained above). The specifications called for the dowels to be drilled into the concrete, but Norcope wanted to place them before pouring. Mr. Gonder and Mr. Lasker noted that the drill method would affect the completion schedule and using epoxy

coated dowels would increase the cost. Mr. Bidniak noted that from a quick review of documentation, Norcope may have been given approval for the in-situ method. If further investigation proved that to be the case, and the in-situ method could not achieve the required results, Norcope may be entitled to compensation.

b. There was also discussion about Norcope's request to use wooden rather than steel forms. Mr. Lasker said that either wood or steel would meet that required performance criteria. If the use of wooden forms did not meet specifications, Norcope would make it right. Mr. Gonder noted that they were having difficulty locating steel forms and that they would be more expensive. He confirmed Mr. Lasker's statement that Norcope would ensure that contract requirements were met using wooden forms.

6. Construction Meeting (May 28, 2014) – Norcope was given permission to pour a test strip of 10 panels using wooden forms. Norcope asked to pour an entire row as the test strip.

7. The decision to permit Norcope to use the in-situ method of dowel placement was rescinded and Norcope was directed to drill and epoxy dowels into the concrete.

8. Construction Meeting (June 4, 2014) – Nothing of note other than that the lean mix had all been poured and passed its 7-day test.

9. Construction Meeting (June 6, 2014) – Mr. McFarlane noted settlement of the lean mix occurring in the southwest corner. Mr. Jansson said that

Yukon would provide a letter that Norcope would not be responsible for any vertical movement so long as the forms were set to grade and within tolerances. As Norcope and the subcontractors were concerned about the settlement, there was discussion about pouring PCC over cracked areas of lean mix. The following statements are contained in the meeting minutes:

a. Mr. Petzold said that the intent of the design was not to fix the subgrade issues but to bridge over top of it and that it was not surprising that cracking occurred, given the nature of the soil underneath. He said that no issues were being raised about the cracking of the lean mix because he was not surprised to see movement in the soil.

b. Mr. Petzold said that if the forms were set to the design grades, the formwork crews would not be held accountable for any movement after they had been set. He also said that he was willing to accommodate relaxing the vertical tolerance if the quality of the concrete met specifications.

c. Mr. Jansson confirmed that Norcope would not be responsible for any cracking in the PCC if the cracking was determined to be from settlement issues.

d. Mr. Petzold said that if any cracks should occur after the PCC had been poured during the warranty period, everyone would need to

work together to determine whether it was caused by settlement or poor-quality paving.

10. Construction Meeting (June 11, 2014) – Mr. McFarlane reported that random cores were taken, which passed testing except those in Rows I and J which had high air voids. Three more cores were taken in that area and they all failed. The area was removed and new lean mix was poured. Discussions about the dowelling process continued.

11. Construction Meeting (June 18, 2014) – Surveys showed that the slab had stabilized.

12. Construction Meeting (July 4, 2014) – Nothing of note.

13. Construction Meeting (July 16, 2014) – Mr. Jansson said that he had an updated memo about the investigation of cracking which he would send to Mr. Lasker. Yukon stated that it required the cracked panels from Row E (22 and 24) be replaced. Yukon said that it was open to having the cracked panels in Row H repaired with an increase in the warranty period by four years. Otherwise, the panels would need to be replaced.
Mr. Petzold said that the later the panels were replaced the more disruption there would be at the airport. Mr. Jansson said that any issues with inspections, questions, and concerns should be directed to him and Mr. Petzold and not directly and solely to Mr. McFarlane.

14. Construction Meeting (July 30, 2014) – Mr. Jansson stated that Yukon was willing to explore repairing panels. It would be Norcope's decision to

repair the panels immediately or in the spring. He said that if the repairs failed, the panels would need to be completely removed and replaced.

15. Construction Meeting (August 6, 2014) – Mr. Gonder said that he would like to investigate the soil under the apron. He suggested drilling deeper than the lean mix to obtain soil samples. Mr. Gonder said that Tetra Tech could drill the holes but that he would like a third party to analyze the results.

16. Construction Meeting (August 13, 2014) – Tetra Tech was reviewing the crack repair methods submitted by Norcope.

Tetra Tech Reports

[64] One of the issues in the case is the claim that Tetra Tech, through Dr. Czarnecki and Mr. Petzold, prepared reports that contained false information and conclusions. The key report is dated July 27, 2015 (the Final Report). It is the report which is the basis for Yukon's claim against Norcope. There are drafts of this report and other reports appended to it. One of those appended reports is of particular importance. Drafting of that report began early in July and was released in December 2014 (the "December Report"). In its closing argument Norcope says about the Final Report (called by Norcope the "Demand Report"):

> The Demand Report was prepared by Professional Engineers who were directly involved in the construction of the Apron and highly qualified in the engineering of concrete. The Demand Report was comprised of mistakes, falsehoods, exaggerations and unsupported conclusions. It was false and misleading. The quantity and scale of issues with the Demand Report leads (sic) to the conclusion that it is not only a report that has no merit and cannot be relied upon, but that it was drafted for the deliberate purpose of affixing Norcope with complete responsibility for replacing

> 100% of the Apron while ensuring that nothing and no one else would hold any responsibility for it.

[65] As a result of these allegations: the process for preparing the report and its drafts; the appendices and the authorship of the report; and its draft are themselves in issue. The construction issues contained in the report are dealt with elsewhere in these reasons.

[66] The first draft of the December Report was a memo dated July 8, 2014, to Mr. Jansson from Mr. Cowan and Mr. McFarlane entitled 'Concrete Apron Panel Placement Assessment – Field Observations'. The memo describes the process for PCC pouring in Lanes (also referred to as Rows) G, I, E and H and site observations of cracks. The conclusion in part says,

> [b]ased on previous experience and knowledge with concrete apron panel placement projects and from the project information listed above, Tetra Tech EBA has concluded that the uncontrolled cracking, identified in the panels for Pilot Lane E and Fill-in Lane H, is unlikely the result of settlement or movement and likely the result of improper finishing techniques, in particular delaying the cutting of the contraction joints.

[67] For each of the lanes, times are identified for the start of the pour, start of texturing and curing, and start of contraction joint cutting. The air temperature is also noted. When the times in this first draft are compared to the SORs for the relevant days, there are times in the draft that are not in the SORs. Mr. Cowan was crossed examined extensively about this report. He said he and Mr. McFarlane worked together to put it together by reviewing the SORs and discussing the contents. He said everything in the report would have been because of discussions with Mr. McFarlane. He was asked

more than once whether he fabricated the information in the report and he denied doing so.

[68] The next draft of the December Report is dated July 14, 2014. The draft is from Mr. Cowan, Mr. McFarlane, and Dr. Czarnecki and addressed to Mr. Jansson. This draft incorporates the times that had been contained in the July 8th version. In this version, there is a comment that there were cracks discovered in two panels in Pilot Lane E. The report says the cracks were identified prior to starting the contraction joint cuts.
Mr. Cowan agreed the notation about cracking in those panels did not appear in an SOR until two days after cutting. At one point, he said he did not have any memory of the discrepancy between the date of the notation and the fact that it was made two days after cutting. He also said it must mean the notation was incorrect. The conclusion states the cracking in E and H was not due to settlement or movement, but delayed application of the curing compound when evaporation rates were high. It further states delayed cutting of contraction joints most likely caused the shrinkage cracking. For Lanes G and I, because of the high evaporation rates, the report concluded there was the possibility of shrinkage cracking. Mr. Cowan said those conclusions were drawn as a result of discussions with Dr. Czarnecki and Mr. Petzold.

[69] The next draft of the December Report is dated September 9, 2014. It is no longer in the form of a memo, but a draft report. This draft was prepared by Mr. Cowan, reviewed by Mr. Petzold and approved by Dr. Czarnecki. This report and the final December Report (issued December 12, 2014) repeated the information included in previous drafts in addition to more information. Although the information for each of

Lanes G, I, E and H are different, the narrative of one is reflective of the types of changes made to them all. For Lane G, the July 8 memo reads:

> Pilot Lane G was completed on June 21, 2014. The pour started at 10:15 am and was completed at 9:30 pm. The air temperature ranged from 7 to 17 degC, windy and mainly clear of clouds. Surface texturing started at 12:30 pm and curing application started at 2:00 pm. Contraction joint cutting started around 12:00 pm an June 22. 2014.

[70] The final section on Lane G reads:

> Pilot Lane G was completed on June 21, 2014. The pour started at 10:15 a.m. and was completed at 9:30 p.m. The air temperature ranged from 7 to 17^{o}C, windy and mainly clear of clouds. Surface texturing started at 12:30 p.m. and curing application started at 2:00 p.m. A delay between surface finishing operations and the curing compound application was 4 hours (surface finishing started at 10:15 am). During that length of time the concrete surface was exposed to high evaporation rates (defined as significantly higher than 0.5 kg/m2*hr) without any protection. In addition, the edges of the panels were not sprayed with the curing compound at all after the forms' removal, leaving the sides of the concrete unprotected. Contraction joint cutting started around 12:00 p.m. on June 22, 2014 – 26 hours following start of the paving operation.
>
> The calculated evaporation rates obtained from historical data during June 21, 2014 pour are plotted below.
>
> [*Here a chart is inserted*]
>
> The evaporation rates were higher than 0.5 kg/(m2.h) and a delay in curing of concrete combined with the unprotected sides of the Lane G may lead to a high potential for cracking. It should be noted that while there was no cracking observed at the time of writing this memo, the contributing factors mentioned above indicate a significant potential for cracking to appear.

[71] Mr. Petzold was cross-examined about the times set out in the December Report and asked to reconcile some of the statements made. Mr. Petzold did admit that some

of the times set out in the report were not noted in SORs. He said there would have been conversations with Mr. McFarlane but he had no recollection about specific conversations about information that was in the report but not in SORs. Mr. Petzold testified that Mr. Bidniak likely provided comments that resulted in some of the changes between the initial memo and the December Report in its final form. However, before including any of the comments, Tetra Tech would have evaluated them.

[72] The Final Report had several attachments:

- elevation and cracking charts, two site instructions, a memo from Petzold to Czarnecki, cc Habibova regarding the speed screed;
- the December Report, borehole logs, the September Geotechnical Report, Borehole logs and soil test results, the Voigt Paper;
- survey data and a concrete core examination report dated July 27, 2015 (a renamed final copy of the draft report attached to the December report with photos and laboratory test results attached).

[73] Mr. Petzold testified that the purpose of the Final Report is set out in the last paragraph of the Executive Summary which reads:

> … The causes of the concrete failure are identified, and the feasibility of repairs and/or replacement of the panels is assessed. The potential impact of the current condition of the apron and the impact of the safety of the operations is discussed.

[74] In addition to these reports, Mr. Petzold and Dr. Czarnecki issued a Technical Memo on August 22, 2014. The purpose of the memo was to assess possible crack repair products for the full panel thickness cracks because of the assessment done on July 8, 2014, of Lanes E, G, H, and I. The memo concluded that none of the products

were suitable for the apron surface. The memo recommended either replacement of the panels; or repair using one of the products listed or a flexible joint sealant, with this second method at the contractor's risk and with the approval of the airport operator.

[75] Mr. Petzold's evidence about the December Report generally was that he relied on the information provided in the report and when he had questions about specific items, he would ask. He did admit that to draw some of the conclusions about timing of certain processes during the PCC pour, there would need to be more information than was contained in the SORs. However, he did not recall specific conversations when that additional information was supplied. With respect to the reference to cracks in Lane E identified prior to cutting even though the SOR that contained the information was dated after the cuts were made, Mr. Petzold had no specific memory of discussions he may have had with Mr. McFarlane, but repeated that if he needed more information, he would have picked up the phone. He disagreed when challenged that the allegations of excessive delay between steps were false. With respect to the September 9 draft, Mr. Petzold believes they set up a call to discuss questions that Mr. Bidniak had regarding the contents. He said by this time they had concluded the cracking was because of Norcope's deficient work; even though Mr. Bidniak wanted to be sure they considered everything. He said Mr. Bidniak's comments would have been considered in drafting the final version of the December Report, but the conclusions were Tetra Tech's.

[76] Dr. Czarnecki said some of the contents in the Final Report. written by Mr. Cowan, were incorporated into section of reports authored by her. Dr. Czarnecki was challenged on why she signed and stamped the September 2014 version of the

report when she had only written portions. She said she wrote portions and approved the balance of the report. She said by signing as a professional engineer, she is responsible for the report. The September draft ultimately became the December Report which was issued for use and became an appendix to the Final Report.

Dr. Czarnecki was asked why she did not sign the December report. She speculated that she may have been unavailable at the time.

[77] Dr. Czarnecki was cross-examined extensively about the narrative in the December Report concerning the four Lanes. She testified that she wrote the portion of the report dealing with the field inspection and the weather conditions. She said because of the developing cracks, Tetra Tech decided to look at weather records to see whether the site conditions called for additional action. There is a guide that provides evaporation rates for concrete. The exterior of concrete dries much faster than the interior of the concrete and that differential can lead to dry shrinkage cracking.

Dr. Czarnecki's concluded that for each lane there was a delay between surface finishing and the application of the curing compound. She concluded there was exposure to high evaporation rates without any protection and the edges of the panels had not been sprayed with curing compound once the forms were removed.

Dr. Czarnecki was asked whether she was aware that Mr. Gonder had threatened litigation at the time that she was preparing the report. She said she was not.

Dr. Czarnecki did know the purpose of the report was to use in discussions regarding deficiency mitigation with Norcope.

The Editing of the Final Report

[78] When Mr. Crist took over in May 2015, his goal was to obtain the final Tetra Tech report so Yukon could present it to Norcope. As the work was finished on August 24, 2014, August 24, 2015, was a critical date. After that date, there would be no warranty on the work. Mr. Crist said when he walked the apron, the deficiencies were very clear to him. On June 15, 2015, Mr. Crist received a draft of the report. He reviewed it and then sent detailed comments to Mr. Petzold and Dr. Czarnecki itemizing several issues where he was looking for clarification. Another draft was forwarded on June 23, 2015, and Mr. Crist again sent back comments and pressed Tetra Tech for the final report. At that time, he drafted a letter to Norcope so he could immediately begin discussions with Norcope about the deficiencies once he had the final report. In the meantime, there was an email exchange between Dr. Czarnecki and Mr. Jay, an engineering trainee at Yukon, which included Mr. Crist and Mr. Petzold about new cracking at the airport. Dr. Czarnecki indicated the new cracking was typical for crazing or map cracking that is related to inadequate or delayed curing. She indicated since there was evidence that the slumps were too high and the surface wet and poorly finished, this would be expected. She finished by indicating that this potentially affected 100% of the work. Mr. Crist said that when he read that email, bells started to go off that the apron may require 100% replacement.

[79] The next draft of the report is dated July 13, 2015. Mr. Crist and Mr. Toleman, also of Yukon, suggested edits to this draft. Norcope argues the fact Mr. Crist and Mr. Toleman suggested edits that were then adopted by Tetra Tech is evidence that is part of the scheme to intentionally interfere with Norcope's relationship with Yukon.

Mr. Crist testified that his comments and edits were intended to make the report clearer and more comprehensive so he would be able to discuss the results with Norcope and Intact. Mr. Crist knew the report was not going to be well received by Norcope and discussions were going to be turbulent. The edits are:

1. In the draft executive summary, Tetra Tech had written: "Prior to commencing construction, several changes were requested by NORCOPE to accommodate the construction methodology and materials available to them that were non-compliant with the project specifications. As the changes were reviewed, it became evident that the quality of the final product, i.e., the apron, may be compromised by the requested changes." Mr. Crist's comment was that that was a strong statement, and "may suggest that by YG allowing the changes essentially created the failures. My understanding is that the [sic] it was a performance-based specification and that NORCOPE was advised that the final product may be affected by the requested changes but they took that risk and proceeded anyway. Suggest re-wording to make this clear." The final report made a slight change to the first sentence and then said "The changes were reviewed and NORCOPE was advised by GY that the final product might have been compromised. Ultimately, since the specification was performance-based, it was understood that the contractor was accepting the risk associated with the selected construction methodology and the impact on the quality of the final product." Mr. Crist testified that he later learned that the contract was not performance-based.

2. In the section dealing with seasonal elevation change, the draft said: "The survey conducted in April 2015 indicated that the southwest portion of the apron experienced elevation gain and the largest gain was concentrated in the area between Line B and Line D and rows 5 to 7 **with one crack in Panel C-6 that can be possibly attributed to the elevation change.**" The last phrase, highlighted here, was not in the final draft. Mr. Crist said that he did not remember discussing the deletion with Tetra Tech. He does not recall asking them to remove it. He agreed that the omitted comment does conflict with what is said in #10 of the Executive Summary.

3. In #10 of the Executive Summary, the draft said: "The seasonal elevation changes potentially caused by frost heave were monitored and there is no evidence that the panel movement contributed to the cracking noted on the apron." Mr. Crist commented that Norcope would be using elevation change as its main argument, and the report needed to reinforce the conclusion that the cracks were not caused by heaving. He then said: "In discussion with Geoff and Bozena you acknowledged the seasonal elevation but stated that if the Apron was constructed properly it would withstand the shifting ground and would not crack. This should be confirmed within the report." The final report added "Cracking of the panels is consistent with the shrinkage cracks, reflective cracking and crack propagation with time. The changes in the direction of the propagating cracks are influenced by high friction and bonding to the LMC base." In cross-examination, Mr. Crist acknowledged that Tetra Tech

never told him that they did not design the apron and they did not know how much vertical movement the apron could withstand.

4. There is also the notation by Mr. Toleman asking who approved the bond breaker.

[80] Mr. Petzold testified he did not recall telling Mr. Crist if the apron was properly constructed, it would not crack notwithstanding elevation changes, but that was Tetra Tech's opinion. Mr. Petzold said the change to the report included the statement that it was a performance-based specification which was done at the request of Mr. Crist. With respect to the removal of the phrase regarding the crack in Panel C, he first said he did not know why it was removed, nor did he recall any discussions about removing it. He said the phrase would have been removed because of a re-evaluation by Dr. Czarnecki. He did not agree that one crack could result in a conclusion that all of the cracking was caused by frost heave, given the size of the apron and the number of other cracks. He agreed Tetra Tech did not add a statement that if the panels were built to specification, they would withstand cracking, as requested by Mr. Crist. However, there was wording added to #10 of the Executive Summary that the cracking was consistent with shrinkage cracks, reflective cracking, and crack propagation. However, he admitted, that at the time of testifying, the crack in C is some evidence of it being caused by seasonal movement. Mr. Petzold did know the report was going to be used to make a claim against Norcope. He acknowledged the report said nothing about Tetra Tech's QC role for Norcope, nor Tetra Tech's role in the mix design, nor Tetra Tech's involvement in the bond breaker choice.

[81] Dr. Czarnecki agreed she made the changes requested by Mr. Crist in the executive Summary (No.1 above). She said the changes in no way affected her engineering conclusions. She testified there is never one reason for any failure and crack development is one of those situations. When she included the notation about panel C6 in the draft, it was because that possibility could not be omitted even if it is a remote possibility. As she was writing the report, she said more information was coming out. Because she had doubts about the possibility that elevation change contributed to the C6 cracking, she removed it from the final version. It was her decision as an engineer to remove the section, in light of the above, to delete the reference.
Dr. Czarnecki said when she told Mr. Crist if the apron was constructed properly to withstand the shifting ground, it would not crack, she believed the statement to be true. Dr. Czarnecki said the elevation changes due to soil conditions are not unique to Whitehorse. From her previous experience in Calgary, where she dealt with the same seasonal changes, there was no evidence that the cracking of the apron was related to seasonal changes. Controlled cutting as part of the finishing process would mean that any elevation change would be uplifted at the joint and then go back down. She said that she could not reconcile the type of cracking on the apron with elevation change. She said that the cracks were not caused by frost heaves but were exacerbated by them. Dr. Czarnecki said that she maintains this opinion.

[82] Dr. Czarnecki said as part of the engineering analysis, she included all possible causes of the cracking and then excluded the least probable. Then she considered all the information she had, including the information from Mr. Jay. She concluded that elevation change was the least likely cause of the cracking in panel C6.

[83] Dr. Czarnecki had asked Mr. Jay to inspect specific areas as there were areas of high uplift that cracked and areas of high uplift that did not crack. She concluded where there was cracking, it was exacerbated by the presence of movement but was caused by something else. She withdrew the comment about C6 because it is impossible for one panel to crack because of uplift and not another one. Her opinion is there were several contributing causes for the cracking.

[84] In preparing the drafts for the Final Report, Dr. Czarnecki knew it was the intention of Yukon to use the report for discussions about deficiency mitigation with Norcope. She agreed Mr. Crist indicated how the report was to be structured in terms of tying the deficiencies to long term operation and safety of the airport.

[85] Dr. Czarnecki was taken to the draft that had comments from Mr. Crist and Mr. Toleman. She says the comments by Mr. Crist about this being a performance-based contract were not part of her investigation. Those comments were separate from the engineering recommendations and decisions. It was part of the background information.

[86] Dr. Czarnecki said the changes made between the July 13 and the July 27 report were not necessarily because of new information but rather a result of a review of the available information and her assessment of that information. In terms of removing the information about C6, she looked long and hard to make a final decision. She said never in her career has she changed her technical opinion at someone’s request, and it did not happen here.

[87] The Final Report concludes with a summary of deficiencies as follows:

- lack of bond breaker which contributed to cracking, and affecting 100% of the panels;
- poor concrete consolidation, affecting 100% of the panels;
- inadequate air void characteristics, caused by lack of production controls and QC testing, affecting 100% of the panels;
- improper joint installation, causing an accumulation of dirt and sand, contributing to high FOD risk, affecting 100% of the panels;
- joint ravelling which would continue to deteriorate and cause risk of FOD, affecting 30% of the panels (Norcope notes that joint ravelling is not listed in the Plans as a condition which would cause the concrete to be defective);
- poor surface finishing, combined with lack of freeze thaw durability, would contribute to surface paste loss, affecting 100% of the panels;
- panel cracking, affecting 58 panels.

[88] Mr. Crist testified that he hoped that Yukon and Norcope could work together to address the deficiencies.

The Criticism of the Final Report

[89] Norcope alleges the Final Report contained falsehoods and was prepared deliberately to point blame at Norcope. Norcope says the following items prove their assertion:

- the phrase “with one crack in Panel C-6 that can be possibly attributed to the elevation change” was removed from the Final Report;

- there was no mention that Tetra Tech recommended the bond breaker that was used;
- the misstatement that this was a performance-based contract and that Norcope was accepting the risk associated with the selected construction methodology and the impact on the quality of the final product;
- it did not say that Tetra Tech did the mix design;
- it did not say that Tetra Tech was contracted to do QA for Norcope;
- there were misstatements or falsehoods about the information in the report, including the timing of certain activities, how many layers of bond breaker were applied, and that cracks were identified in SORs after the panels were cut, but alleged that the cracks appeared before cutting;
- There were mistakes about whether certain equipment was approved for use.

[90] Yukon also responded to an undertaking given during the examination of Daniel Qian. He had been asked what Tetra Tech knew about the vertical movement. There were two questions and answers as follows:

> Q Advise if Tetra Tech is now aware of how much vertical movement the apron was designed to withstand due to frost heave and, if so, when it became so aware.
> A No
> Q Advise why Section 3.3.3 of the analysis in the July 27, 2015 report does not refer to the design of the apron and what it was designed to take in terms of vertical movement as a result of frost heave.
> A Tetra Tech was not the design engineer, so it did not have that information.

[91] Mr. Petzold said that Tetra Tech had sufficient technical knowledge to understand the settlement. Personally, he did not know how much pressure the panels could withstand, but Tetra Tech did.

[92] Intact argues Tetra Tech should have provided information in the report about the fact that if the apron was properly constructed, it would have withstood vertical movement.

[93] There was extensive questioning about who authored and who signed various drafts of the reports. There is no doubt that the drafting was a collaborative affair. There is nothing wrong with using others to assist in creating a report as long as the people who are ultimately responsible sign off on the content. The problem here is there did not seem to be any clear lines of responsibility about who was approving whose work.

The Construction Issues

[94] There are five main areas about how the apron was constructed that are in dispute: the apron design; the mix design; the pouring and consolidation of the concrete; finishing the concrete; and the bond breaker. These areas are dealt with here. There is no disagreement amongst experts that there were some poor construction practices and substandard workmanship, specifically in terms of curing and joint cutting and cracking. Their relevance to this decision is twofold: first, the allegations regarding the Final Report and second, how the poor construction practices and substandard workmanship affect overall responsibility for the poor outcome of the apron. There is also an issue about the joint sealant, which is a small issue relative to the other issues in this case. Joint sealant needs replacement at least once during the life of the apron.

The only issue is whether the design was defective so that the joint sealant would need to be replaced sooner than expected.

[95] As much as possible, I have attempted to segregate the evidence of witnesses on each issue. There are times, however, when evidence on more than one issue is captured in a paragraph because of the manner in which the witness's evidence was given.

The Apron Design

[96] The principal issue is whether the cracking in the southwest corner of the apron was caused by the design of the apron, which failed to provide protection against frost heave and settlement, or by poor construction practices and materials, or by a combination of both. The designers, Mr. Anderson and Mr. Bartsch, were firm the design was good, the design had been used in similar climatic conditions such as the Edmonton airport, and any failure was because of changes in the specifications. For them, Canadian airports generally are exposed to freezing temperatures, so based on standard practices, the 2014 design was acceptable. Mr. Anderson was asked to assume there had been seasonal fluctuations of as much as 10-12 centimetres. He said it would not affect his opinion because that kind of movement has occurred in other projects where the outcome was successful. They both said the problem was with changes that were made which were contrary to the specifications. Noted above are several such changes. Neither of these witnesses were asked if they could identify one or more changes that made the design less effective.

[97] Tetra Tech always maintained that if the design had been constructed as specified, even considering the changes, the apron should have been able to withstand

the frost heave and settlement. It was poor construction practices that caused the problem. Norcope and Intact claim the primary cause of failure in the southwest corner was frost heave and settlement, although their expert, Mr. Cumming, qualified what he said about causation.

[98] Most of the facts are not in dispute. No one challenged the fact that the design met minimum standards to protect the concrete from frost heave and settlement. As set out above, the results of the bore samples in the 2010 geotechnical testing and confirmed in the 2014 testing, showed a minimum depth for silt (frost susceptible material) of 1.5 metres and the minimum standard set by Transport Canada is 1 metre. The standard says: “When the subgrade contains pockets of highly frost-susceptible soil that are limited in area, the pockets shall be excavated to a depth of at least 1 m, but preferably to the full depth of frost penetration”. Mr. Bartsch went further and said the design exceeded the minimum standard because the minimum depth was more that 1 metre. Everyone agreed with the obvious which is the soil depths were variable and boreholes only tell you what is at the borehole and not across the apron. Mr. Bartsch was confident that the number of boreholes gave him sufficient information to design the apron. Mr. Cumming testified that it is preferable to excavate the frost susceptible material, but he does acknowledge that is not mandatory language used by Transport Canada.

[99] Having met the minimum standards, the question is whether something else should have been done. That takes me to the 2021 design for the replacement apron. Mr. Bartsch’s role in the 2021 apron was to oversee the design of the apron and he was Engineer of Record for Associated Engineering. The soil conditions below the existing

apron did not change between 2014 and 2021. The surveys during that time showed movement. For the 2021 project, Yukon was given a choice of designs by Associated Engineering. They were a partial replacement of the apron, a full replacement constructed as in 2014 or a risk adverse design of full replacement that would include removal of frost susceptible soil in some areas – basically a 'fool-proof' design against the conditions of the field and any issues that arose during construction. Yukon chose the 'fool-poof' design. Both Mr. Bartsch and Mr. Anderson said that they had more information available to them in 2021, including the survey data and information about the potential for subsurface water which can contribute to the risk of frost susceptible soils and the risk of frost heave.

[100] Yukon in response to a Notice to Admit, said the following:

> Admitted that the vertical movement of the apron possibly contributed to the severity of the cracking in these panels (listed in Notice to Admit as A-8, B-6, B-7, B-8, C-5, C-6, I-3, I-4) but the extent of that contribution is, as yet, undetermined.

[101] That takes me to the theory of the defence. Mr. Cumming said the root cause of the concrete distress was frost heave and settlement. Mr. Cumming relied on two things. First was the information provided in the surveys conducted by Mr. Hauff. Mr. Cumming said the cracking patterns follow the areas where there have been elevation changes because of frost heave and settlement. The cracking is most prevalent where the frost heave and settlement was the greatest. He noted that when he visited in October 2021, there was additional cracking and damage resulting from the same phenomenon that occurred each year. Second, he relied on the 2021 tender

documents to replace the apron in which one option required the removal of frost-susceptible material that would be replaced with non-frost susceptible material.

[102] Mr. Cumming agreed the basis of his opinion that it was seasonal elevation changes that caused the cracking in the southwest corner was a correlation between the pattern of cracking and the pattern of elevation changes. He did not test the panels or do other investigation to support his opinion. He said it was abundantly obvious why the panels cracked. Mr. Cumming admitted that in the zone he identified as having cracking caused by elevation change, about half the panels had cracked. He did not do a statistical analysis to see how strong the correlation was between the elevation change and the cracking, given the number of cracked panels. He said there may have been other reasons why cracking occurred or that contributed to the cracking. He did admit it is not the absolute measure of elevation change which causes cracking but the differential change between different parts of the apron. He also agreed the distance from the peak of the elevation change to where concrete was restrained may affect whether there is cracking. It is not the amount of change but the slope. He agreed that if all the panels were of homogenous materials and the same stress was applied, they should act the same way. If the stress was the same, but the panels were not homogeneous, the effects on the panels would be different. He also said he could not identify at what level of elevation change the panels would begin to crack because there were too many variables including the wear beneath the panel, the load applied, the strength of the panels and its thickness. He said he was relying on his engineering judgment for his conclusion.

[103] In my view, Mr. Cumming, Mr. Bartsch, and Mr. Anderson have reasonable opinions. We know that even Mr. Cumming found poor construction practices in other parts of the apron. It is not reasonable to conclude that despite Norcope performing poorly in other parts of the apron, that their work in the southwest corner met all required specifications and standards. I also accept that frost heave and settlement contributed the cracking in the southwest portion of the apron. However, it is more likely than not that poor construction practices also contributed to the cracking. It is almost a chicken and egg issue. Mr. Anderson and Mr. Bartsch would say the poor construction was the underlying cause and Mr. Cumming would say that it was the frost heave and settlement. The following in Mr. Cumming's report is an example of the puzzle. Mr. Cumming identifies 22 panels, including Panels B15 to B25, where some of the cracking was due to construction defects or substandard workmanship. He says the following about cracking in those panels:

> Cracking in the lean mix concrete was documented to be present at Panels B15 to B25 prior to the placement of the PCC pavement; accordingly reflective cracking is the likely initial cause of the north-south cracks at these areas. However, since 2014, additional cracking has manifested at Panels B13 to B18 is likely related to seasonal ground movement. Had the cracking in Panels B15 to B18 not formed in 2014 due to reflection of lean mix cracking through the PCC pavement, it is likely that these panels would have cracked anyway due to seasonal ground movement.

[104] However, the fact is the cracking in 2014 happened because of reflective cracking, not seasonal ground movement.

[105] B13 to B18 are not included in the 22 panels he concludes are damaged because of poor construction. They were damaged by reflective cracking. I deal with responsibility for that cracking below. However, for determining what role elevation

change played in any of the damage, he only makes the comments, through correlative reasoning, that panels B15 to B18 would have cracked due to seasonal ground movement if they had not cracked as a result of reflecting cracking.

[106] The defendants are critical about how many boreholes were drilled to obtain geotechnical information. They are correct that the boreholes only give information about the place where the borehole was drilled. It cannot give information about whether there was anywhere in the apron area where the silt was at a shallower level.

[107] Finally, I have information from Mr. Leaman. As I said above, I need to be careful about the extent to which I use Mr. Leaman's opinion, other than his general expertise in this area. In that regard, he set out a list of items that would be required to be tested to determine if proper construction practices would have reduced the cracking. Not all those tests have been done by anyone.

The Mix Design

[108] The issue is whether the mix design developed by Mr. Plaunt of Tetra Tech was good. At issue is the aggregate properties of the mix. Concrete consists of coarse and fine aggregate. If the mixture is too coarse with not enough fine aggregate, it will be a less fluid mixture. Sieve analyses were performed by Tetra Tech on the aggregate provided by Norcope. The same source of aggregate was used for both the lean mix and the PCC. In the design mix for the lean mix, the coarse aggregate met CSA standards. The fine aggregate sieve test failed for the 2.5 mm sieve, but according to the design document, it was still considered usable. The same tests were done for the PCC mix design. The coarse aggregate sieve test passed but the fine aggregate sieve test failed for 2.5, 1.25, .0630 and .315 sieves. The mix design document says

notwithstanding being coarser than CSA standards, it was considered acceptable since the concrete on this project would not require a fine trowelled finish.

[109] The mix did not meet the air content requirements. It was at 3% when the mix design called for 5.5-6%. The design document does say that admixture will need to be provided during mixing to increase the air content. Concrete needs air to ensure freeze-thaw durability. Entrained air, microscopic air bubbles, is inserted so that when the concrete freezes it allows for expansion. If the air voids are too far apart, the water in the concrete will expand and will cause damage. As well, the concrete needs to be consolidated properly to eliminate entrapped air, air that is naturally occurring in the concrete that needs to be worked out during the consolidation process. Both Mr. Petzold and Dr. Czarnecki indicated that in the normal course the mix is adjusted on-site when the slump test is conducted.

[110] Mr. Gonder testified Mr. Beecher said there were problems with the mix design from the very beginning. He said Mr. Beecher told everyone. Mr. Gonder said he never communicated with Mr. Plaunt or Mr. Cowan about this issue. He trusted Mr. Beecher. He said they could not have requested a new mix design from Tetra Tech because it would take too long. Mr. Gonder denied he had any obligation to tell Yukon there was a problem with the mix design.

[111] In his evidence at trial, there was the following exchange in cross-examination:

> Q And the – what I'm trying to do, Mr. Gonder, is to understand from you whether you thought, bad as the mix was and hard as it was to place, once it got in there, the mix didn't result in deficiencies in the concrete in accordance with the specs we just looked at, these kind of things here, or whether, using that mix, the concrete you placed didn't meet spec because of the defects in the mix. Those are the – the

> two alternatives I'm putting before you and asking you which one you had in mind or would have in mind now.
> A It is a – it's the – the mix design that resulted in the – these deficiencies that you speak of or the specifications we're trying to meet.
> Q So the concrete that you placed did not meet spec, then, in your view.
> A Correct.

[112] Mr. Petzold said Norcope submitted the proposed mix design to Yukon, and Tetra Tech, in its QA role, would have reviewed the design for Yukon. Mr. Petzold said he would have had the design reviewed by Dr. Czarnecki because she is the leading concrete specialist at Tetra Tech. He said he does not recall anyone ever suggesting the mix design was faulty. Mr. Petzold also testified there are no tests to determine whether the mix was freeze-thaw durable, but the practice was the mix is adjusted on-site to ensure the correct air content.

[113] Dr. Czarnecki said in May 2014, she had been called about the mix design for this project, just as she was for many projects in other Tetra Tech offices. Dr. Czarnecki is responsible for reviewing all of the airport mix designs for Tetra Tech. Dr. Czarnecki has no memory of the call with Mr. Plaunt in May. Neither does she remember identifying any problems with the design. Only one sieve did not meet the gradation in the lean mix testing. As a result, she concluded it was a sampling issue because the mix design for the lean mix was satisfactory and the aggregate was taken from the same source. She found no issue with the flexural strength but agreed that the air content was below what it needed to be. However, Dr. Czarnecki was not concerned because a small mixer is used when testing for air content, but the power of mixing is different in the production mix which is mixed in the trucks. That meant that the air could

be adjusted then. As a result, Dr. Czarnecki had no issue with the mix design. In an email to Mr. Petzold on July 30, 2014, Dr. Czarnecki said the following:

> It is unfortunate that in small markets we work for the owner and at the same time we do mix design for the contractor. I recall some verbal communications with Myles about the mix design but I did not see nor signed the letter. The mix design is acceptable but the sand gradation failed and we have a comment in the report that this would be fine. The other issue why there was no air adjustment on the trial batch testing. At 3% air it fails and now all this testing was done on concrete that is not freeze thaw durable. It would be good if we could keep our noses clean.

[114] Dr. Czarnecki said there was also evidence of bleeding, which in turn is caused by excessive water in the mix. She concluded the water likely was added to obtain a better slump. The excessive water makes the surface more porous and susceptible to disintegration.

[115] Miles Plaunt oversaw the mix design for the PCC. Mr. Cowan signed and stamped the mix design. Even though he is not an expert in mix design, Mr. Cowan acknowledged he assumed responsibility for its performance. Mr. Cowan did not recall having discussions with Mr. Beecher where Mr. Beecher was complaining about excessive bleed water or other issues. He denied he ever told Mr. Beecher it was too late to do anything about the design and that Mr. Beecher would just have to work with it. In rebuttal, Mr. Cowan denied Mr. Beecher had a discussion with him about changing the mix design, nor that he said the testers on site were ‘kids’, nor that he gave advice to Mr. Beecher on how to deal with bleed water. Mr. Cowan denied he ever told Mr. Beecher he would approve deficiencies in General Enterprises’ work if he would assist in the case against Norcope. I need to be careful in assessing Mr. Cowan’s evidence because he, like Dr. Czarnecki and Mr. Petzold, is tainted with the conflict-of-

interest issue, particularly for an opinion that Mr. Cowan might offer. However, the questions about his conversations with Mr. Beecher are facts, not opinions. As between those two witnesses on those factual issues, I prefer the evidence of Mr. Cowan. As stated above, I found Mr. Beecher's evidence unreliable, and there is nothing about these facts that raises a concern about Mr. Cowan's credibility.

[116] Mr. Cumming said the sand was coarser than ideal. That would impact the amount of water required to make the mix suitable. It also required more fine materials to be used to fill in a larger amount of cement. Additionally, there needed to be an increase in the amount of air, to between 5% and 8%, in the concrete paste to ensure durability to freezing cycles. There should have been a mock-up that would show the contractor had everything figured out. It is common to have such a mock-up done in the first section to be paved. Mr. Cumming acknowledged the fail on the sieve test could have been a sampling issue as the aggregate came from the same source. However, when they got different test gradings on aggregate from the same source, they should have done another sample.

[117] Mr. Cumming agreed with Dr. Czarnecki that the air parameters in the laboratory can differ from those on-site because of the different size of mixer. In that regard, he indicated there should have been rigorous QC and QA scrutiny. He also said the water content was up and down like a yo-yo during construction.

[118] Mr. Cumming disagreed with Mr. Riffel about the conclusion in the Final Report that the spacing factor between air voids was higher than specified and that negatively impacted the freeze-thaw durability. Both Mr. Riffel in the initial report, and Mr. Cumming in his report, and testimony, agreed that the air void parameters had not

been met. However, while Mr. Riffel stated there was no evidence the concrete was critically saturated, meaning that there could be surface scaling, Mr. Cumming testified from his observations, there had been critical saturation which resulted in surface scaling.

Pouring and Consolidating the PCC Layer

[119] As set out above, when the PCC arrives on-site, a slump test is performed to ensure it is of an appropriate consistency to pour into the forms. If it is not fluid enough, plasticizer can be added. Once the concrete is poured, it is consolidated to remove entrapped air. Mr. Cumming said that he would have expected tighter control over the pour and more frequent slump tests.

[120] Mr. Gonder was questioned about the QC testing done on the loads as they arrived at the site. On June 25, 2015, Mr. Plaunt emailed Mr. Lasker asking whether Norcope wanted full-time testing done. Mr. Lasker replied he thought Mr. Beecher knew what to do. To this, Mr. Plaunt replied: “Are you sure?.....after all the problems with bad loads on Saturday, I think you are taking on a big risk.”

[121] Mr. Gonder alleged, without any evidence, he advised Tetra Tech they were not performing their QA role properly. He testified he assumed Mr. Beecher told them. Mr. Gonder acknowledged on several occasions the concrete was failing specifications. There is an email dated July 22, where Mr. Plaunt told Mr. Lasker there were quite a few loads with slumps out of specifications (between 150 to 200). Mr. Gonder admitted it was General Enterprises’ responsibility to make sure the concrete poured met specifications. At one point in the cross-examination, he indicated some of the issues set out in the emails were ‘news to me’. However, he admitted it was ultimately Norcope

who was responsible for bad loads. As quoted above, Mr. Gonder said he knew the concrete that was being poured did not meet specifications.

[122] In September 2014, there was an email exchange between Mr. McFarlane, Mr. Bidniak, and Mr. Petzold. The exchange began with an email from Mr. McFarlane. He found seven panels were out of tolerance for air content. The specifications called for an air content of 5% to 8%. In response to a question from Mr. Bidniak in that same chain, Mr. McFarlane said: “We also told their superintend [sic] of our results every time and they chose to leave the mix in place.” In September 2014, there was more email traffic about mixing and pouring the concrete. During his testimony Mr. Gonder was taken to several emails where there was discussion about: the testing of the concrete; the concern that the problem with the concrete was the trucks were not mixing the concrete enough; and the PCC not being properly placed. The emails in September 2014 are of limited use in terms of determining what happened because by this time the apron had been completed. At this point in time everything that was being said and done was in an effort to determine how to solve the problems with the condition of the apron, and perhaps assign blame.

[123] Mr. Beecher testified that bleed water was present on the first day of the pour. He said he told Mr. McFarlane bleed water was holding up the curing process. Mr. McFarlane and Mr. Cowan told him they thought there needed to be more consolidation. In terms of the slump tests, Mr. Beecher said the mix was so rocky it would not flow out of the trucks. He said they added some plasticizer to get it flowing. Then they would use water to rinse the fins of the mixer. He said this was always his

practice to remove the plasticizer from the fins. He denied adding water to the concrete to adjust the slump.

[124] Dr. Czarnecki testified on July 28, 2014, 10 core samples were taken from Lanes E and H. All the July 2014 core samples were tested for density, three were tested for compressive strength and two were tested for air-void parameters. The report concluded the density of the cores was found to be significantly lower than the design density. That meant there was either a lack of consolidation of the concrete, or the mix was altered, the most probable alteration being the addition of water. The main contributing cause of the low densities was entrapped voids, caused by inadequate consolidation. The analysis of the air-void parameters led to the conclusion that the interiors of the panels were not freeze-thaw durable. This resulted in the conclusion that the potential for deterioration of the apron due to freeze-thaw damage was significant. These conclusions were reached because of Dr. Czarnecki's examination of the high air content along with the spacing factor between the voids. On September 6, 2014, four core samples were taken from Lanes A, B, H, and J. A report, reviewed by Dr. Czarnecki and accepted by Mr. Petzold, reporting on the results of those core samples is appended to the Final Report. All four showed large consolidation voids and concrete bonded to the lean mix. In the Final Report, there is a photo of a cross-section of one of the cores. From that she concluded that the concrete was not consolidated. There was honeycombing, a phenomenon where there is the agglomeration of coarse aggregate with no paste in between. That resulted from insufficient vibration during the finishing process. Honeycombing makes the concrete weaker and along with improper spacing of the entrained air and the existence of entrapped air, it facilitates cracking.

[125] Dr. Czarnecki said in the Final Report the equipment used by Norcope had not been approved. She admitted that statement was incorrect. She testified she only learned it was not accurate after she had written the report.

[126] Mr. Cumming and Mr. Riffel did not identify poor consolidation as one of the construction defects. Mr. Riffel said the consolidation voids appeared to be small and well-distributed, although concentrated in the lower portion of the PCC and would not facilitate cracking.

[127] Mr. Leaman said the air-void spacing exceeded CSA standards. The core samples also showed honeycombing. Mr. Leaman says the consolidation is done to remove all entrapped air in the concrete and to ensure that dowel bars are fully encapsulated so stresses can translate from the dowel bars through the concrete. Mr. Leaman said the consolidation equipment was undersized or underpowered for the project, but it could have been used if there was manual labour with handheld vibrators to consolidate.

[128] He said there was also evidence of bleeding, which is caused by excessive water in the mix, likely added to obtain a better slump because of the coarseness of the mix. The excessive water has nowhere to go but up to the surface, since the lean mix prevents it from being drained into the subsurface. That meant that the surface was more porous and lead to disintegration of the concrete. Excessive bleed water can also cause delay in finishing or applying the curing compound. Mr. Leaman said that the QC and QA were ineffective as several loads of concrete were out of specification and no corrective action was taken. He said in some instances where QA had recommended that a load be rejected, Norcope's directed that it be used. He also said that the air

voids should have been tested when first pouring the concrete. He said that it was the contractor's responsibility to verify the air void parameters.

[129] Mr. Cumming said the contractor should have been told by Tetra Tech to keep trying until they got the mix correct. Mr. Leaman said the slumps were variable and if the plasticizer dosage was constant, there needed to be another explanation for that variability. He concluded the reason for the variability in the slump tests and therefore the concrete was the water content.

Finishing the Concrete

[130] The process for finishing the concrete once it is consolidated consists of finishing (brooming), texturing, curing, and cutting the joints. The timing of these steps is critical. Mr. Leaman and Mr. Riffel pointed out that any delays before curing can affect the durability of the finished surface because having the surface exposed to the air can result in rapid evaporation, which in turn causes dry shrinkage, which creates cracks. The curing compound ensures that the moisture is retained. This is important because the hydration of the concrete mix causes the chemical reaction which results in a bond between the aggregate and the cement.

[131] There was an issue between the experts about where to obtain the information on climactic conditions. As noted above, the evaporation rate which is determined by the climate in which the PCC is poured needs to be known to ensure that the PCC does not dry too quickly. Dr. Czarnecki used Environment Canada data from the weather station at the airport. Mr. Riffel was critical of using that data since conditions at the surface of the concrete can be different from the weather station reading. Mr. Leaman says the weather station at the airport is close enough to gauge the evaporation rate

and is the one referenced in the CSA standards. Mr. Leaman said it is up to the contractor to have the evaporation rate information.

[132] A second issue is when the joints were cut. It is important to cut the joints as soon as possible after curing, again to avoid uncontrolled cracking. On July 9, 2014, Mr. Jansson wrote to Mr. Gonder advising that Tetra Tech had concluded that the cracks appeared because of improper finishing, mainly because of delays in saw cutting. The letter stated there needed to be saw cutting capacity available on a 24-hour basis to ensure saw cutting was completed as soon as possible in accordance with the contract documents. Mr. Gonder testified he knew the specifications required there be saw cutters available on a 24-hour basis and that the saw cutters were not available on that basis. Notwithstanding the after-the-fact debate about where to obtain the climactic data, experts from all sides agreed there was a delay in curing and joint cutting which caused cracking. Mr. Gonder had been told that Norcope should have been monitoring the panels and not waiting until the next day to do the cutting.

[133] Everyone agreed there was excessive bleed water which can lead to weaker concrete. Bleed water comes to the surface during the finishing process. Removing it from the concrete mixture affects its homogeneity and its ability to bond between the aggregate and the cement. Mr. Beecher said there was bleed water on the first day of the PCC pour and it caused delays. Mr. Beecher said he was having problems and the testers they (meaning Tetra Tech in their QC role) had were ‘kids’. Mr. Beecher spoke with Mr. Cowan about changing the mix design. He said Mr. Cowan said he would review the mix design but nothing came of it. Mr. Beecher said Mr. Cowan advised there was no time to change.

[134] Mr. Cowan did not recall having discussions with Mr. Beecher where Mr. Beecher was complaining about excessive bleed water or other issues. He denied he ever told Mr. Beecher it was too late to do anything about the mix design and that Mr. Beecher would just have to work with it. In rebuttal, Mr. Cowan denied Mr. Beecher had a discussion with him about changing the mix design, nor that he said that the testers on site were 'kids' nor that he gave advice to Mr. Beecher on how to deal with bleed water. To change the mix design there would have needed to be a field assessment completed which they were not asked to do.

[135] Why there was excessive bleed water was a matter of debate. Everyone agreed the concrete mix was coarser than desirable. Everyone agreed the concrete was difficult to pour and there were unsatisfactory slumps. The solution was to add admixture on-site, but not add water. There is one comment in an SOR where water was added to solve a problem with the slump. The excessive water may have been added at the plant to solve the problem of a lack of fines in the mix design, or it may have been added on site to make the concrete easier to work with. Either should not have been done. I find that water was added so that the mixture could be poured and that is the responsibility of Norcope. If Norcope was struggling with the mixture, it ought to have gone to Tetra Tech who designed the mix. Norcope did not.

The Bond Breaker

[136] The purpose of bond breaker is to allow movement between the lean mix and base. All parties agreed that the PCC layer bonded to the lean mix, which created stress on the PCC, which could lead to cracking. This bonding in turn made the saw cuts ineffective even if the saw cuts had been done as soon as possible. At first,

Norcope had proposed that no bond breaker be used. Yukon insisted that bond breaker be used.

[137] There are two issues that were raised. The first was the use of Fabrikem WB-Cure which is a curing compound and not a bond breaker. Notwithstanding repeated questioning of Yukon witnesses that stated or insinuated that Tetra Tech recommended Fabrikem, it did not. Tetra Tech had indicated that a white cure compound product could be used as a bond breaker. Fabrikem is a white cure compound. Tetra Tech had advised Yukon that Norcope had submitted three products that Tetra Tech indicated were satisfactory for use. One of them was Fabrikem. Mr. Jansson advised Mr. Gonder that Yukon approved of the three products proposed; Norcope was to advise the Engineer which product they planned to use; if they chose Fabrikem they needed to apply a minimum of two coats to ensure the entire surface was covered; and finally, they needed to ensure the entire surface was clean and dry before the PCC was placed.

[138] In Mr. Petzold's testimony, he said he was aware that one of Norcope's suppliers had indicated that a curing compound was not recommended as a bond breaker. However, senior engineers at Tetra Tech indicated it would work, and on that basis, Mr. Petzold included it as one of possible bond breakers. Although Mr. Gonder testified they told Yukon that Fabrikem should not be used, he did admit that Norcope was given a choice of bond breaker or Fabrikem and Norcope chose Fabrikem. Unlike with the settlement of the lean mix, there was no threat by Norcope to stop work because of Mr. Gonder's position that Fabrikem should not be used. Mr. Beecher testified he told Mr. McFarlane he had never heard of a curing spray being used as a bond breaker.

Mr. Cumming and Mr. Riffel said that curing compounds are not always effective as bond breakers because they do not actually build up a film on the surface of the lean mix. However, Mr. Cumming did admit that curing compounds are sometimes effective.

[139] The second issue is whether Norcope applied the bond breaker properly or at all. There is a photo in the Final Report that showed workers pouring PCC directly on top of the lean mix. Mr. Petzold said if there had been bond breaker applied the surface of the lean mix would have been white. Mr. McFarlane said he did not see two coats of bond breaker being applied at any given time. However, he could not say two coats were not applied, perhaps during times when he was not observing. Mr. Beecher said they did not apply less than two coats. Mr. Cumming indicated if the lean mix and PCC bonded in a panel, the panel would crack. Not every panel in the apron cracked.

Joint Sealant

[140] After the cuts are made, a flexible joint sealant is applied which also allows the concrete to move but maintain a seal. The sealant usually last for about 10 years, so even if there were no other problems with the apron, the sealant would need to be reapplied during the life of the apron. Norcope requested a change in the product that was specified for the joint sealant as the product was not available. Yukon agreed. There was agreement that the sealant was not applied correctly with the result that it would need to be replaced earlier than it should have been.

[141] There is also agreement that the design of the joint was not compatible with the product used. Mr. Cumming and Mr. Riffel said when a substitute product was approved, the design should have been adjusted for the new product. Dr. Czarnecki said it appeared the product and site instructions were not followed. This again is one of

the issues where the work was not properly supervised by Yukon and Tetra Tech, and Norcope did not take the care it should have when it knew the product had changed.

Miscellaneous Issues

[142] The first is the use of wood forms. There is nothing that specifically relates the use of wood forms to the defects in the apron. However, what happened in terms of their use is relevant to the roles played by Tetra Tech and Yukon. The contract specifications required the use of steel forms for the formwork. However, Norcope used wood forms. On May 22, 2014, Mr. Petzold wrote a lengthy email outlining the problems with using wood forms. He noted at the end of the email that as Yukon and Tetra Tech had been flexible on the issue of bond breaker, he recommended that Norcope be notified that they should get the proper formwork or the project will be stopped until Norcope was able to comply. On May 23, 2014, Mr. Petzold advised Mr. Jansson he did not have confidence in wood forms. He forwarded photos where wood forms had been used showing joints that were left on the lean mix concrete which were far from straight.

[143] In the same letter where Mr. Jansson advised about the bond breakers, he indicated that Yukon was prepared to consider the viability of wood forms. However, this was on condition that 10 test panels were to be poured; the test panels needed to be approved by the Engineer before Norcope was to proceed further; and if the Engineer was not satisfied with the results, Norcope would need to use steel forms.

[144] On June 23, 2014, there was an exchange of emails regarding the wood forms. Norcope had requested that rather than 10 panels be poured, they be permitted to pour the entire lane. Yukon agreed on the basis that tolerances would be checked on the entire lane once the forms were removed. Mr. Gonder said he would only pull off the

forms on 10 panels as they did not have the time to do the entire lane. He then advised Mr. Petzold that Norcope would stop work if pulling off forms from 10 panels was not acceptable. Yukon, in an effort to keep the project moving, advised Mr. Gonder they would allow Norcope to remove the forms from 10 panels to allow Tetra Tech to verify compliance.

[145] A second stand-alone issue is a reflective crack that runs through Lane B from panels 15 to 25. There was a crack in the lean mix which reflected up to cause a crack in the PCC. Dr. Czarnecki admitted her conclusions about the crack are based on her observations and site photos because the PCC had already been poured. The Final Report says the lean mix construction joint was not properly reinforced to minimize reflective cracking. The site instructions required the lean mix to be sealed with a flexible sealant. Then the PCC was to be poured halfway and a reinforcing mat was to be inserted before the second half was poured. What happened was the PCC was poured in one layer, using blocks to support the reinforcing mat during pouring. According to Dr. Czarnecki, the existence of the blocks and the random height of the reinforcing mat meant the consistency would have made the reinforcement ineffective. She also noted the PCC joint was grouted, which would make the PCC joint a preferred location for a crack to develop from the bottom up. Mr. Petzold said using blocks to set the mesh rather than pouring half the concrete and then putting on mesh could mean that the concrete was not fully consolidate so that gaps could act to induce cracks. Mr. Petzold did acknowledge in cross-examination that either way was acceptable. However, in re-examination he stated in his view the two-step pouring option was preferable.

[146] Mr. Riffel says the reflective crack was caused by the design of the reinforcement (inadequate spacing of the bars) and having the reinforcing mat placed halfway through the pour without any supporting blocks. Mr. Leaman said the crack may have been caused by dry shrinkage, but it could have been caused by something else. Mr. Leaman indicated a preferable method of isolating the crack in the lean mix would have been to put down a wide sheet of heavy polyethylene.

[147] In the Final Report, Dr. Czarnecki identified edge spalling and ravelling as one of the defects. She made her comments based upon her visual observations, the design detail of the construction joints and the material used to seal the joints. She said she did not agree that the design of the joints was incorrect. Dealing specifically with the spalling and ravelling, she said it likely occurred because the wrong blade type was used, along with the fact that a backer rod that was too small was used and the sealant was applied incorrectly. Spalling and ravelling result in difficulties in clearing the apron and create a high risk of FOD.

[148] Finally, there is an issue raised by Mr. Petzold about an improperly placed dowel. On June 26, 2014, Mr. Petzold sent an email to Mr. Malik about a dowel which ended up directly underneath a controlled crack location. He had attached a photo. He noted in the email that placement of the dowels results in a very weak location in the concrete and the ability of the dowel to transfer load is reduced. He said ‘it would be prudent, for Norcope to check the remaining rows and correct any layout problems’. I had no other evidence on this issue.

Conclusions

The Final Report

[149] It is helpful to pause here to address an engineer's professional duty. Norcope cites the Yukon *Engineering Profession Regulation*, OIC 1996/056, which states in the Code of Ethics (Schedule A) under Duty of Professional Engineer to the Public:

> Every professional engineer shall:
>
> 1. regard their duty to public welfare as paramount;
> …
>
> 7. sign or seal only those plans, specifications and reports made by them or under their personal supervision and direction or those which have been thoroughly reviewed by them as if they were their own work and found to be satisfactory;
>
> …

[150] Norcope also points to s. 16 of the *Regulation* which says finals plans, specifications, reports or documents shall be signed and sealed by the engineer who is responsible for the document and supervised its preparation. In cross-examination, Mr. Petzold was taken to the Alberta Professional Engineers and Geoscientists of Alberta Ethical Guidelines and Rules of Conduct 3.2.3 which requires engineers to 'conduct themselves with integrity, honesty, fairness and objectivity in their professional practices.' Mr. Petzold agreed the duty of fairness took precedence over the interests of clients.

[151] In the trial, we heard from engineers from several jurisdictions. It is fair to assume the professional responsibilities of engineers are similar, if not identical, across the country.

[152] It is important to remember who the report was intended for. It was written to form the basis of discussions with Norcope about the deficiencies. This was not a report like a public commission which is intended for wide distribution and use. Norcope knew how the use of the bond breaker came about. Norcope knew who did the mix design. Norcope knew it had a contract with Tetra Tech to do QC. Nobody was deceived by the failure to address these things in the report. With respect to the incorporation of the comment about performance-based specifications, Tetra Tech now admits this was incorrect. It should not have been put into the report, but again, Norcope knew what contract it had with Yukon. In terms of the mistakes, such as what equipment was approved, those were mistakes which were admitted by Tetra Tech. Dr. Czarnecki noted in her report the equipment proposed by Norcope for paving had not been approved. That was incorrect. Dr. Czarnecki testified she only learned this was not an accurate statement after she had written the report.

[153] That takes me to the misstatement or falsehoods that are alleged. In terms of the bond breaker, there is conflicting evidence about how many coats were applied. A photo that was part of the Final Report shows one panel where PCC is being poured over lean mix that has no bond breaker on it. It may have been that in some instances there were two coats of bond breaker applied but we know for one panel there was none applied. In terms of the timing of certain activities during the process of finishing the concrete, Norcope made much of the fact that times were in the reports which were not in the SORs. We know Mr. McFarlane kept field notes and not everything that is in the field notes made it to the SORs. We know from several witnesses that people spoke by phone or had in-person conversations. The times that were inserted were in the first

draft of the December Report prepared on July 8, 2014. At that time, while strains in the relationship between Norcope on the one hand and Yukon and Tetra Tech on the other were starting to show, the project was proceeding reasonably well. Mr. Cowan would have no reason at that time to make things up. It is more likely the times that are reported in the draft, which ultimately became the December Report, got there because of verbal conversations between Mr. McFarlane and others. To suggest Mr. Cowan purposely made up times when he wrote the first draft in July because it would get around the June warranty letter regarding settlement does not accord with my view of the witnesses' testimony or the emails that were circulating throughout this period. There is nothing in the Tetra Tech communication that suggests any sort of plan to insert false information into documents so as to assign blame to Norcope.

[154] Dr. Hussein was qualified as an expert able to give opinion evidence regarding good engineering practice in conducting investigations of failure analysis and preparing reports regarding investigations of failure analysis. He gave three opinions. First, he said when identifying the causes of concrete failure of the apron, good engineering practice required the writers to identify seasonal elevation changes as either a cause or potential cause of failure. Second, he opined the fact the bond breaker used was recommended by Tetra Tech, should have been mentioned in the report. Third, he said the phrase regarding the crack in Panel C should not have been removed.

[155] I accept that Dr. Hussein is a highly qualified engineering scholar, respected by the wider engineering community in Canada. However, with respect to his first two opinions, I repeat what I said early. This is not a report for wide consumption. This was written to begin discussions about fixing the apron deficiencies. Yukon and Tetra Tech

took the view those deficiencies were the fault of Norcope. As will be seen below, in some respects they were correct; in others they were not. This was intended to be used in a quasi-adversarial discussion and it advanced a position about responsibility. There was no evidence it was meant for anything else.

[156] The only edit that was made to the Final Report that causes me discomfort is taking out the phrase about Panel C6. Mr. Petzold testified he now agrees the crack in C6 could be evidence of cracking caused by seasonal elevation change. Dr. Czarnecki maintains the position that in her engineering judgment it was appropriate to remove. I find the phrase should have stayed in. It was taken out because of an error in judgment or a keenness to support a client in dealing with failed project. It was done by someone whose firm was in a conflict of interest. It points to a level of advocacy that is not appropriate.

[157] In the Riffel Report, there is a point-by-point commentary on the 16 items contained in the Executive Summary of the Final Report. As Mr. Cumming testified, there are points where he and Mr. Riffel agree with the Tetra Tech conclusions and points where they disagree. My review of that commentary shows there are about five items where there is agreement, about four where there is substantial disagreement, with the balance being commentary where there is partial agreement or a reliance on different data such as core samples.

[158] I conclude that while the removal of the comment about C6 was wrong, there is no evidence this or anything else done in the Final Report was done maliciously, falsely, or with an intent to harm Norcope. Tetra Tech was acting as an enthusiastic advisor to Yukon, at a time when I conclude that there were still genuine intentions on the part of

Yukon to find some sort of mediated solution to the problems with the apron, and that is all. Playing the role of enthusiastic advisor will be addressed below given the conflict of interest Tetra Tech was in.

[159] In the alternative, Norcope alleges that Tetra Tech acted negligently in relation to the Final Report.

[160] Norcope argues Tetra Tech was told by Yukon that 'Yukon was going to rely on the Demand Report and use it to pursue Norcope and Tetra Tech'. Norcope says Tetra Tech knew Norcope would suffer damages if the report was negligently prepared.

[161] To find a negligence claim against Tetra Tech on behalf of Norcope there must be a duty of care owed to Norcope by Tetra Tech. Whether there is a duty of care requires the application of the two-part test which is: is there sufficient proximity between the parties that the defendant would reasonably contemplate that carelessness might cause damage to the plaintiff; and if so, is there anything that should limit the duty (*Hercules Managements Ltd v Ernst & Young*, [1997] 2 SCR 165 ("*Hercules"*)). The analysis for negligent misrepresentation is no different (*Hercules* at para. 21). *Hercules* goes on to examine what proximity means in negligent misrepresentation cases. It says at para. 24:

> … To my mind, proximity can be seen to inhere between a defendant-representor and a plaintiff-representee when two criteria relating to reliance may be said to exist on the facts: (a) the defendant ought reasonably foresee that the plaintiff will rely on his or her representations; and (b) reliance by the plaintiff would, in the particular circumstances of the case, be reasonable. …

[162] And at para 26:

> In negligent misrepresentation actions, however, the plaintiff's claim stems from his or her detrimental reliance on

> the defendant's (negligent) statement, and it is abundantly clear that reliance on the statement or representation of another will not, in all circumstances, be reasonable. …

[163] The facts in *Hercules* are also instructive. There, the action was brought by shareholders against auditors, claiming negligent misrepresentation contained in annual audits. The company under audit went into bankruptcy. The shareholders claimed the annual audits were negligently prepared, and they had relied on them to make investment decisions. The claim was dismissed. The court held the auditors did not owe a duty to the shareholders because the purpose of the reports was not to assist shareholders in making investment decisions but rather to assess how the company was being managed. In performing their role, they did not owe a duty to individual shareholders, but to the company.

[164] Norcope cites three other cases to claim a duty of care existed between Norcope and Tetra Tech with respect to the preparation of the Final Report. One involved a case between a successful job seeker, whose job was terminated soon after hiring even though the company claimed there was long-term work; a house buyer, who relied on an inspection report prepared by an engineer who knew the report was being prepared for consideration by potential buyers; and a plaintiff who relied on an engineer who did an assessment on the plaintiff's behalf before the plaintiff invested in a hotel property. These cases are not relevant since in each there was a direct contractual relationship between plaintiff and defendant. There was no such relationship between Norcope and Tetra Tech insofar as the Final Report is concerned. To find a duty between Norcope and Tetra Tech in relation to the Final Report assumes that what happened to the Final Report caused Norcope damage.

[165] The Final Report was used by Yukon to initiate discussions with Norcope about retaining an independent party to conduct an investigation into the problems with the apron. There never was agreement to retain that third party. At best, Yukon was 50% responsible for that failure, although the email exchanges suggest to me that Norcope was less cooperative than Yukon in coming up with a third party. Failing resolution through a third-party investigation Yukon started this action and is relying, in part, on the Final Report. It is not convincing in areas and, given the conflict of interest, I am cautious in relying on its contents due to its authorship. However, what that leaves Norcope with is a complaint about a bad expert report. That does not create a proximate relationship between Norcope and Tetra Technor does itself cause damage. There is no action in negligence against Tetra Tech for the contents of the Final Report.

[166] Intact argues Tetra Tech should not have written the Final Report until it had carried out a more extensive investigation. I have made my findings with respect to the report. It is what it is. It did not create any cracks in the concrete. I relied on very little of the information and opinions contained in the report unless there was either testing or visual evidence (photos) or testimony that corroborated the information or opinions.

[167] Finally, I indicated above there seemed to be little version control in terms of who was authoring, reviewing, and approving the content of the various versions. While this was sloppy, it does not on its own attract liability.

The Conflict-of-Interest Issue

[168] Tetra Tech was in a conflict of interest from the beginning of the project. Of that there is no doubt. The issue is finding a line from that conflict of interest to damage suffered by Norcope or Yukon. As found below, Tetra Tech did not do its QA and QC

job properly or the project would have been stopped to sort out the problems that are identified as construction issues. The mix design on its own was problematic. It could have been adjusted through testing. Tetra Tech did not give the mix design and pouring the concrete the attention it deserved given the obvious issues about the content of the mix. However, those failures, while they lead to liability, are not, in the context of this action, made worse by the conflict of interest. This is not a regulatory proceeding to deal with the professional responsibility of anyone. This is only an action to determine liability for a badly constructed airport apron. Tetra Tech's conflict of interest does not add anything to the findings I have made.

The Construction Issues

[169] The mix design was problematic. Dr. Czarnecki knew there would need to be adjustments on-site because of the lack of fine aggregate. That in itself did not create the problem because no one challenged the ability to adjust the mix on-site. The slump testing was inadequate and there were times when truckloads that did not meet specifications were poured. There was no consistent QC or QA to stop the work until Norcope got the mix right. Mr. Gonder and Mr. Beecher said there were problems pouring the concrete, but unlike with the settlement of the lean mix where they stopped work, they just continued to pour. On at least one occasion, they were caught adding water to the mixture. That leads me to conclude it was not the only time they added water to the concrete to make it pour more easily. The entire process from designing the mix, to making it, testing it, and pouring it were all flawed.

[170] I accept that consolidation was poor, resulting in a concrete that had entrapped air that was not properly spaced, which resulted in it not being freeze-thaw durable.

Although the equipment that Norcope used was approved, the equipment was not used in a workmanlike manner and that caused the failure of consolidation.

[171] I accept the product used as a bond breaker did not function well. There is no adequate evidence to support a conclusion that Fabrikem was the right product to use. On the other hand, there is some evidence that Norcope was resistant to applying a bond breaker at all and in some cases it did not apply anything at all. However, that becomes irrelevant given Yukon has not proven Fabrikem was the correct product.

[172] Everyone agrees there was late curing and joint cutting which caused cracking. Finally, the miscellaneous items listed above all show poor workmanship on the part of Norcope.

[173] Given these conclusions, the question is how much of the damage to the apron was caused by inadequate construction and how much was caused by seasonal movement. I cannot conclude all the problems in the southwest portion were caused only by seasonal movement as there is nothing that would allow me to conclude poor construction practices employed elsewhere on the apron were not employed in the southwest corner. Likewise, there is no evidence the problems with the PCC mix were somehow non-existent in the southwest corner. The failure of adequate QC and QA was an apron-wide problem. Finally, Yukon did nothing to stop construction when problems, particularly with the mix, started to appear. As I do not know whether the apron was designed to withstand seasonal elevation changes of the degree shown in the 2014 and 2015 surveys, but because I do know about the failures listed above, my apportionment of liability does not incorporate the seasonal elevation change. The elevation change exacerbated the cracking, but I cannot find that it alone caused it.

[174] I need to address the warranty letter and how it fits with these conclusions. Although no one was explicitly questioned, it is reasonable to conclude that Yukon gave that warranty on the understanding that the construction in the area of seasonal movement would be done properly. It cannot be an answer to the claim that even though the construction was poor, that letter is a defence. It is not.

The Duty of the Contractor

[175] Yukon argues that Norcope breached its contract by failing to do the work in a workmanlike manner. It relies on the decision in *Brunswick Construction Limitée v Nowlan*, [1975] 2 SCR 523 ("*Brunswick*"). There, an architect prepared plans to construct a house. Brunswick was retained for the construction of the house. After the owners moved in, several defects in the house appeared. The contractor had built the house without the direction or assistance of any engineer or the architect. The trial judge had found that architectural plans were defective and found there was evidence of bad workmanship on the part of the contractor. The Supreme Court of Canada found the owners were relying entirely on the contractor's skill in doing the work. It said that

> …a contractor of this experience should have recognized the defects in the plans which were so obvious to the architect, Arnoud, subsequently employed by the respondents, and, knowing of the reliance which was being placed upon it, I think the appellant was under a duty to warn the respondents of the danger inherent in executing the architect's plans, …" (p. 529).

[176] In *Auto Concrete Curb Ltd v South Nation River Conservation Authority*, [1993] 3 SCR 201 ("*Auto Concrete Curb Ltd*"), the issue was whether the engineer on a project has a duty to advise prospective contractors of the need to obtain permits to do the work as proposed by the engineer. The Court said at p. 204:

> It has long been established that, barring specific arrangements to the contrary, the method by which a contractor chooses to execute the work falls within its sphere of responsibility, and that neither the owner nor the design professionals employed by the owner have a duty to advise the contractor as to what method to choose, or how to go about accomplishing the work by whatever method the contractor in fact chooses. … This settled rule defines legal responsibility and it not abrogated by the fact that some design professionals may in fact choose to advise contractors on the methods they choose to use and on problems which may be associated with the choice of a particular method.

[177] In response, Norcope cites *Comeau v Perreault* (2002), 17 CLR (3d) 131 (Ont Sup), the court said at para 12:

> I conclude from these cases that a contractor's duty and corresponding liability, in the circumstances where the work contracted for is not feasible given the defective and/or aged state of the work site, may be wider than the terms of the contract. The concept of imposing a duty on the contractor appears to be impacted by the amount of reliance placed on the skills of the contractor and the existence (or non-existence) of an architect or engineer on site; the owner's knowledge of the work being performed and/or construction work in general.

[178] Mr. Gonder in his evidence and Norcope's counsel in argument say anything Norcope or its subcontractors did incorrectly were the responsibility of Yukon and Tetra Tech. They argue they should have stopped poor workmanship and therefore, it is their fault, and Norcope should take no responsibility. *Brunswick* is a case where the contractor apparently had no supervision. That is not this case. However, it is reasonable to assume that a contractor, when hired, is expected to perform the duties in accordance with the specifications. Norcope agreed to do that and at times they failed. I rely on *Auto Concrete Curb Ltd* and particularly the passage quoted above.

[179] No one on this job did their work competently and the fact Tetra Tech failed in its QA and QC roles and Yukon failed in its supervisory role does not take away from Norcope's responsibility.

Results on Liability

[180] In the result, liability for the apron defects is split. The lack of QA and QC and the problematic mix design fall on Tetra Tech. The failure of poor construction practices falls on Norcope. The failure to essentially pay attention to what was happening on the project falls on Yukon. Tetra Tech's involvement in the defects is the greatest and I assess it at 50% of the problems. Norcope takes 35% and Yukon the remaining 15%.

Yukon acted in Bad Faith

[181] The argument is this. Yukon knew about the frost susceptible soils, they knew that stairs and doors of the terminal adjacent to the apron were warped or damaged, they knew the lean mix settled, they acknowledged Tetra Tech was in a conflict of interest, and they knew about the elevation changes in the southwest corner. Knowing all of this: they required Tetra Tech to make changes in the Final Report and dismissed seasonal frost as a potential cause of the cracking of the apron; knowingly relied on a lie fabricated by Tetra Tech engineers to advance an unreasonable and exaggerated claim against Norcope. As a result, Yukon breached its duty to perform its contractual duties honestly and reasonably and not capriciously and arbitrarily. In the alternative, Norcope says if it did not breach its duty of good faith, Yukon acted negligently in relying on the opinion of Tetra Tech.

[182] I have already found the Tetra Tech Final Report was not written maliciously or contained falsehoods. They, and their client Yukon, were taking a strong position about

the failure of Norcope to do its job properly as it tried to work toward a solution. I have already found Norcope did not do its job properly. The fact Yukon took a strong position towards Norcope's failures is a choice that is made in the litigation process. Yukon was entitled to take that position with the risk of all litigators that if they fail, they will be liable for costs.

[183] There is a more specific argument, namely that because of the role played by Mr. Crist in drafting and amending the report, he, and therefore Yukon, participated in the fabrication of a false report and that leads to bad faith. In addition to my findings above, for the most part, Mr. Crist's questions and suggestions were not unreasonable. Norcope made much during trial about the fact he asked Tetra Tech to add a section about FOD. Whether an apron is constructed in a manner that ensures passenger safety is a relevant consideration. When he addressed the issue of the seasonal elevation shift, his comments were that Tetra Tech, in its professional opinion, could reject or accept. Asking the questions does not attract fault.

[184] Norcope also argues Yukon's unreasonable and excessive demand denied Norcope the opportunity to repair deficiencies. There is nothing to indicate Norcope was prepared to repair the deficiencies to the extent I have found the deficiencies are Norcope's responsibility.

[185] I also note throughout the project, Yukon acceded to many requests by Norcope to change methods and materials that were specified. If Mr. Anderson and Mr. Bartsch are correct (and I need not decide), some of those changes may have compromised the design. The accommodation by Yukon was done to ensure the apron was completed

without inordinate delay. However, Yukon could have insisted on Norcope following the design and specifications as it contracted to do**.**

[186] Finally, I note what Mr. Gonder said about his frame of mind when he entered into the contract with Yukon. He said Norcope was never prepared to accept any risk because of subsurface conditions. However, he knew there would be no subsurface excavation. He said he knew all along the subsurface would cause problems and he simply expected to renegotiate the contract. This may or may not fit the legal definition of bad faith since no one argued it, but it fits my definition of a contractor whose motives at the time of signing the contract were questionable.

Claim of Intentional Interference with Economic Relations

[187] Norcope claims Tetra Tech intentionally interfered with Norcope's business relationship with Yukon. The argument is this. The Demand Report prepared by Tetra Tech was false and misleading. The authors of the report were highly skilled engineers involved in the construction of the apron. They knew or ought to have known the report was false and had been prepared with the intention of causing Yukon to demand Norcope replace 100% of the apron. The fact the report was false was an act of civil fraud on the part of Tetra Tech. Yukon relied on the report, making unreasonable demands on Norcope, and causing embarrassment to Norcope and damage to its reputation.

[188] The seminal case on intentional interference with economics in *Bram Enterprises v AI Enterprises Ltd*, 2014 SCC 12. Justice Cromwell, for the court, laid out the framework for these claims as:

- The scope of these claims should be kept narrow and is available in three-party situations where the defendant commits an unlawful act against a third party and that act intentionally causes economic harm to the plaintiff.
- Conduct is unlawful if it would be actionable by the third party or would have been actionable if the third party had suffered loss as a result of the conduct.
- The tort is available even if there are other available causes of action. (para. 5).

[189] Of particular relevance to this case are Justice Cromwell's remarks regarding the intention requirement. At para. 95, he said:

> … It is the intentional targeting of the plaintiff by the defendant that justifies stretching the defendant's liability so as to afford the plaintiff a cause of actions. It is not sufficient that the harm to the plaintiff be an incidental consequence of the defendant's conduct, even where the defendant realizes that it is extremely likely that harm to the plaintiff may result. Such incidental economic harm is an accepted part of market competition.

[190] At para. 96, he quotes from Goudge J.A. in *Alleslev-Krofchak v Valcom Ltd*, 2010 ONCA 557, where he in turn summarises the House of Lords in *OBG Ltd v Allan*, [2007] UKHL 21, [2008] 1 AC 1:

> … intentional interference with economic relations requires that the defendant intend to cause loss to the plaintiff, either as an end in itself or as a means of, for example, enriching himself. If the loss suffered by the plaintiff is merely a foreseeable consequence of the defendant's actions, that is not enough. (para. 50)

[191] Again, I have found no fraud or false statements on the part of Tetra Tech; they were an enthusiastic expert for Yukon. That is not what this tort is for.

Claim of defamation

[192] Norcope claims it has been defamed by statements made by Mr. Murchison to the *Yukon News* in an article published on December 4, 2015. The article at issue was apparently written because of an interview given a few days earlier by Mr. Gonder about the project. The article says Mr. Gonder told their reporter the project had problems from the beginning because the apron was constructed on ground that was susceptible to seasonal frost and the concrete started to sink as soon as it was poured. He said Yukon knew about the problem and chose to ignore it. He is quoted as saying the government is trying to "cheat and cut corners". Apparently, Yukon initially refused to give information in response to Mr. Gonder's assertions, but then decided to respond. The report says Mr. Murchison denied Mr. Gonder's allegations. He admitted there was one area that was frost-susceptible, but the apron panels were designed to withstand seasonal movement without cracking. The soil conditions, he said, had nothing to do with the problems. He blamed Norcope for not building the panels properly. He said the concrete that was poured did not have the strength or durability needed. He said pouring concrete is like making a cake, the ingredients need to be mixed properly. Norcope, he said, did not do that. In response to that statement, Mr. Gonder is quoted as saying if the concrete mixture had been the problem, Yukon would have stopped work before completion. Mr. Murchison was asked why construction was not stopped. He replied problems are not always evident immediately. Mr. Murchison also said Norcope had been declared in default of its contract in August 2015 and Yukon was dealing with the bonding company.

[193] The defamation claim was made more than two years after the publication of the stories, so unless Norcope can show some republication, the claim falls outside of the limitation period. Norcope argues the results of a Google search constitute a republication. Mr. Gonder says it has made it difficult to obtain financing for projects he is working on. All I have by way of evidence about such Google republication is the testimony of Mr. Gonder. Without a screen shot or some in-court display of what Google shows, I have no reliable evidence about what is on Google about this action. This claim fails.

Yukon Claim for Punitive Damages

[194] Yukon claims punitive damages for Intact's claims of deceit and wrongdoing. The claim was made at the time of trial. The argument is that Intact knew from Mr. Gonder's evidence the concrete that was poured did not meet specifications but continued in its allegations against Yukon. Yukon says this intentional action does not befit a surety (*Whiten v Pilot Insurance Co*, 2002 SCC 18). Even if I accepted the late amendment of the pleadings on this claim, in my view, given the way the trial unfolded, any failed claims of deceit or fraud should be dealt with in costs.

Damages

[195] I was given quite different damage calculations. Mr. Schmidt, for Norcope, estimated the replacement of 12 panels at $773,930. No one challenged Mr. Schmidt's methodology or expertise in terms of how he determined this amount. However, since Norcope's responsibility is greater than simply 12 panels, these numbers are not helpful.

[196] Mr. Cumming said that 101 of the 257 panels needed to be replaced. Twenty-two panels required replacement because of improper construction or substandard workmanship. He reached that conclusion because those cracks appeared before the first exposure to freezing temperatures. He said the primary cause of cracking for the balance of the panels was the seasonal ground movement.

[197] Mr. Anderson provided three scenarios as follows:

- The replacement of 67 panels, load transfer restoration for less significant cracks, and joint sealant removal and replacement (Option 1) which totals $11,902,500 broken down as $7,935,000 for the work, $1,587,000 for the construction contingency and $2,380,500 for contingency to address safety issues (“FOD”).
- Full replacement of the apron but without any removal of frost susceptible materials (Option 2) which totals $11,911,200 broken down as $9,926,000 for the work and $1,985,200 for the construction contingency.
- Full replacement of the apron with removal of frost-susceptible materials in localized areas, installation of non-frost susceptible backfill, and installation of some drainage facilities which totals $13,460,400 (Option 3).

[198] For the first option, he has included a 30% FOD and for all he has included a 20% construction contingency. He offered a 1, 2 or 3% discount rate since some of the costs extend over the life of the apron.

[199] In a rebuttal report to the Associated Engineering Report, Mr. Cumming proposed a hybrid approach which consisted of:

- Load transfer restoration on 20 panels where there is cracking in the north and east parts of the apron.
- Full removal and replacement at areas unaffected by seasonal movement – 12 panels.
- Full removal with subdrainage in areas affected by seasonal movements in the south and westerly area of the apron.

[200] The basic principle for calculating an award of damages in a contract case is the expectancy principle "…that requires the party in breach to pay, as damages, an amount of money that will provide the victim of the breach with the financial equivalent of performance (McCamus, *The Law of Contracts* (Toronto: Irwin Law Inc, 2005) at 813).

[201] Of the three scenarios proposed by Associated Engineering and addressed by Mr. Cumming, the most extensive option cannot be considered as an appropriate option to assess damages. In 2014, Yukon contracted to build an apron that did not address the underlying soil conditions, so Yukon cannot be awarded costs based on an option that requires more extensive work by addressing those soil conditions. While their 2021 decision to choose the 'fool-proof' option probably makes sense generally, Yukon is not entitled to be compensated for that choice.

[202] That leaves Options 1 and 2 of Associated Engineering and Mr. Cumming's hybrid approach. The difference between Associated Engineering's Option 1 and Mr. Cumming on his approach is that Mr. Cumming's approach includes costs to treat the underlying soil, which cannot be part of the award. If you take away the value of that additional work, the differences between the amounts are:

- Associated uses $1,500 as the per panel cost to replace and Mr. Cumming uses $1,000. Associated uses $1,000 per panel for its full-replacement option. I also note that for the hybrid approach, Associated allows for the replacement of 10 panels in years 12 and 22, and 20 panels in year 27. The per unit cost for those replacements is $2,000. I assume that the per unit differences are based upon the economies achieved in replacing larger numbers or all the panels.
- Associated does replace 30 panels over the life of the apron.
- Associated adds a construction contingency and an operational risk contingency (FOD).
- If you remove the costs for subsoil treatment in the Cumming estimate, the Cumming's total is about $5,640,000.

[203] No one explained in detail why there needed to be a construction contingency applied, so any speculation on my part would not be appropriate. Also, I had no explanation about the difference in per panel replacement costs between Mr. Cumming and Associated Engineering. Mr. Cumming says that he used the estimated unit costs as presented in the Associated Engineering report, so I take from that he did not do an independent costing. As a result, I will take the numbers provided by Associated Engineering. If you remove the construction contingency from both Options 1 and 2, but retain the FOD contingency in Option 1, the amounts total $10,315,500 ($11,902,500-$1,587,000) for Option 1 and $9,926,000 for Option 2. It is marginal, but it is less expensive to replace the entire apron (without subsoil mitigation) than to do the repairs.

In the result, the damages that must be allocated between the three parties as set out above is $9,926,000.

[204] There is then a question of betterment since Yukon did have the use of the apron for eight years. The life span of an apron is around 25 years. That means that Yukon has had the use of the apron for just about 32% of the lifetime of an apron. Counsel for Yukon provided several cases on whether there should be a reduction in damages for betterment. As Yukon has had the use of an apron, I agree with those cases that have found it is appropriate to reduce the damages for this reason. The second question is how to value that use. Again, there is a difference in opinion as to how, but it seems that it is most logical to use the cost to replace the damage and deduct a percentage. Reducing the total damages of $9,926,000 by 32% the damages to be apportioned are $6,749,680. As Norcope has been found liable for 35% of the damages, they are responsible for $2,362,388 of the total cost.

Consequential Matters

[205] There are two Norcope claims that I have not addressed specifically, namely a claim for delay and a claim for negligent misrepresentations in the plans and specifications. My findings and the facts set out above make it unnecessary to deal with them. The claims are dismissed. If there are consequential matters to be addressed including the issue of costs, counsel are to contact the Trial Coordinator within 30 days of the issuance of this judgment.

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KENT J.