

Court of Queen's Bench of Alberta

Citation: Dow Chemical Canada ULC v NOVA Chemicals Corporation, 2018 ABQB 482

Date: 20180620
Docket: 0601 07921
Registry: Calgary

Between:

Dow Chemical Canada ULC and Dow Europe GmbH

Plaintiffs/Defendants by Counterclaim

- and -

NOVA Chemicals Corporation

Defendant/Plaintiff by Counterclaim

Restriction on Publication

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**Reasons for Judgment
of the
Honourable Madam Justice B.E. Romaine**

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DOW CLAIM

I. Overview

[1] Dow Chemical Canada ULC (Dow Canada) and NOVA Chemicals Corporation (Nova) jointly own one of the largest ethylene production facilities of its kind at Joffre, Alberta. This facility commenced operations in 2000, with Nova as both a joint venture partner and the operator of the facility. The dispute arises out of the operation of the facility. The parties have claimed and counterclaimed against each other for damages in the hundreds of millions of dollars. The matter was tried over a period of a year, with involvement of numerous counsel, voluminous documents and a large number of expert and lay witnesses.

[2] Dow alleges that Nova breached the joint venture agreements in six key ways:

1. Nova had a duty to run the facility at full rates when the Co-owners so nominated and it did not do so.
2. Nova had a duty to deliver to Dow a certain proportion of the facility's production; it did not do that and instead converted to itself some of Dow's share of the production through a scheme called "ethane allocation".
3. Nova failed in its duty to pay to Dow its share of infrastructure capital fees.
4. Nova took cleaner fuel for the production of ethylene for its own uses and charged Dow an average fuel price.
5. Nova had a duty to account to Dow for each individual co-product produced at the facility; it did not do so.
6. Although some of these obligations are characterized in the joint venture agreements as operator obligations, Nova was not acting as operator when it took steps that put it in breach. Nova as Co-owner of the facility caused Nova as operator to be in breach of the joint venture agreements.

[3] Nova submits that this is mainly a dispute over contractual interpretation, and that Dow's interpretation of the agreement is incorrect. Nova alleges that Dow is attempting to rewrite the agreements in a manner that would result in both a supply and a production guarantee that were not intended by the parties. Nova also submits that it had no choice but to respond to an unforeseen shortage of feedstock in operating the joint venture, and that it operated the facility in a safe and reasonable manner.

[4] The Dow plaintiffs seek damages in the Canadian dollar equivalent of \$822,671,670 USD, plus interest and certain declaratory relief. They also ask for provision to be made for the top-up of damages beyond December 31, 2012, which is when, by agreement of the parties, evidence of damages was curtailed to the date of judgment.

[5] Nova counterclaims for breach of contract, failure to pay and unjust enrichment, and seeks damages in the amounts of \$50,000,000 USD and \$719,260.40 CAD. Nova also seeks certain injunctive and declaratory relief. The Nova counterclaim is determined in the second part of this decision.

II. Introduction

[6] By agreement dated July 11, 1997, Nova and Union Carbide Canada Inc. (UCC) entered into a joint venture to build and operate an ethylene plant, which the parties referred to as E3 (hereafter, E3 or the Plant). When E3 was built, it was the largest single-train ethane cracker in the world.

[7] An ethylene plant, or “cracker,” produces ethylene, a hydrocarbon mixture and other by-products, primarily, in this case, using ethane as a feedstock. Ethylene is an essential element in many plastic and petrochemical products.

[8] This lawsuit involves the operation of E3 and spans the years between 1997, when the joint venture was formed, until the end of 2012, when the parties to the litigation have agreed to cut off their evidence of operations for the purposes of this action.

[9] The construction of E3 was part of a larger project referred to as the “J200 Project”, which included petrochemical facilities both on and off Nova’s massive Joffre petrochemical site near Red Deer, Alberta (the Joffre Site) where Nova had already built two smaller ethane crackers, E1 and E2, and other facilities described later in this decision.

[10] In August 1999, the Dow Chemical Company (TDCC) announced that it was acquiring Union Carbide Corporation (UC). TDCC is the parent company of Dow Canada and Dow Europe GmbH (Dow Europe). UC is the parent company of UCC.

[11] In May 2001, as a step in the merger of TDCC and UC, UCC assigned its rights to the production of E3 to Union Carbide (Europe) S.A. (UCESA). In October 2001, UCC amalgamated with TDCC’s Canadian operations, becoming Dow Canada. At the same time, UCESA merged with Dow’s European corporate entity, becoming Dow Europe. Thus Dow Canada is now a Co-owner of E3 with Nova, and Dow Europe is entitled to Dow Canada’s share of ethylene and other products produced at E3.

[12] E3 commenced operations in July 2001. From early 2001, when Dow began its involvement with E3, problems arose between the two Co-owners. Nova is responsible under the joint venture agreement for sourcing ethane as a feedstock for E3 (the Pool or ethane Pool). Nova decided that it could not share information about the Pool as it was required to do under the joint venture agreements because Dow, unlike UCC, was competing with Nova to obtain ethane for its operations in Alberta. Dow was not in a position to comply with the contractual requirement that only Nova be allowed to source ethane contracts in the E3 “Pool area”, since, unlike UCC, it had been in the business of supplying ethane as feedstock to other facilities it owned in Alberta before the merger.

[13] In addition to these threshold issues, Nova very shortly implemented a scheme called “ethane allocation”, which limited Dow’s share of ethylene produced by E3 on the basis that Nova had insufficient ethane to meet Joffre Site “demand” for ethane. Nova submits that this scheme is authorized under the joint venture agreements; Dow submits that it is not, and that, at any rate, it was unnecessary, was misrepresented to Dow, and is a breach of Nova’s responsibilities as Operator of E3.

[14] The parties disagree about what E3 was capable of producing, with Dow alleging that Nova failed to run the Plant at maximum capability because it did not need the ethylene for itself and that it sought to limit Dow as its major competitor. Nova submits that the Plant’s capacity to produce was limited by various factors.

[15] Dow sues for damages in the amount of \$678,754,502 for its main claims of losses due to ethane allocation and failure to optimize E3's performance, and \$116,740,202 relating to other claims and certain adjustments, \$27,176,966 relating to an infrastructure revenue claim, and interest. Dow also applies for provision to be made for the calculation of remaining damages from December 31, 2012 until the date of these reasons. Finally, Dow seeks the removal of Nova as operator of E3 and such consequential relief as follows, including the appointment of an interim receiver or monitor. Nova defends on the basis of contractual authority and necessity, and relies on the limitation of liability provisions of the joint venture contracts and statutory limitation provisions. Nova counterclaims in the amount of \$50,000,000 USD and \$719,260.40 CAD on the basis of breach of contract, failure to pay, and unjust enrichment. Nova also seeks specific performance or a mandatory injunction, and in the alternative, declarative relief.

[16] This was a seven-month trial with numerous witnesses and a huge production of documents. Twenty-one counsel from six law firms participated in the trial in various capacities. The evidence primarily involved the period of time from February 2001 until the end of 2012 and included operational data for each of the three ethylene crackers on the Joffre Site during that period. Evidence with respect to the historical context of the joint venture from 1998 until E3 was completed was also presented.

[17] The two main issues with respect to the Dow claim are:

- a) On the evidence, did Nova convert to its own use part of the ethylene produced at E3 that was contractually owned by the plaintiffs?

Nova concedes that it did take more than its ethylene production proportion of ethylene from E3, and the amount is not in issue. Nova submits that it was justified and had authority to do so.

- b) Did Nova fail to run E3 to its productive capacity, and was that required by the Joint Venture agreements?

Nova submits that capacity was restrained by uncommon mechanical issues, but at any rate, there was no contractual obligation to run that way. It was only an objective.

[18] The issues with respect to the Nova counterclaim are identified in the second part of this decision.

III. Detailed Submissions of the Parties with respect to the Dow Claim

[19] Dow alleges breach of contract with respect to the E3 joint venture agreements. It alleges that Nova made decisions based on its own corporate needs and strategies, disregarding the rights of Dow and treating E3 as if it was a wholly-owned Nova plant and not owned jointly with Dow.

[20] Dow submits that Nova, through ethane allocation, took part of the ethylene and other products produced at E3 that belonged to Dow under the terms of the joint venture for its own use. Prior to June 30, 2004, Dow's ownership proportion of E3 (defined in the joint venture agreements as Ethylene Production Proportion or EPP) was 44.484% and Nova's EPP was 55.516%. Thereafter, Dow exercised an option that resulted in Dow's EPP increasing, and, as a

result, each Co-owner's EPP was 50%. Dow submits that Nova converted some of Dow's share of E3 production for its own use through ethane allocation, referred to as the Allocation Claim.

[21] Dow also submits that Nova failed to run E3 at full rates as it had a duty to do under the joint venture agreements and as both Co-owners have consistently requested and nominated. Its resulting claim for loss is referred to as the Optimization Claim.

[22] The specifics of Dow's claims in respect to these allegations are as follows:

- a) Nova's imposition of ethane allocation has been:
 - (i) a repeated course of conduct in the nature of conversion; and
 - (ii) a breach of section 3.02(a) of the Plant Co-Owners Agreement (COA) and section 13.2 of the E3 Operating and Services Agreement (OSA), both of which mandate that Dow receive its EPP of the products produced at E3.
- b) Nova's failure to run E3 at full rates has been:
 - (i) a breach of its duties as agent to meet the Co-owners' nominations for ethylene; and
 - (ii) a breach of sections 4.3(b), 4.4 (a) and 7.3 of the OSA.

[23] Dow also submits that Nova, as an E3 Co-owner, has breached section 3.2(c) of the OSA and section 3.11 of the COA.

[24] In addition, Dow submits Nova failed in its duty:

- a) to pay Dow its share of the infrastructure capital fees;
- b) to deliver aggregate Pool ethane to E3 (and by using cleaner incoming ethane for use at its plant E2, using ethane with more CO₂ at E3, and charging Dow the average Pool price);
- c) to account to Dow for each individual co-product produced at E3; and
- d) to act appropriately as Operator when it took steps that put it in breach (recognizing that some of these obligations are designated as "Operator obligations"). In other words, Dow submits that Nova as Co-owner caused Nova as Operator to be in breach of its duties.

[25] Nova submits that the Dow plaintiffs now attempt to revise and rewrite the commercial bargain in their interpretation of the joint venture agreements. Specifically, Nova says Dow's interpretation:

- a) requires a supply guarantee;
- b) ignores the Ethane Pooling Principles;
- c) results in a production guarantee; and
- d) leads to unlimited liability of Nova.

[26] Nova submits that an ethane shortage justifies its development and use of ethane allocation, and that Dow knew about ethane allocation as it was occurring and failed to object to it. Further, Nova submits that it operated E3 to its productive capability, subject to mechanical issues that constrained production.

[27] Nova submits that even if it is found to have breached the provisions of the joint venture agreements, the Dow plaintiffs' damages claim is fundamentally flawed because:

- a) the Operator is not liable for any damages barring a finding of gross negligence or wilful misconduct, and even then, any claim for loss of products, loss of profits and loss of production are barred;
- b) the Allocation and Optimization Claims are limitations-barred prior to June 29, 2004, and certain ancillary claims are barred in their entirety;
- c) even if damages are not entirely barred, the Dow plaintiffs are not entitled to the damages they have claimed and have failed to prove their alleged losses:
 - (i) Dow Canada has no entitlement to E3 ethylene;
 - (ii) the plaintiffs have not assessed damages based on the existence of separate legal entities acting in their own rational interests;
 - (i) TDCC's actions, not Nova's, caused many of the plaintiffs' losses;
 - (ii) the Dow plaintiffs have not proven many of their losses:
 - (B) unlimited demand is a fallacy;
 - (C) the Asset Utilization Database (AUDB) was not proven and is not reliable; and
 - (D) raw material losses recorded in the AUDB are not evidence of lost production due to lack of E3 ethylene; and
 - (iii) the Dow plaintiffs failed to mitigate their losses; and
- d) Dow's damages expert improperly relied on unproven facts and made methodological errors in assessing damages.

[28] The specifics of Nova's counterclaim will be dealt with later in this decision.

IV. Facts

[29] The facts as I have found them are set out both in Appendix A and in my analyses of the issues. Where there is a discrepancy between the facts set out in the Appendix A and other parts of this decision, the facts set out in the Appendix A prevail, unless indicated otherwise. Appendix B sets out an Acronym Glossary for ease of reference.

V. Principles of Contractual Interpretation

[30] The Alberta Court of Appeal has recently set out a useful review of the applicable principles of contractual interpretation in *IFP Technologies (Canada) Inc v EnCana Midstream and Marketing*, 2017 ABCA 157 at paras 79-89, leave to appeal to SCC refused, 37712 (April 5, 2018).

[31] The goal of contractual interpretation is to determine the objective intent of the parties at the time the contract was made through the application of legal principles of interpretation: *Sattva Capital Corp v Creston Moly Corp*, 2014 SCC 53 at para 49. To this end, "the exercise is not to determine what the parties subjectively intended but what a reasonable person would

objectively have understood from the words of the document read as a whole and from the factual matrix”: Geoff R Hall, *Canadian Contractual Interpretation Law*, 2nd ed (Markham: LexisNexis, 2012) at 33. Accordingly, disputed contractual terms must be interpreted, not in isolation, but in light of the contract as a whole: *Tercon Contractors Ltd v British Columbia (Transportation and Highways)*, 2010 SCC 4 at para 64.

[32] In *Sattva*, the Chief Justice commented that courts ought to “have regard for the surrounding circumstances of the contract – often referred to as the factual matrix – when interpreting a written contract”: at para 46. Further “ascertaining contractual intention can be difficult when looking at words on their own, because words alone do not have an immutable or absolute meaning”: at para 47.

[33] Evidence of surrounding circumstances is not used to add to, subtract from, vary or contradict a contract, but as an objective interpretive aid to determine the meaning of the words the parties used: *Sattva* at paras 59-61. As stated in *IFP* at para 81:

[While the surrounding circumstances] cannot be used to craft a new agreement, a trial judge must consider [them] to ensure the written words of the contract are not looked at in isolation or divorced from the background context against which the words were chosen. The goal is to deepen the ... understanding of the mutual and objective intentions of the parties as expressed in the words of the contract.

[34] A trial judge must consider the relevant surrounding circumstances even in the absence of ambiguity: *IFP* at para 82 [citations omitted]. Surrounding circumstances are explained in *IFP* at para 83:

... As to what is meant by surrounding circumstances, this consists of “objective evidence of the background facts at the time of the execution of the contract ... that is, knowledge that was or reasonably ought to have been within the knowledge of both parties at or before the date of contracting”: *Sattva, supra* at para 58. Examples of relevant background facts include: (1) the genesis, aim or purpose of the contract; (2) the nature of the relationship created by the contract; and (3) the nature or custom of the market or industry in which the contract was executed: *Sattva, supra* paras 47-48; *Geoffrey L. Moore Realty Inc. v The Manitoba Motor League*, 2003 MBCA 71 at para 15, 173 Man R (2d) 300; *King v Operating Engineers Training Institute of Manitoba Inc.*, 2011 MBCA 80 at para 72, 270 Man R (2d) 63; [*Ledcor Construction Ltd. v Northbridge Indemnity Insurance Co.*, [2016 SCC 37] at paras 30, 106.

[35] The Chief Justice further commented at para 83 of *IFP* that surrounding circumstances can include “absolutely anything which would have affected the way in which the language of the document would have been understood by a reasonable man”, citing *Sattva* at para 58, where Lord Hoffman is quoted in *Investors Compensation Scheme Ltd v West Bromich Building Society*, [1998] 1 WLR 896 at 913 (UKHL).

[36] Evidence of negotiations is not itself admissible as part of the factual matrix: Hall at 29; *Keephills Aggregate Company Limited v Riverview Properties Inc*, 2011 ABCA 101 at para 13. Nor generally are prior drafts of an agreement: *Wesbell Networks Inc (Receiver of) v Bell Canada*, 2015 ONCA 33 at para 13. As stated in *IFP* at para 85:

...[E]vidence of negotiations is relevant insofar as that evidence *shows* the factual matrix, for example by helping to explain the genesis and aim of the contract: Hall, *supra* at 30, 80. Moreover, written evidence of those negotiations is far more objective evidence of the parties' intentions than after-the-fact evidence from opposing parties about oral statements made during negotiations. [emphasis in original]

[37] With respect to the role of parol evidence in resolving ambiguity, the Chief Justice commented at paras 86-87 of *IFP*:

Further, where a contract itself is ambiguous, extrinsic evidence, that is parol evidence, may be admitted to resolve the ambiguity. ... In the face of ambiguity, the interpretation promoting business efficacy is to be preferred so long as it is supported by the text: ...

Mere difficulty in interpreting a contract is not the same as ambiguity: ... A contract is ambiguous when the words are "reasonably susceptible of more than one meaning" ... An ambiguity in the contract also allows courts to consider evidence of the parties' subsequent conduct post-contract: ... But it must be understood that even under this ambiguity exception to the parol evidence rule, there are limitations as to what parol evidence is admissible. In this regard, evidence as to the parties' subjective intentions is generally inadmissible. [citations omitted; emphasis added]

[38] Commercial contracts should be interpreted in accordance with sound commercial principles and good business sense: John D McCamus, *The Law of Contracts*, 2nd ed (Toronto: Irwin Law, 2012) at 763-766. The standard imposed by a requirement of commercial reasonableness was considered in Hall at 245:

...Clearly it is highly contextual, dependent upon the relevant circumstances and the facts of the case. This point was well expressed in a labour arbitration decision in the following terms:

...What it means is efforts that are reasonable in the circumstances all things considered. What is reasonable in the circumstances will obviously depend on the facts of particular case.

The standard of commercially reasonable efforts does not oblige a party to exhaust all possible means of fulfilling the condition, nor to undertake steps which are expensive, time consuming or commercially irresponsible.

[39] Provisions should not read in isolation, but in harmony with the agreement as a whole: *McClelland and Stewart Limited v The Mutual Life Assurance Company of Canada*, [1981] 2 SCR 6.

[40] Generally, words should be given their ordinary and literal meaning: *Indian Molybdenum Ltd v The King*, [1951] SCR viii. However, if there are alternatives, the court should reject an interpretation or a literal meaning that would make the provision or the agreement ineffective, superfluous, absurd, unjust, commercially unreasonable, or destructive of the commercial objective of the agreement: *Consolidated-Bathurst Export Ltd v Mutual Boiler & Machinery Insurance Co*, [1980] 1 SCR 888; *Scanlon v Castlepoint Development Corp* (1992), 11 OR (3d)

744 (CA), leave to appeal to SCC refused, 23427 (August 5, 1993); *Aita v Silverstone Towers Ltd* (1978), 19 OR (2d) 681 (CA).

VI. Allocation Claim

A. Factual Context

[41] There is no dispute that Nova was concerned at the senior management level about the merger of Dow and UCC. Nova management was particularly concerned about the prospect of sharing information about E3 with the only other major purchaser of ethane in Alberta, which was also its major competitor. It took action shortly after the announcement of the merger in August 1999 to ensure that information about ethane supply contracts, previously available to UCC under the terms of the E3 joint venture agreements, not be made available to Dow, and it terminated meetings of the feedstock subcommittee set up under the agreements. It filed objections to the merger with the US Federal Trade Commission and the Canadian Competition Tribunal, submitting unsuccessfully that Dow should be required to divest its interest in E3 as a condition of the merger.

[42] As early as the spring of 2000, Nova management was discussing options to alleviate its competition concerns. Notes from a meeting dated February 14, 2001 of members of a small working group formed by Nova in response to the announcement of the merger indicate that Nova's "wish list" included minimizing the supply of ethylene to Dow, taking Dow out of E3, and increasing Nova autonomy in managing the ethane Pool.

[43] The evidence establishes that in late 2000 or early 2001, Allan Broenink, at the time a manager of the Ethylene Business Team (EBT), was the originator of the concept of ethane allocation.

[44] As described in the Factual Overview and Chronology in Appendix A, Mr. Broenink and members of the EBT first checked the E3 joint venture agreements to see if there was any provision regarding the distribution of ethane to E3 in periods of perceived shortfall, and found nothing. Mr. Broenink found justification for the concept in provisions set out in a 1996 agreement called the Post-1998 Agreement among Cost-of-Service Customers of E2. He conceded that, in formulating the concept, it was his responsibility to produce the best commercial result possible for Nova. He also acknowledged that, although he was aware of the provisions of the OSA that would have allowed Nova to declare an insufficient supply of ethane as an event of *force majeure*, Nova senior management had directed that this provision not be used for a shortage of ethane, as it would require disclosure to the public investment markets.

[45] It is also clear from the evidence that, at the time, Nova knew that it would not require more ethylene than it was able to produce at the Joffre Site until the end of 2001.

[46] Nova now finds justification for ethane allocation in section 4.6 of the OSA, which will be discussed later in this decision.

[47] The first clear discussion of ethane allocation with Dow occurred on June 2, 2001. Although the Joint Venture Management Committee (the E3 Management Committee) met on June 1, 2001, ethane allocation was not on the agenda. Instead, Mr. Broenink and George Pan, Nova's Director, Ethylene Business, met with Hugh Fergusson and Steve Williams of Dow in a separate meeting.

[48] Mr. Fergusson and Mr. Williams had become involved in Dow's Alberta operations through the UCC/Dow merger earlier that year and were Dow's representatives on the E3 Management Committee. Mr. Fergusson, who became Vice President, Hydrocarbon and Energy for Dow in Canada, joined the committee in February 2001, and Mr. Williams came on board later.

[49] Mr. Broenink's presentation to Mr. Ferguson and Mr. Williams indicated that the ethane supply to the Joffre Pool had been less than actual demand for several months. This was inaccurate, in that a recent internal Nova presentation had confirmed that Nova's share of ethylene from the Joffre Site was higher than its expected demand.

[50] The presentation stated that E1 was then not operating due to scheduled maintenance. If E1 started up on June 1, 2001, the Nova people indicated that, "Joffre would be in immediate ethane allocation".

[51] Nova proposed that it would defer the E1 startup and "deem" ethane allocation (and hence, ethylene production) as if E1 had started up on June 1, giving Nova and Dow percentages in production corresponding to what was defined as "Feedstock Fractions" in the joint venture agreements. "Feedstock Fractions" are the amounts that the Co-owners are to pay for their share of the Pool ethane acquired by Nova. They are a lower percent than the EPP. Thus, during this period of deemed ethane allocation, Dow would obtain less ethylene from the joint venture than it would be entitled to, given its EPP.

[52] Mr. Fergusson did not recall this meeting. He testified that the main focus of the E3 Management Committee's activity in the spring and summer of 2001 was ensuring that E3 would be up and running and achieving commercial operation. He was aware of Nova indications that it was experiencing an ethane shortage, guessing that he first became aware of that in the summer of 2001, following E3's rate trial. He recalled being told by Nova that this was a temporary situation. He understood that, under the protocol being proposed, each of E1, E2 and E3 "would share in the pain." He understood that this would have some impact on the amount of ethylene Dow would receive, that it would lose ethylene pounds at E2 and E3, but that there would be no economic consequences for Dow at E1.

[53] For the period that E1 was offline in the spring and summer of 2001, Mr. Fergusson accepted Nova's recommendation as outlined in the presentation.

[54] Mr. Broenink conceded that there was no disclosure during the meeting of the economic impact of deemed ethane allocation on Nova as opposed to Dow. He acknowledged that he was not aware of any occasion on which Nova disclosed to Dow that, under ethane allocation, Dow was receiving a different percentage of its demand for ethylene than Nova was. Nova never disclosed the extent to which its internal or external demands were met during periods of ethane allocation.

[55] On June 4, 2001, Mr. Broenink reported in an internal newsletter that Nova had initiated ethane allocation with Dow and that this allowed Nova "to capture about 30,000,000 pounds of ethylene previously assumed [by Dow] in June". This refers to the reduced amount of ethylene delivered to Dow as a result of deemed ethane allocation.

[56] The temporary deemed ethane allocation was only supposed to extend to the end of the E1 outage. E1 went back on-line on September 10, 2001, but despite this, Nova imposed a new form of ethane allocation on Dow until February 2002. In mid-September, all three plants were

operational, and Nova was supposedly allocating ethane to each plant, as opposed to the earlier version of ethane allocation that distributed ethylene as though there had been a deemed allocation of ethane at E1. No one at Nova sought agreement from Dow on this form of ethane allocation, but Mr. Broenink informed Margaret Eastman of Dow in September 2001 that ethane allocation was continuing.

[57] Nova concedes that, despite its representations to Dow that ethane was being allocated to each plant, the scheme that commenced after September 10, 2001 did not involve any actual allocation of ethane to the three plants. Ethane was only “notionally divided”. In reality, Nova regularly allocated more ethane to E3, and then took part of Dow’s EPP of the ethylene actually produced at E3.

[58] The reason for actually allocating more ethane to E3 is clear: E3 was the newest, most efficient cracker and could produce more ethylene at a lower cost.

[59] On December 18, 2001, Mr. Fergusson questioned why an E3 daily status update that he had received had reported that E3’s production for that day was 81.4% of capacity, and that E3’s “current constraints” were described in the document as a “business plan”. Mr. Fergusson noted that E3 was running at about 600 million pounds per year below capability and “unless I misunderstand the situation this shortfall is entirely the result of a shortage of ethane”. Mr. Pan of Nova responded that he agreed that “business plan” was too broad a description to explain E3’s operating rate versus capability, and the description would be changed to “ethane supply”.

[60] It was Mr. Broenink’s responsibility, as manager of the EBT, to decide whether or not to impose ethane allocation, with the assistance of two other members of the team. Mr. Broenink decided that if current ethane supply was less than 165,000 barrels a day, the ethane nameplate capacity of the three crackers exclusive of the E1 Toll, ethane allocation would be imposed. The E1Toll was an agreement whereby up to 600 million pounds of Dow ethane could be processed into ethylene through E1. The term of the agreement was from January 1, 1999 to December 31, 2008.

[61] The evidence establishes that no one at Nova told Dow prior to the fall of 2004, at an E3 Management Committee meeting or elsewhere, that when Nova imposed ethane allocation, each cracker at the Joffre Site did not in fact receive its *pro rata* share of supply based on nameplate.

[62] In August 2002, Mr. Pan sent Mr. Fergusson a draft agreement called the “Joffre Site Agreement”, and a draft amendment to the existing E2 optimization agreement among Dow, Nova and others, both prepared by Mr. Broenink. In addition to referring to Nova’s proposal to use propane as an alternate fuel for E3, the draft agreements provided that all feedstock acquired for the Joffre Site would be pooled, and each cracker would be allocated a portion of the Pool based on ethane nameplate or Feedstock Fractions. It also provided that all ethylene and co-products produced at the Joffre Site would be pooled and allocated among the three crackers based on the Feedstock Fractions, which was basically the ethane allocation scheme that Nova had already been implementing. The amendment referenced to this the idea as “site optimization”.

[63] Mr. Fergusson told Mr. Pan and Graham Flint, Nova’s Vice President, Western Operations, that this proposal was not something Dow would agree to. I accept that Mr. Fergusson did not understand that Nova was already implementing “site optimization” through ethane allocation. Although Dow declined to participate in propane use and declined the site

optimization amendments, Nova proceeded with the use of propane as an alternate fuel and continued to impose ethane allocation.

[64] Mr. Fergusson testified that, from time to time, Nova would talk about optimizing the Joffre Site, the theory being that, regardless of ownership, Nova would manage the three crackers however it saw fit and that E3 would be part of the site as a whole. Whenever this was mentioned by Nova, he “pushed back as hard as [he] could”. Dow’s view was that E3 was a stand-alone facility and it made no sense to combine the operations of E3, the “world’s greatest, newest ethane cracker”, with E1, a plant that was 30 years old.

[65] Mr. Fergusson wrote to Nova management in September and October 2002, pointing out that “if there is a shortfall of ethane ... this would be an event of *force majeure*”. He wrote again in January 2003, asserting that Nova’s obligation to maximize production to meet demand at E3 was completely clear, and that Nova’s other obligations were not Dow’s concern. He noted that what was happening was in fundamental breach of Nova’s obligations.

[66] Mr. Flint and Rick Henson, Vice President, Petrochemicals, were aware that Dow was opposed to ethane allocation. When Chris Foy, Nova’s “resident expert” on the E3 joint venture agreements, spoke to them in October 2003 about obtaining Dow’s consent to ethane allocation, they indicated that there was no point as Dow would not enter into such an agreement.

[67] During the years of his tenure as Vice President of Dow, Mr. Fergusson attempted to negotiate a manufacturing joint venture with Nova, under which each of Nova and Dow would be responsible for supplying their *pro rata* share of ethane feedstock to E3, thus resolving Nova’s allegations of a shortage of feedstock.

[68] In April 2004, at a meeting of senior executives of Dow and Nova, Mr. Flint made a presentation that included references to “[the] Joffre Pool developed to ensure equitable sharing between [Nova] and UCC of ethane supply risk/cost”. The presentation noted that there would be no ethane available to increase E3’s capacity as anticipated by the Capacity Optimization Program (COP) undertaken in 2002 to improve E3’s performance until “Base Ethane Supply” had been filled.

[69] The presentation included a pictorial explanation to Dow executives of ethane allocation. Nova did not explain that it was actually allocating more ethane than disclosed to E3 and taking a larger share of the ethylene produced at E3 for itself. The presentation purported to show the “allocated share” of ethane for each plant, and that “such methodology ensures that each of the ethylene plants receives the same percentage of available ethane as they have paid fixed costs for”. Nova was not imposing ethane allocation at the time of the presentation.

[70] Mr. Ranesh Ramachandran became President of Dow Canada and head of hydrocarbons in May or June 2004, commuting to Calgary from Houston until September 2004.

[71] Mr. Ramachandran said that his expectation when he became President of Dow Canada was that E3’s capacity was [REDACTED] billion pounds, with Dow entitled to half of the ethylene output. Dow almost always nominated 100% of its share of the output. He became concerned when he discovered that E3 was not producing as much ethylene as was expected. He first inquired internally about this at Dow and then raised the issue with Nova.

[72] Mr. Ramachandran testified that he was given many reasons why E3 was not running as hard as it should, but the predominant one was that Nova did not have enough ethane to run through E3. Mr. Ramchandran was referred to a Nova nomination email dated June 30, 2004

directed to Ms. Eastman. It confirmed that Nova was nominating 100% of its share of E3 production for July 2004. It also noted that “[b]ased on ethane supply forecasts, ethane allocation will be in effect in July, 2004”.

[73] Mr. Ramachandran testified that this was the first time that he was exposed to the term “ethane allocation”. He tried to find out what it meant. He testified that the Dow employees were a little confused by the term, but indicated that it was probably related to the fact that Nova did not have enough ethane to run E3 at its full rate, so there must be some sort of allocation. Different people were telling him different things.

[74] On July 21, 2004, Mr. Ramachandran emailed a list of issues and questions to Val Mirosh of Nova for the purpose of developing a position paper on what was happening. His questions included the following:

- a) During periods when the Pool does not have sufficient ethane to supply capacity requirements for each of E1, E2 and E3, on what basis is the available ethane allocated among those three plants? What other factors (other than scheduled shutdowns for maintenance and other work), including contractual provisions that bind Nova, affect decisions about the rates at which to operate manufacturing units?
- b) Having exercised the option on the seventh furnace, Dow’s Ethylene Production Proportion (being its entitlement to a share of all products of E3) is now 50%. Are there other factors that Nova believes affect Dow’s entitlement to E3 outputs (ethylene and other products)? If so, what are they and pursuant to what provision of what agreement or instrument binding on Dow do they operate?
- c) In the case of (a), are the applicable decisions sanctioned pursuant to a provision of an agreement to which Dow or Union Carbide is a party or some other instrument that is binding on Dow? If so please describe ...

[75] Ms. Eastman sent Dow’s August 2004 nomination for E3 ethylene in a format different from prior nominations, nominating “the greater of [Dow’s] 50% share of E3 nameplate capacity or its 50% share of E3 actual production”.

[76] Mr. Broenink responded that, due to “insufficient ethane feedstock in the pool to meet site demands,” Dow would receive “the equivalent volume of ethylene derived from its 25.578% share of the available ethane in the pool ...” Mr. Broenink conceded that what he meant by site demands was 165,000 barrels a day, a number derived from the nameplate capacities of the three crackers minus the E1 Toll, and not related to actual demand at all.

[77] Mr. Ramachandran was unsatisfied with Mr. Broenink’s letter and he, Mr. Fergusson and Nova management including Mr. Flint met on August 11, 2004.

[78] Mr. Flint testified that he attempted to describe how ethane allocation worked in an email dated August 12, 2004.

[79] The email referred to “requirements of E1 and E2”, which Mr. Flint conceded did not mean actual requirements but hypothetical requirements if E1 and E2 were filled to their nameplate.

[80] He also conceded that when he referred to demands for ethylene production, he meant capacity. In the email, he indicated that each plant received the same percentage of available

ethane as their percentage paid for fixed costs. Mr. Flint conceded that this was not accurate, that Nova was actually taking ethane from E1 and E2 and using it as E3 ethane.

[81] Mr. Ramachandran completely disagreed with the concept as it was described to him. He tried to resolve the issue by suggesting alternatives, such as Dow paying a higher fixed cost percentage, but received a response from Mr. Flint that, for the first time, referred to section 4.6 of the OSA as a rationale for ethane allocation. That section, discussed later in this decision, includes an acknowledgement that the Operator will provide Services to all facilities on the Joffre Site. Mr. Flint's response, included the following comments:

...

Ethane supply is being allocated to each of the Joffre assets in accordance with the Operator's obligations to provide services to all facilities on the Joffre Site, including E1 & E2, without discrimination on the basis of ownership of any one particular manufacturing unit at the Site.

I have attempted to point out that allocating ethane in times of shortage on a preferential basis to E3 results in the other plants at Joffre being short of ethane supply to meet their ethane demands.

...

Preferentially supplying ethane to E3 would breach the Operator's obligation to not discriminate on the basis of ownership but more importantly effect NOVA's ability to supply its third party and internal ethylene supply commitments.

[82] Mr. Flint conceded that the reference to "demands" in the second excerpted paragraph was "not quite true", as it was actually a reference to nameplate capacity. He also acknowledged that he did not disclose to Mr. Ramachandran that Nova was not supplying ethane to each cracker according to the Feedstock Fractions but instead was supplying more ethane to E3.

[83] Mr. Flint also acknowledged that, despite the reference to the reason why ethane was not allocated preferentially to E3, preferential allocation is what Nova had actually been doing. He conceded that, at time of ethane allocation, Nova considered itself free to supply ethane to any of the three crackers, and generally decided to put more in E3. Thus, Nova was receiving the benefit of a greater portion of E3's ethylene than its contractual EPP most of the time, more than it had nominated, and Dow was receiving less than its EPP most of the time, less than it had nominated.

[84] Mr. Ramachandran attempted to find a solution to the issue, and also expressed concern over Nova's failure to run E3 at maximum rates. Various offers and counter-offers were made throughout the fall of 2004. In September, Nova made a streaming proposal to Dow that Dow found to be unacceptable. Mr. Fergusson provided a critique of the proposal, commenting that the strongest argument Dow had was non-performance under the OSA, but that litigation would take a long time to resolve in a booming market for ethylene. Mr. Ramachandran agreed.

[85] He reported internally in November 2004 that he had learned that Nova was taking the position that, even if there was more ethylene made in E3, Dow was not entitled to 50% of the E3 output. Mr. Ramachandran said that Dow made it clear that it disagreed with what Nova had been doing, and the business solution was to bring more ethane into the system. He was still hopeful that, through the use of streaming and other mechanisms, litigation could be avoided.

[86] On November 22, 2004, Nova sent Mr. Ramachandran a draft letter of intent to address the supply of ethane issue. The letter again included a provision that purported to “formally” adopt the ethane allocation protocol as a means of allocating ethylene production.

[87] Mr. Ramachandran told Nova that it was silly to try to back-door something into an agreement on an issue about which they had a fundamental difference of opinion.

[88] In May 2005, however, Dow agreed that between May 1, 2005 and October 31, 2006, it would accept an ethane allocation protocol during periods of time in which there was an insufficient supply of ethane from the Pool to meet Pool user demand as a condition of a streaming agreement. However, Nova actually imposed ethane allocation during the term of this agreement if available ethane supply was less than the nameplate capacity of the three crackers less the Dow toll, rather than on the basis of the demands of the pool users.

[89] At an October 2005 meeting of senior representatives of Dow and Nova, Dow again told Nova that the allocation protocol was not in accordance with the E3 joint venture agreements and that 50% of any ethylene and co-products produced at E3 during these periods belonged to Dow. Nova reiterated that it was allowed to allocate ethylene from E3 in the manner in which it did. The parties agreed that Dow would take the lead in designing a mechanism to stream additional ethane to E3.

[90] The evidence is clear that in January 2008, Nova recognized that Joffre’s Site capacity was substantially higher than Nova’s ethylene demand, and that, to meet such demands, Nova could run E3 and E2 to capacity and limit E1 to a low level of production. It also recognized that, if it filled E3 up to its full capacity of █████BPY and delivered half of the ethylene produced to Dow, Dow would be balanced in its ethylene demand and would not need to use the expensive E1 Toll.

[91] In December 2008, Mr. Broenink informed Dow that demand at the Joffre Site had dropped dramatically and would not recover until sometime in 2009. As “Operator”, he indicated that Nova would reject a “significant portion of December’s ethane supply” to reduce working capital. However, he advised that Nova was forecasting a potential shortage of ethane “to meet Joffre demand” in 2009, and ethane allocation may be required later in 2009. This was despite advice from David Tulk, a Nova employee who was at that point purporting to act as Operator. Mr. Tulk’s initial concerns were that he was “not comfortable with the risk” Nova was taking with this plan, as “[o]nce a barrel is rejected, it is gone forever” and that the second and third quarters of 2009 would be very challenging. Dow objected to this plan, indicating that Nova had no authority to do this without the prior consent of the E3 Management Committee, but Nova proceeded with the plan.

B. Parties and Agreements – Summary of Key Provisions

[92] The E3 joint venture is governed by 11 project agreements, all dated July 11, 1997. The original signatories are Nova (then Nova Chemicals Ltd.) and UCC. All of the contracts relate to E3; matters relating to E1 and E2 are not included in the contracts except in a limited way.

[93] On May 1, 1998, UCC assigned to UCESA its interest in the “Inputs” and “Outputs” of E3, and the rights and obligations in and to the same. Since October 2001, the plaintiff Dow Canada has been the legal successor to UCC and the plaintiff Dow Europe has been the legal successor to UCESA.

[94] The two agreements that are the most relevant to this action are the COA and the OSA.

[95] Under the COA, each Co-owner owns the “Products,” being the ethylene and other products produced by E3, in quantities pro rata to its respective Ethylene Production Proportion (EPP). Section 3.02 provides that the Co-owners agree to design, construct and operate the Plant with the objective of meeting the reasonable requirements of the Co-owners and that, except as otherwise agreed by a Co-owner with respect to its entitlement, each Co-owner shall be entitled to receive all Products produced at the Plant in quantities pro rata to its respective EPP.

[96] The COA provides for the establishment of an E3 Management Committee to “oversee, supervise and direct, on behalf of the Co-owners, the ownership, management and use of the Plant”. The COA provides that the E3 Management Committee decisions require the “unanimous consent of the Co-owners at any meeting or by way of a resolution in writing”.

[97] The OSA provides that, among other things, unanimous consent of the E3 Management Committee is required before there may be any curtailment of E3’s production.

[98] Section 4.1 of the OSA provides for the appointment of Nova as Operator with full power and authority to act as the sole and exclusive agent of the Co-owners “for the purposes necessary to carry out its duties and obligations under [the OSA] as the agent of the Co-owners, in accordance with, and subject to, the provisions of [the OSA]” and the direction of the E3 Management Committee.

[99] The Operator is defined in the OSA as “that Person appointed as such... in its capacity as operator of the Plant and not in any other capacity”. Under the COA, the Operator means Nova in its capacity as Operator of the Plant pursuant to the OSA.

[100] Section 1.6 of the OSA stipulates that, “[e]xcept as expressly provided [in the OSA] in respect of the Operator”, the OSA “shall not be considered to have created an agency relationship between any of the Parties” [emphasis added]. It also provides that “[n]othing at law or in equity and nothing contained in this Agreement shall be construed to create or impose fiduciary obligations between the Parties or on the Operator to the Co-owners.”

[101] Section 4.3 of the OSA sets out some of the Operator’s duties, subject to the terms of the agreement and the direction of the E3 Management Committee. These duties include:

- a) conducting the “Operations”, which are defined as the work and activities performed in respect of E3, including the production of ethylene from E3 and other products produced at E3 “with the objective that [E3], subject to the direction of the Management Committee, will optimize Product production and achieve first decile performance when compared to other ethylene plants in North America”; and
- b) subject to sections 4.5 and 4.6, provide the “Services”, defined as being all services and utilities to the extent required to be supplied to E3 to permit the Operator to conduct the Operations, including “Ethane Services”, defined as a portion of the Services to be provided by the Operator including the acquisition of ethane.

[102] Thus, one of Nova’s duties as Operator under the OSA is to acquire ethane feedstock with the objective of optimizing the production of ethylene and other products from E3. Dow submits that this means acquiring enough ethane feedstock to fill E3; Nova disagrees. It is not necessary that I decide this issue, however, because Nova has conceded that at all times it had acquired enough ethane to fill E3.

[103] The OSA provides for the creation of a “Pool” of contractual rights to purchase ethane from third parties.

[104] The Pool is defined as “the aggregate of all Ethane ... arrangements” existing at any particular time “which have been entered into or obtained by the Operator in providing the Ethane Services” [emphasis added]. Thus, the terms “Operator”, “Operations”, “Ethane Services” and “Pool” in the OSA all refer, directly or indirectly, to E3. However, Nova may request ethane from the Pool for two other uses: use at E1 and E2, and use as an ethylene buffer for the Cochin Pipeline. Either Co-owner as a “Pool User” may request ethane from the Pool for other uses, although neither did. The Operator has the discretion to agree to supply ethane for such other uses.

[105] The OSA authorizes Nova to acquire unlimited volumes of Pool ethane without Dow’s consent. Nova was free to acquire more ethane than necessary to fill E3, at whatever price it chose to pay. Thus, the average Pool price paid by Dow may increase if Nova chooses to purchase more ethane than necessary to fill E3, but that was a contractual risk accepted by the Co-owners. There are other contractual provisions that provide a method of reviewing and controlling this discretion.

[106] The OSA provides that, monthly, each Co-owner is required to provide a “nomination” of its estimated requirements for ethylene production in the coming month. In section 7.1, the Co-owners are required to provide a one-month estimate, a three-month estimate and a quarterly estimate, and the Operator is required to provide a forecast of its ability to produce ethylene from E3 during the various periods. The longer-term estimates were abandoned by both Co-owners shortly after E3 became operational. Subject to section 7.2, every month each Co-owner is obligated to take delivery of the quantity of ethylene from E3 so nominated and produced in its EPP of daily E3 production. Section 7.2 allows a Co-owner to change its nomination up to the day before the month begins. The Operator is required to use reasonable efforts to meet such adjusted nomination. There is no nomination procedure for E1 or E2 included in the OSA.

[107] Each of Nova and Dow almost invariably nominated their full entitlement to E3’s production. However, if a Co-owner nominates less than its full entitlement, the other Co-owner is entitled to take up the remainder.

[108] Section 13.2 of the OSA provides that, subject to certain exceptions not relevant to the issues, each Co-owner has the right to take in kind “a proportion of the Products produced at [E3] equal to its respective Ethylene Production Proportion”. The Operator, also subject to certain exceptions, has the duty of delivering to each Co-owner “a proportion equal to its Ethylene Production Proportion [or EPP] ... of ethylene as and when produced by the Plant at a certain delivery point and other products, as and when produced at E3, at the plant gate.”

[109] As noted previously, under the OSA, the Ethylene Production Proportion, or EPP, is defined as a party’s proportionate entitlement to ethylene production from E3 at a specific time. The definition provides that:

A Party’s Ethylene Production Proportion shall at the commencement of Initial Operations be that proportion of Ethylene production from the initial Capacity of the Plant to which such Party is entitled and thereafter, upon any expansion of the Plant, shall be adjusted to include a proportion of the incremental Capacity of

such expansion equivalent to the proportion to which such Party has participated in the construction of such expansion.

[110] Schedule G of the OSA sets out a sample determination of the EPPs for the initial capacity of E3. It provides that “[t]he starting point in the calculation for [EPP] is the Base Plant and each Co-owner’s right with respect to such Plant” is then set out. The initial EPPs are calculated to be 44.48% of production for UCC and 55.52% for Nova, increasing to 50/50 if, as it did, Dow elected to buy into a seventh furnace.

[111] Thus, Dow submits, and I agree, that, as the Co-owner’s agent, the Operator is to receive its product nominations as requests for ethane in order to produce ethylene in accordance with the nominations, which the Co-owners are then entitled to take in kind. It submits that the sole exception is if the Operator lacks the “ability” to meet the nominations of its principals.

[112] In addition to the Operator’s designation as the agent of the Co-owners and the provisions noted previously, the joint venture agreements contain additional provisions relating to the operations of E3:

- a) Section 7.3 of the OSA provides that “[i]t is the intent and objective of the Co-owners that the Plant continually operate (subject to scheduled turnarounds) at not less than Ethylene Nameplate Capacity of the Plant and that each Co-owner continually take 100% of its Ethylene Production Proportion of Product produced at the Plant.” Dow refers to this as the “duty to operate at full capacity.” Ethylene Nameplate Capacity (ENC) means “the capacity of an ethylene plant to produce ethylene in a year as determined by the Operator in the manner provided for in Schedule E”. In other words, ENC is the estimated actual capacity of the Plant to produce ethylene in a year, taking into account certain deductions.
- b) As previously noted, the Services required to be provided by the Operator include “Ethylene Services”, a subset of Services generally. This includes acquiring the ethane required to permit the Operator to conduct Operations [ss 4.3(c), 1.1(x), (bj) and (c1)] (hereafter, “the duty to provide Ethane Services”). The parties to the OSA acknowledge in section 4.6 that Nova will be providing “services in the nature of Services” to all facilities on the Joffre Site as “operator of the balance of the site,” which is consistent with Nova’s right to acquire ethane in excess of the requirements of E3, “with the objectives of maximizing efficient, flexible and safe operation of the Site as a whole without discrimination on the basis of ownership of any particular manufacturing unit at the Site...”
- c) As noted previously, Nova as Operator must conduct E3’s Operations as agent of the Co-owners “in accordance with, and subject to the provisions of the [OSA] and the direction of the Management Committee”. Section 4.2 of the OSA provides that, subject to any limitations imposed by the Management Committee, “the Operator shall conduct the Operations in accordance with this Agreement and shall perform the duties provided for in Section 4.3 in a manner as would a prudent operator of a like petrochemical production facility”. Since duties set out in section 4.3 include, indirectly, the provision of Ethane Services, the provision of such Services is subject to the standard of care of a prudent operator. Section 4.3(c) refers to Services, of which Ethane Services are a subset, and which therefore include as a duty of the Operator the acquisition of ethane for E3. In performing these duties, the Operator is

acting as agent for the Co-owners, as set out in section 4.1. Section 4.3 does not purport to list all of the duties of the Operator; it specifically is subject to the “terms of this Agreement”, some of which set out additional duties.

- d) Section 4.4 of the OSA sets out actions by the Operator that require Management Committee approval, including any action to cease or curtail production at E3.

[113] Nova submits that, where the parties have deliberately selected and repeatedly used words such as “duties” or “obligation” to describe a contractual requirement incumbent upon the Operator, the absence of such terms in another sections of the joint venture agreements should be interpreted by the Court to mean that the parties did not intend the other provision to impose or imply such a duty or obligation. Such an interpretation, Nova argues, ensures commercial certainty, which the parties intended Article 4 to afford to both agent and principal.

[114] However, Article 4 does not simply set out the duties of the Operator. It is entitled “Operator and Management Committee”, and provides, in part, for the division of responsibilities between the Operator and the E3 Management Committee, including what the Operator cannot do without E3 Management Committee approval. For example, section 4.4 provides that the Operator cannot cease or curtail production at E3 without E3 Management Committee approval, subject to certain exceptions such as *force majeure*. Article 7, which sets out other duties of the Operator, is entitled “Nomination Procedure” and describes the interaction between the Operator and the Co-owners with respect to nominations. Section 4.1 does not restrict the Operator’s appointment as agent to the duties set out in section 4.3, but provides that it is the agent of the Co-owners “for the purpose necessary to carry out its duties and obligation under this Agreement”.

[115] Section 13.2 sets out certain obligations of the Operator in the event a Co-owner decides to take ethylene or co-products in kind.

[116] The *force majeure* provisions of the OSA as set out in Article 23 provide that a party’s contractual obligations may be suspended by reason of, among other things, a “shortage of ...feedstock.” A party prevented from fulfilling any obligation by a *force majeure* must promptly give the other party notice of the *force majeure* and the affected obligations, including reasonably full particulars.

[117] The term “Feedstock Fraction” is referred to in section 5.3 of the OSA, under the heading “Allocation of Ethane Fixed Costs”. The section reads as follows:

All Ethane Fixed Costs invoiced to and paid by the Operator in a Month shall be allocated to the Pool Users in accordance with their respective Feedstock Fraction. The Feedstock Fraction applicable to a Co-owner in a Month and the Ethane Fixed Costs allocated to such Co-owner in such Month will be reflected in the Feedstock Cost Statement delivered to such Co-owner in such Month ...

[118] Ethane Fixed Costs are defined as the costs of acquiring, administering and storing ethane for the Pool. Pool Users are defined as Nova and UC in respect of their total entitlement to request Pool ethane, and Co-owners are defined as UC and Nova in their capacities as owners of E3.

[119] Section 5.9 sets out the method of determining the Feedstock Fractions. Feedstock Fraction is defined at any particular time in respect of Nova as “the fraction which results when the Total NOVA Pool Ethane is divided by the sum of the Total NOVA Pool Ethane and Total

Union Carbide Pool Ethane” and, in respect of UC, “the fraction which results when the [Nova fraction] is subtracted from 1.00000.

[120] Total Nova Pool Ethane means the aggregate of Nova Proprietary Ethane and Nova Joffre Ethane. The difference between these two categories is not relevant to the issues in this litigation.

[121] Section 5.9 also sets out how the Initial Feedstock Fractions of the Co-owners are to be calculated. Further discussion of section 5.9 and the use of Feedstock Fractions is found under “Damages.”

[122] Section 2.1 of the OSA provides that the Operator will account for and allocate to the Co-owners the costs associated with the acquisition and handling of ethane in accordance with section 5, and that Appendices F(A) and F(F) set forth the form of Feedstock Cost Statement to be issued.

[123] Appendix F(A) of the OSA sets out the form of monthly Feedstock Cost Statement and Appendix F(B) provides a sample feed stock fraction calculation.

C. Concept

[124] Section 3.11 of the COA provides that each Co-owner agrees to act honestly and in good faith, and in accordance with the provisions of the joint venture agreement with respect to the ownership and use of the Plant, and to exercise the degree of care, diligence and skill that a reasonably prudent person would exercise as co-owner in comparable circumstances.

[125] Section 5.01 provides that no Co-owner shall be liable to the other Co-owner, as a result of the joint ownership or use of the Plant, for any Excluded Damages.

[126] Nova admits that when it imposed ethane allocation, it took part of E3’s production that would have been allocated to Dow if E3’s production had been allocated in accordance with the EPPs. The amounts are not in issue. Nova concedes that it took for itself more than its EPP of E3’s ethylene and products, and gave Dow less than its EPP.

[127] While Nova says that “there was no written ‘rulebook’ concerning the imposition of ethane allocation”, it submits that it followed a consistent formula. Nova says that, following E1 resuming operations in September 2001, it implemented ethane allocation as follows:

- a) in a month when the available ethane forecast from Nova’s ethane suppliers and inventory was less than 165,000 bpd (which Nova characterizes as sufficient ethane to operate all three crackers at the Joffre Site at what it called Site Nameplate Capacity), Mr. Broenink would direct that ethane allocation be implemented;
- b) ethane allocation was discontinued on rare occasions where Nova had lower demand for ethylene in the coming month;
- c) once allocation was implemented:
 - (i) Pool ethane was notionally divided between the Pool Users based upon their respective Feedstock Fractions;
 - (ii) all ethane was then pooled and processed at the Joffre Site to maximize ethylene production. This generally meant running E3 in preference to E1 and E2, subject to:

- (E) E3 plant constraints; and
- (F) E1 and E2 entering false load operations; and
- (iii) E1, E2, and E3 would move to low conversion operations, thus maximizing the ethylene yield from the available ethane; and
- d) ethylene produced at the Joffre Site would be distributed between Nova and Dow Europe *pro rata* to their respective Feedstock Fractions.

[128] Nova concedes that the result of ethane allocation was that Dow's share of ethylene production was generally less than its EPP of E3's actual ethylene production, and Nova's share of ethylene production was generally higher than its EPP.

[129] Nova also concedes that "ethane allocation" as it was practiced after September 2001 did not involve actual allocation of ethane to the three plants; ethane was only "notionally divided".

[130] Nova used certain software to track ethylene production at and delivery from each of the three crackers. When ethane allocation was imposed, a Nova employee would manually replace the contractual, hard-coded EPPs and enter what Nova calls the "modified EPPs" into the computer program. Dow's modified EPP would almost always be lower, and Nova's almost always higher, than the contractual EPPs.

[131] It is also noteworthy that Nova calculated E3's "share" of ethane by using its original design nameplate capacity figure, but calculated higher "shares" for E1 and E2 by using their updated, higher nameplate capacity figures. Nova also factored into the calculation about whether ethane allocation should be imposed the maximum possible E1 Toll volume, not the volume actually processed. In time, Nova abbreviated this threshold calculation for imposing "ethane allocation" on Dow to "165,000 barrels of available ethane."

[132] In deciding whether 165,000 barrels per day of ethane was available in a given month, Mr. Broenink would take into account Nova's forecast of fresh ethane supply and what was available from storage. Ms. Eastman was notified of whether ethane allocation would be imposed through the nomination process. Once Mr. Broenink had decided that ethane allocation would be implemented, one of Nova's EBT members would create a preliminary production plan.

[133] From June 2002 onward, the preliminary production plan was subject to consideration by the Nova Joffre Production Planning Team (the JPPT). The purpose of the JPPT was to maximize the production of ethylene at E1, E2 and E3 during periods of alleged feedstock shortage at the lowest cost per incremental pound. However, the JPPT played no role in deciding when ethane allocation was to be imposed. Mr. Broenink made that decision until he left the EBT at the end of 2004, and then Mr. Baker made the decision in the same manner.

[127] The JPPT optimized production by running all three crackers at the Joffre site at low furnace conversions, by filling E3 with ethane first (subject to avoidance of false load at E1 and E2), and cracking propane at E1 and E2 as an alternative feedstock.

D. Analysis

[128] The factual questions with respect to this claim are whether, on the evidence, Dow has established that, through ethane allocation, Nova converted for its own use part of the ethylene produced at E3, contrary to the joint venture agreements, and whether Dow knew about and/or

consented to such ethane allocation. The legal question is whether the joint venture agreements authorized Nova to implement ethane allocation.

[129] There is no express provision for ethane allocation in the E3 joint venture agreements. Based on the COA, each of Nova and Dow owns the ethylene and other products produced at E3 *pro rata* to their EPPs.

[130] Dow submits that ethane allocation is *prima facie* a conversion and a breach of contract. However, Nova submits that certain provisions of the E3 contracts authorize Nova to impose ethane allocation by implication.

[131] The following is an analysis of Nova's submissions in that regard:

- a) Nova attempts to justify the use of Feedstock Fractions in its calculations under ethane allocation as the basis that this "conformed" to the OSA, submitting that "the Pool Users' entitlement to Ethane from the Pool derives from their agreement to pay the Ethane Fixed Costs associated with the volume of Ethane which they have requested from the Operator". This ignores the Co-owners' entitlement to their EPP of ethylene, which is the issue here. Nova also argues that the use of Feedstock Fractions reflects the parties' intention that Pool ethane was for use at all three ethylene plants at the site. Dow does not argue that Pool ethane could not be used for E1 and E2, only that the OSA did not create an equal entitlement of all three plants in that regard. As Dow has noted, Nova was free to acquire ethane in excess of what was necessary for E3, and to supply it to E1 and E2 upon request.
- b) Nova also submits that the method of allocating ethane to the Pool Users is consistent with the Post 1998 Agreement, which, it submits, "forms part of the factual matrix within which the OSA was negotiated" and which can be used as an interpretive aid in considering the OSA. This does not help Nova, since the Post 1998 Agreement contains express language relating to site optimization that is missing from the OSA. If site optimization was what the parties intended, Nova had the example of specific language that would accomplish this, and it was not used in the joint venture agreements. The Post 1998 Agreement was a different agreement between different, albeit somewhat overlapping, parties.
- c) Section 5.1(d) of the OSA provides that ethane "shall be made available to all Pool Users in accordance with the provisions of this Article 5". Nova submits that this means that it was justified in imposing ethane allocation.

However, this provision does not authorize allocation of Pool ethane on the basis of Feedstock Fractions or otherwise. "Pool Users" are Nova and Dow. Dow is a Pool User in respect of both the quantity of ethane that Dow has requested be delivered and the Operator has agreed to supply for use at E3, and for other uses outside of E3 upon request and as agreed to by the Operator. Nova is a Pool User in respect of both the quantity of ethane that Nova has requested be delivered by the Operator and the Operator has agreed to supply for use at E1, E2 and E3 (and for minor buffer usage) and for other uses, upon request and as agreed to by the Operator. Section 5.1(d) does not imply that ethane requested for E1 and E2 or for other uses could be supplied by the Operator in any way that would leave E3 deficient. A preference for supplying E3

is not created by the definitions of Pool Users, but by the clear duty of the Operator to conduct Operations with the Objective of optimizing Product production at E3.

In fact, Nova never made a formal request of the Operator to supply ethane to E1 and E2 in years before these plants were transferred to its subsidiary, Nova Chemicals Canada Limited, in 2001 and 2004, and the only request for additional ethane from Nova or its subsidiary was made by Nova on May 9, 2009 in relation to E1, and never followed up.

The Operator is, in any event, not required to supply ethane from the Pool for E1 and E2 unless it agrees to do so. It is the definitions of “Services” and “Operations” that are key, and neither require the Operator’s agreement to fulfill its section 4.3(b) and (c) duties.

Nova submits that a combination of the definitions of Pool Users, Feedstock Fractions and Nova Joffre Ethane mandates that ethane is to be made available in accordance with the Feedstock Fractions of the Pool Users in E1, E2 and E3. This interpretation requires the definitions of “Services” and “Operations”, and the references in “Nova Joffre Ethane” and “Union Carbide Joffre Ethane” to the requirement of the Operator’s agreement to supply and to the Operator’s duty under section 4.3(b), to be disregarded, and cannot prevail.

The reference to the remainder of Article 5 does not help Nova. The objective of section 5.1 is to obtain for the Co-owners “the lowest cost, secure supply sources of ethane”, and it is expressly stated to be “subject to the terms and conditions of this Agreement”. As noted by Dow, Nova is free to acquire further volumes of ethane for E1 and E2, and, in fact, the price of that ethane would be averaged out in the Pool and shared by Dow, ensuring that Nova could not feed cheaper ethane to E1 and E2.

Nova submits that subsections 5.1(c) and 5.1(d) of the OSA, through their reference to “Pool Users”, give force to the intention of the parties that Ethane Services are to be provided to the whole of the Joffre Site without priority to any particular plant. However, “Ethane Services” are a subset of “Services”, which are services required to be supplied to or at E3. “Pool Users” means Nova and UCC/Dow, including with respect to both Joffre Ethane and Proprietary Ethane, but both uses require a request of the Operator and the Operator’s consent to supply. As noted previously, there is no evidence that Nova requested Joffre ethane for use at E1 or E2, other than a single instance that was not followed up. The only evidence of requests is that each of Nova and Dow almost always nominated their entire share of ethylene from E3 in accordance with the OSA, implying a request for enough ethane to produce that amount of ethylene. Neither section 5.1(c) nor 5.1(d) refer to equal priority; in fact, much of Article 5 refers to the process that a Co-owner must go through to access

Proprietary Ethane. If ethane is requested for E1 and E2, and this would result in the Operator being unable to comply with its duty under 4.3(b), the Operator would have to refuse or to obtain more ethane to meet the additional demands.

d) Section 4.6 of the OSA entitled “Provision of Services” reads as follows:

The parties acknowledge that Nova, in addition to being Operator of the Plant, is also operator of the balance of the site and that, in accordance with and subject to the provisions of this Agreement, services in the nature of the Services are being provided to all facilities on the Site (and in the case of Ethane Services the Operator will also provide such services to Pool Users for Proprietary Ethane and to Nova in connection with its Corunna Plant operations) with the objectives of maximizing efficient, flexible and safe operation of the Site as a whole without discrimination on the basis of ownership of any particular manufacturing unit at the Site and achieving overall lower costs for such services, based on inter alia scale, inventory management and centralized procurement expertise. [emphasis added]

[132] Nova submits that this section entitles it to ration ethane among the plants at Joffre as it sees fit.

[133] This mischaracterizes section 4.6, which is, as Dow submits, a shield provision, not a sword. It is an acknowledgment by the Co-owners that Nova is also the Operator of the rest of the Joffre Site, and provides services similar to ethane supply to its other facilities. It permits this situation for the purpose of the objectives of: (1) maximizing efficiency, flexibility and safety in the operation of the Site, without discrimination on the basis of ownership; and (2) achieving overall lower costs. The words “without discrimination on the basis of ownership” modify the objective of efficient, flexible and safe operation of the Site, and are as much for Dow’s protection as for Nova’s. In other words, in providing services to facilities other than E3, Nova may not discriminate on the basis of its ownership of the other facilities. These words do not qualify the obligation to provide 50% of E3’s output to Dow or the Operator’s obligation to acquire ethane for E3, or its duty to optimize production at E3.

[134] Nova refers to the phrase “without discrimination on the basis of ownership of any particular manufacturing unit at the Site” as a “contractual obligation”, but it is an acknowledged objective, not an obligation, and specifically, an objective with respect to “maximizing efficient, flexible and safe operation of the Site as a whole.”

[135] Nova submits that ethane allocation had four elements, all of which are founded in section 4.6 of the OSA:

1. the Operator’s obligation not to discriminate in the provision of the “Services” including Ethane Services on the basis of plant ownership;
2. the Operator’s entitlement to allocate Ethane amongst the three ethylene plants at the Joffre Site in the event of a feedstock shortage consistent with this obligation of non-discrimination;

3. the Operator's entitlement to optimize the efficient and flexible operation of the entire Joffre Site in order to maximize the quantity of ethylene manufactured on a site-wide basis; and
4. the Operator's power to "deem back" ethylene production to E1 and E2 so as not to discriminate in the provision of "Services" to the three ethylene plants on the basis of ownership, as Ethane that would otherwise have been supplied to E1 and E2 was instead streamed to E3 in order to maximize site-wide ethylene yield.

[136] With respect to the first element, Nova submits that section 4.6 of the OSA "required and empowered Nova to provide Services, including Ethane Services, to all three crackers at the Joffre Site." This is not correct. "Services" are defined by the OSA as services provided by the Operator to the Co-owners "to or at the Plant". The acknowledgement in section 4.6 stipulates that, in addition to Nova's provision of the Services to the E3 Co-owners as the Operator, "services in the nature of the Services are being provided to all facilities on the Site" by Nova as "operator of the balance of the Site". This makes it clear that these other services are not "Services", and the Operator is not providing them, rather they are provided by Nova in another capacity as the operator of the balance of the Site under other arrangements. Nova submits that while services to or at the Plant, the scope of "Ethane Services" extends beyond E3. This too is incorrect. "Ethane Services" are a subset of the "Services" that are to be provided to E3.

[137] As noted by Dow, it makes no sense for a provision in an agreement between the Co-owners of E3 and their Operator as part of a joint venture relating to E3 to have an overarching purpose of "governing" how services are to be provided to other units on site that have different ownership, may have their own contractual arrangements, and are not even all ethylene plants. What does make commercial sense is that section 4.6 is an acknowledgement that the Joffre Site includes other plants, and that, on that Site, Nova has other roles that might intersect with its role as the E3 Operator.

[138] I find that section 4.6 is a recognition of Nova's role in providing services to other facilities on the Joffre site, that because of this, economies of scale may be achievable, and that section 4.6 is the Co-owners' acknowledgment that this is a permissible state of affairs as long as Nova did not favour itself over its Co-owner's interests.

[139] With respect to the second element, that "the Operator's entitlement to allocate Ethane amongst the three plants" in the event of an ethane shortage consistent with "the obligation of non-discrimination", as noted, there is no right of ethane allocation in the OSA, and the Operator's duty to optimize production at E3 affords preference to E3 in the allocation.

[140] The third element, the Operator's entitlement to optimize the efficient operation of the Site "in order to maximize the quantity of ethylene manufactured on a Site-wide basis", is also an inaccurate characterization of section 4.6. Nova's obligation to optimize production is set out in section 4.3(b), which imposes a duty on the Operator to conduct Operations "with the objective ... of optimizing Product production" at E3. Section 4.6 does not mention the optimization of production. At any rate, Nova concedes that ethane allocation did not maximize ethylene production on a site-wide basis, as it did not create any greater volume of ethylene produced at Joffre, but instead altered the shares of ethylene that were delivered to Nova and Dow.

[141] The fourth element is also a skewed interpretation of section 4.6. The prohibition against discrimination does not empower the Operator to do anything; it prevents conduct that may be discriminatory. There is nothing in section 4.6 that allows the Operator to deem back ethylene production to E1 and E2 or that allows ethane that would otherwise be supplied to E1 and E2 to instead be streamed to E3 “in order to maximize site-wide ethylene yield”. This interpretation implies a great deal into section 4.6 without justification.

[142] Nova submits that, insofar that Nova has a duty as Operator under section 4.3(c) to provide Services to E3, that duty is subordinated to the provision of Services to the whole of the Joffre Site, relying on the words “Subject to Sections 4.5 and 4.6” in section 4.3(c). However, section 4.6’s acknowledgment of Nova’s provision of services to other Joffre facilities is itself “in accordance with and subject to the provision of this Agreement”. If section 4.6 was intended to subordinate otherwise clear duties of the Operator, and if the words “without discrimination on the basis of ownership” were intended to be an over-arching contractual duty and empowerment, that overarching duty and power would have been drafted in a clear manner, and it would not be necessary to contort the words of section 4.6.

[143] It is noteworthy that Nova recognized that Dow would not agree to any “site optimization” agreement, despite its efforts to promote that principle. Site optimization does not make commercial sense in the context of the joint venture.

[144] I also note Nova’s admission that the EBT initially reviewed the E3 contracts for language permitting some form of ethane allocation, and found none. Section 4.6 was not raised as a justification for ethane allocation until Mr. Flint’s August 12, 2004 email. While the issue of whether section 4.6 authorizes ethane allocation is a legal question of contract interpretation, this failure to find any clear power to impose ethane allocation by the EBT supports Dow’s allegation that Nova’s view at the time was that section 4.6 did not provide the required authorization.

[145] In support of the fourth element, Nova also submits that, through a combination of sections 5.2, 4.6 and 7.1, Nova as Operator has no obligation to supply sufficient ethane from the Pool to run E3 at maximum capacity or to meet the Co-owners’ nominations at the expense of E1 and/or E2. In particular, Nova submits that it:

- a) had broad discretion pursuant to section 5.2 of the OSA to provide Ethane Services, with no requirement of consent from the E3 Management Committee;
- b) was to provide Ethane Services with the “objectives of maximizing efficient, flexible and safe operation of the Site as a whole without discrimination on the basis of ownership of any particular manufacturing unit at the Site” pursuant to section 4.6; and
- c) was only obligated to provide the Co-owners with a “forecast of its ability to produce Ethylene during the forecast periods” subsequent to receiving the Co-owners’ nominations, pursuant to section 7.1.

[146] As noted previously, the objective of maximizing the efficient, flexible and safe operation of the Site without discrimination was an objective, not a duty, relating to “services in the nature of Services” to all facilities on the Site, not “Ethane Services”. It was not an over-arching contractual imperative that could be interpreted in a manner that overrides the duty to provide Ethane Services. Taken as a whole, these provisions do not eliminate the Operator’s duties to

provide Ethane Services to E3, even as an implied term. At any rate, the joint venture agreements include a prohibition against implied terms.

[147] Nova submits that an interpretation of the contracts that would require the maximization of ethylene production at E3 is an “elevation” of a commercial joint venture into a supply agreement with obligations of guaranteed delivery. If by this, Nova means a commitment to acquire enough ethane to fill E3, that is one of Nova’s duties as Operator as part of the provision of Services. Nova submits that it is commercially unreasonable for the contracts to be interpreted as imposing a duty on it as Operator to acquire enough ethane to fill E3 “for a nominal and fixed annual fee of \$2.7 million”. In fact, the annual fee also includes the recovery of substantial costs for Nova personnel, including, for example, more than \$15 million in 2011. It allows Nova to share site costs that it would otherwise be solely responsible for. At any rate, Nova concedes that it always had enough ethane to fill E3. There is nothing commercially unreasonable about imposing a contractual duty on the Operator to do so, subject to the *force majeure* provisions of the joint venture agreements.

[148] Nova also submits that it would be unreasonable for it to agree that it would never buy ethane for use at E1 and E2 if preferential loading of E3 resulted in a shortage, but Dow does not make that assertion. There is nothing in the joint venture agreements that would prevent Nova from buying ethane for the Pool to ensure that Nova would not be short of fuelstock at E1 and E2, and Dow was contractually obliged to help pay for that ethane even if the cost of it increased the average Pool price that the Co-owners shared.

[149] Nova submits that the terms of the OSA that authorize Nova to acquire unlimited volumes of Pool ethane at whatever price it chooses to pay is in conflict with the objective set out in section 5.1, which is to secure the lowest costs secure supply sources of ethane. I agree with Dow that this conflict does not exist.

[150] The objective of securing the lowest cost, secure supply sources of Ethane for the Pool does not excuse failure to provide sufficient ethane to fill E3. The Operator has the duty to enter into contracts as necessary for the “Operations” and the Operations include the production of ethylene and the provision of “Services”. Services include all services and utilities required to be supplied to the Plant, and include Ethane Services relating to the acquisition of ethane. There is nothing in the OSA that allows Nova as Operator to decide not to acquire ethane if it considers it too expensive.

[151] In contrast, there are provisions of the OSA that contemplate a Co-owner objecting to the acquisition of ethane if such acquisition would adversely affect the average Pool price. Section 5.8(b) permits a Co-owner to object to any request by the other Co-owner for Proprietary Ethane where such objecting Co-owner is of the opinion that “the effect of complying with such request would be to significantly increase the total average unit Ethane cost of the Pool”. Similarly, section 5.12, which sets out a mechanism for a Co-owner to request ethane for use outside the Pool area, grants the Operator in subsection (vi) the discretion not to acquire the requested ethane where such an acquisition potentially “significantly increases the total average unit Ethane cost of the Pool”. The parties thus granted each Co-owner the right to veto an acquisition of Pool ethane by the other Co-owner for its private use, and they granted the Operator discretion to decline to acquire Pool ethane for the private use of a Co-owner if such an acquisition would significantly increase the average Pool price. They granted no such discretion, however, to avoid

the Operator's general obligation to acquire sufficient Pool ethane to provide the Services to the E3 Co-owners and to meet their ethylene nominations.

[152] In addition, the creation of the Feedstock Subcommittee provides the Co-owners with the necessary information to monitor the Operator's acquisition of feedstock, and take action at the E3 Management Committee level if a Co-owner objected to an acquisition on the basis of cost or otherwise (although Nova discontinued the operation of the Subcommittee when the Dow merger was in progress).

[153] The contracting parties thus provided for the Operator to acquire "for the Co-owners the lowest cost, secure supply sources of Ethane for the Pool" until enough had been acquired. I agree with Dow that what the OSA does not countenance is that the Operator, having acquired enough ethane for E3 as contractually required, would then choose, on its own criteria, not to acquire further ethane at the lowest cost then available, allege a shortage, and take back part of the acquired supply for the use of a plant owned by a Nova affiliate, purporting thereby to leave E3 "short". I am satisfied by the evidence that this is what Nova did for much of the term of the joint venture when it imposed ethane allocation. When Nova was acquired by IPIC, a change of strategy occurred and Nova switched to making as much profitable ethylene as possible, even if average ethane costs were higher and downstream margins were thereby lower. Dow submits, and I accept, that the fact that, in order to meet its new internal commercial mandate, Nova paid more for ethane and acquired much more of it, demonstrates that ethane was available at prices that Nova had previously chosen not to pay.

[154] Nova submits that giving priority to the Co-owners' ethylene nominations under section 7.1 of the OSA and streaming all ethane in the Pool to E3 until those nominations are satisfied ignores Nova's request, as a Pool User, to make ethane available to it for use at E1 and E2.

[155] The evidence does not establish, however, that Nova made any requests as a Pool User for ethane to supply E1 and E2 at nameplate capacity. Mr. Tulk acknowledged that, other than the monthly nominations of the E3 Co-owners and a letter in May 2009, he was not aware of any Pool User requests for ethane for E1 and E2.

[156] Dow submits that the Co-owners' nominations were their requests, and Nova only requested ethane to fill its nomination for E3 production. If Nova had made such a request, it would, as Operator, have had to evaluate its ability to supply from the Pool.

[157] Nova submits that, if an obligation to first fill E3 with ethane from the Pool exists, it should be found in Article 4, which sets out the Operator's duties. It submits that the objective set out in section 4.3(b) of optimizing product production and achieving first decile performance is an indication that an unqualified obligation to fill E3 first should also have been included in the Operator's duties if this was the intention of the parties. This argument arises from Nova's submission that the Operator's duties are restricted to Article 4, which I reject.

[158] Nova submits that there is no obligation, implied or express, upon the Operator to source a particular quantity of ethane from the Pool in order to run E3 at some operating rate that Dow maintains is required by the OSA. Dow submits that the Operator has an obligation to use reasonable efforts to meet the Co-owners' obligations so long as it has the ability to do so.

[159] Nova argues that Dow's claim of an obligation rests on three assertions:

- a) that Nova as Operator is agent of the Co-owners;

- b) that ethylene nominations are an instruction from the Co-owners, as principals, to source a quantity of ethane sufficient to meet those nominations; and
- c) that the Operator must fully satisfy the nominations or be in breach of the OSA.

[160] While Dow says that this is Nova's theory, not Dow's, it submits that these assertions have been established in any event.

[161] With respect to whether Nova as Operator is the agent of the Co-owners, Nova refers to this as a "contrived" theory of agency and submits that the extent of the Operator's duties as agent are established and limited by section 4.1 of the OSA. Dow does not dispute that the nature of the agency relationship is as set out in the OSA, however, Dow submits that Nova is appointed as agent for the purposes of carrying out all of its duties under the OSA, and not just under Article 4. A noteworthy example is the requirement of section 13.2 of the OSA that the "Operator shall deliver to each Co-owner a proportion equal to it EPP of ... ethylene ... and other products ... produced" at E3.

[162] There is no dispute that the analysis of whether an agent-principal relationship exists, and the scope of any such relationship, is largely fact-driven. Where an agency relationship arises from an express contract between the agent and principal, the nature of the contract between the parties will determine the nature of the agency, including the duties and obligations or actions the agent is to undertake on behalf of the principal. Neither instructions nor undertakings will be implied into a contract of agency where they are prohibited by the contract itself. There is also no dispute that, in construing the terms of a contractually created agency relationship, reasonable principles of contractual interpretation will be used in determining the agreed-upon undertakings or instructions the agent was to accomplish. Agents must act within the terms of their authority: *Fine's Flowers Ltd v General Accident Assurance Co of Canada* (1977), 17 OR (2d) 529 (CA) at para 53.

[163] The appointment of Nova as agent for the Co-owners under section 4.1 is for the purpose of carrying out the duties and obligations of Operator under the OSA. The appointment is subject to the provisions of the OSA and the direction of the E3 Management Committee. There is nothing in section 4.1, or in the other sections of Article 4, that restricts the appointment to the duties and obligations of the Operator under Article 4. As noted previously, the Operator has additional duties set out in other parts of the agreement.

[164] While the standard of care of a "prudent Operator of a like petrochemical production facility", as set out in 4.2, refers specifically to the duties set out in section 4.3, that does not indicate that the status of the Operator as agent does not exist with respect to all of its duties and obligations under the agreement. The duties set out in section 4.3 refer specifically to the operations of E3, in which context, the standard of care set out in section 4.2 is a guideline and a limitation.

[165] It is instructive that the standard of care of a prudent operator applies to the section 4.3(c) duty of providing the Services, which includes ethane acquisition, contrary to Nova's submission that this duty falls outside the gambit of agency.

[166] While section 1.6 of the OSA provides that the agreement is not to be considered to have created an agency relationship between the parties, this declaration is specifically noted to be "[e]xcept as expressly provided ... in respect of the Operator". While it is true that section 1.6 also provides that nothing in law, equity and the OSA shall be construed to create or impose

fiduciary obligations on the Operator owed to the Co-owners, this does not limit the status of the Operator as agent under the agreement.

[167] With respect to whether the nominations are an instruction from the Co-owners to source ethane sufficient to meet the nominations, Nova denies that such an obligation exists. Dow says that it does: that when the parties by their contractual nominations advise of their requirements for E3 ethylene, and the Operator as agent has the ethane to meet those requirements (as Nova concedes that it always had), the Operator as agent must supply sufficient ethane to E3 to meet those requirements. Dow points out that the Operator had no proven obligations under the joint venture agreements to make ethylene for anyone else.

[168] Section 7.1 of the OSA provides that each Co-owner shall advise the Operator of the Co-owner's best estimate of its requirements for ethylene for each month in the next succeeding three months (such estimate being the Co-owner's nomination for the first of such three months), and quarterly for the next four quarters beyond such three-month period.

[169] The Operator shall notify each Co-owner of its forecast of its ability to produce ethylene during the forecast periods. The Co-owners are obligated to take delivery of the quantity of ethylene they have nominated in their EPP of daily E3 production, unless they adjust their nomination in accordance with section 7.2.

[170] Nova submits that these sections impose only obligations on the Co-owners, and only a reporting obligation on the Operator, and that, at any rate, the term "ability" could include mechanical, feedstock, and storage-related limitations. It argues that, if this section was meant to impose a duty, it would be clearer, and that there is not a corresponding reference in section 4.3, which it says is the only provision that sets out duties of the Operator. As noted previously, I do not accept that submission.

[171] With respect to such "ability", Dow concedes that feedstock might be a limitation if Nova did not have enough ethane to meet its principals' requirements, but notes that the issue is purely theoretical, as Nova concedes that it always had enough ethane to fill E3. With respect to storage limitations, each Co-owner was responsible for its own ethylene storage. If Nova had insufficient storage, it could under-nominate. Therefore, Dow submits that Nova's storage limitations could not be a restriction on its ability to produce.

[172] Nova's argument that "ability" can encompass mechanical limitations and shortage of feedstock is at odds with the OSA's *force majeure* provisions which include occurrences beyond the reasonable control of the party claiming suspension of an obligation, and specifically, shortage of feedstock as an event of *force majeure*. Nova submits that a shortage of ethane is not a *force majeure* if it is not invoked by a party claiming suspension of an obligation under the agreement, as Nova submits that, as Operator, it had no obligation to source a quantity of ethane sufficient to satisfy the nominations of the Co-owners or operate E3 at any particular rate of production. As a result, Nova argues that it did not need to declare a shortage of ethane as a *force majeure*.

[173] This is faulty reasoning. If a shortage of ethane is not a *force majeure* event because the Operator had no obligation to source enough ethane to operate E3, when would it be a *force majeure*?

[174] Dow notes that Mr. Flint, who served as Nova's corporate representative, testified that when Dow and Nova nominated in full at E3, as they did virtually every month, he understood

those nominations to require that E3 be operated at capacity such that each Co-owner received its half of the productive capability of E3.

[175] Also, when Nova issued its Notice of Default asserting that Dow's opposition to the Harmattan project was "contrary to Dow's obligations under section 3.2(c) of the OSA not to do any act or thing which could cause Nova Chemicals to be in breach of or in default under the Project Agreements", this assertion, as confirmed by Nova counsel, was a reference by Nova to its obligations under the OSA to fill E3 with ethane.

[176] While Nova refers to other comments by Mr. Flint made in response, these comments are more Mr. Flint's attempts to justify ethane allocation than his comments on contractual obligations.

[177] However, Dow's argument is not as broad as Nova describes it. Dow submits that when principals in an agency relationship, by contractual nominations, advise of their requirements for E3 ethylene, and the Operator as agent has the ethane to meet those requirements, as Nova concedes it always had, then the agent must put the ethane into E3 to meet their requirements. This is particularly so where, as here, the agent has no proven obligation to make ethylene for anyone else under the contract in question.

[178] With respect to what Nova characterizes as Dow's third assertion, that the Operator must fully satisfy the nominations or be in breach of the OSA, Dow submits that the express measure of the Operator's duty is its "ability" to produce ethylene during the nomination month. If the Operator has the ability to produce ethylene, but fails to produce it according to the nominations, it is in breach.

[179] Dow says that Nova has repeatedly been in breach because it has not demonstrated any lack of ability to meet the Co-owners' nominations; merely a lack of willingness to do so.

[180] One of the most basic obligations of an agent is to obey and carry out the instructions of its principals: *Andriuk v Merrill Lynch Canada Inc*, 2013 ABQB 422 at para 81, aff'd 2014 ABCA 177.

[181] In summary, I find that the Operator had an obligation set out in section 4.3(b) and 7.1 to secure enough ethane from the Pool to run E3 at the rate necessary to satisfy the nominations of the Co-owners. This was not an "ethane supply guarantee", as it depended on the Operator's ability to satisfy the nominations. That ability could be affected by mechanical constraints that fell within the definition of *force majeure*, or the Operator could assert a shortage of feedstock that would fall within the *force majeure* provisions. As Dow points out, it is not necessary to decide whether the agreements impose an ethane supply guarantee on the Operator, as Nova as Operator always had the ability to fill E3, and often did in priority to the other crackers. It invoked ethane allocation for other reasons.

E. Nova Defences to Allocation Claim

1. Ethane Shortage

[182] Nova witnesses testified extensively about Nova's efforts to secure ethane sources, specifically about the following factors that Nova submits support its claim of an ethane shortage:

- a) Nova expert witnesses Mr. Mathieson and Mr. Bietz opined that there was an ethane shortage in Alberta from 2001 through to the end of 2012, which was the period for which data was available;
- b) the ethane shortage was recognized by both Nova and Dow from late 2000 onward. Every Dow ethane manager, beginning in 2000 with Mr. Williams, recognized the ethane shortage in internal Dow communications;
- c) the causes of the ethane shortage were beyond Nova's control. The Alliance Pipeline, unfavourable NGL prices and higher CO₂ all conspired in 2001 to create an unexpected shortage, and thereafter, steady declines in export natural gas flows past the straddle plants at the Alberta borders reduced the amount of ethane available for recovery; and
- d) the ethane shortage recently came to an end as a result of a sea change in the industry – horizontal drilling and fracking – which made available vast amounts of ethane-rich gas in northwestern Alberta and northeastern British Columbia and ethane-rich oil from the Bakken formation in the Williston Basin of North Dakota.

[183] Nova submits that its efforts to address the ethane shortage were diligent and commercially reasonable. Dow does not agree. As the party asserting a contested proposition, the burden is on Nova to establish that there was an actual shortage in the circumstances: *Kelly v Alberta (Energy Resources Conservation Board)*, 2009 ABCA 349 at para 43. However, it is not necessary to address in detail the efforts made, and the submissions about why they may or may not have been sufficient or reasonable, because I am not satisfied that there was an ethane shortage that would affect the operations of E3.

[184] Nova's submission that it was justified in imposing ethane allocation because of a shortage of ethane feedstock beyond its control suffers due to the facts established by the evidence:

- a) Nova witnesses Messrs. Mathieson, Tulk and Wade conceded that Nova always had enough ethane to fill E3 and to run it at its maximum productive capacity;
- b) by shortage, Nova concedes that it does not mean insufficient ethane supply to fill E3, or even insufficient ethane to fill E3 and Nova's other ethylene needs at E1 and E2. Rather, it appears from the evidence that Nova's represented shortage meant insufficient ethane to fill the three Joffre crackers to their name-plate capacity, updated for E1 and E2 but at original design nameplate for E3 (later abbreviated to 165,000 barrels of available ethylene), whether or not Nova actually needed the ethylene that would be produced in that way;
- c) Nova did not adduce any evidence that indicates that it was ever short of ethylene to meet its actual demands;
- d) ethane allocation did not operate to fill all three crackers with a share of available ethane in accordance with their nameplate capacity in any event, as more often than not, Nova "allocated" the supply to the three plants on only a notional basis and distributed the ethylene made at the site roughly according to the "nameplate" capacities of the plants. As a result, Dow received less ethylene than had E3 been filled with ethane and had Dow then received its EPP of the ethylene produced; and

- e) Mr. Ferrigno, Nova's own expert witness, indicated that, had Nova run E1 and E2 at a minimum safe level and fed E3 the rest of the ethane it had acquired, there was sufficient ethane to run E3 at full rates throughout the claim period, except for a relatively small shortage. If instead of Mr. Ferrigno's safe level, Nova's internal maximum safe levels were used, Nova always had enough ethane to run E1 and E2 in a stable fashion and to run E3 at a rate of at least [REDACTED] billion pounds per year.

[185] So, while Dow may have accepted Nova's representations that it was short of ethane as an explanation for imposing ethane allocation at the time, and while there may have been a systematic shortage of ethane in Alberta to fill the aggregate nameplate capacities of all existing Alberta ethylene crackers, the issue of ethane shortage as a justification for ethane allocation does not aid Nova.

2. Disclosure

[186] Nova submits that Dow was "well aware" that Nova was imposing ethane allocation, with the result that Dow Europe was not getting its EPP from E3. The degree to which Dow and Dow Europe knew about ethane allocation and what Dow was told about the scheme can best be described through an analysis of Dow's knowledge in the period from June 1, 2001 to May 2004 when Mr. Fergusson was vice president, and then the first few months of Mr. Ramachandran's presidency.

[187] It is clear that Dow accepted the form of ethane allocation suggested by Nova in June 2001, and also clear that Dow's acceptance was only for the period when E1 was unoperational. When Mr. Broenink advised Dow's Ms. Eastman in mid-September 2001 when E1 resumed operating that ethane allocation would continue, it was, of necessity, a different form of ethane allocation, since all three crackers were then in operation. It is clear that Nova did not seek approval for the implementation of this new form of ethane allocation from Dow directly, whether through the E3 Management Committee meetings or from Mr. Fergusson or other Dow senior management.

[188] This new form of ethane allocation was imposed from September 2001 until the end of January 2002, from March through the end of June 2002 and in October 2002. It was imposed in January and February 2003, in May 2003 (when Dow acknowledged it in a one month streaming agreement) and then not until July 2003. It was not imposed again until July 2004, at which time Mr. Ramachandran became involved.

[189] The evidence from Mr. Broenink, supported by documentation, is that Ms. Eastman was advised by nomination letters, emails and conversations with Mr. Broenink when ethane allocation would be imposed in a coming month. Dow concedes that it understood from the nomination responses that Dow Europe would be receiving less than the 100% it generally nominated due to the imposition of ethane allocation. Dow also concedes that Ms. Eastman:

- a) was aware that Nova's nomination "often referenced ethane allocation as a reason for Dow not getting its share of E3";
- b) was aware that under ethane allocation "pounds could come from E1 and E2 to get to the total E3 share". That is, she thought that ethylene was being allocated to the parties from the Joffre Site as a whole, not just E3;
- c) believed she would have informed Mr. Fergusson the first time she became aware that ethane allocation was being imposed; and

- d) incorporated the effect of ethane allocation into Dow's supply/demand balances in August 2002, which in turn were provided to a number of Dow personnel, including Mr. Fergusson.

[190] However, Nova represented to Dow as a rationale for ethane allocation that there was a shortage of ethane to meet actual demands, which was almost always incorrect. Nova's description of how ethane allocation operated was also incorrect: Nova did not disclose that there was no actual rationing of available ethane among the three plants as described, and that Nova was feeding more ethane to E3 and taking some of Dow's EPP of the resulting ethylene.

[191] Nova submits that ethane allocation was raised at E3 Management Committee meetings between March 2002 and November 2004, and also referenced in the context of Nova's proposal to use propane as a fuel at E3 in the summer of 2002. However, these references did not explain the true nature of ethane allocation and did not disclose that Nova was taking more than its EPP share of E3 production.

[192] Nova submits that Mr. Fergusson raised no objections at the E3 Management Committee level during his tenure. However, it is clear from notes of a meeting of senior Dow and Nova management in mid-September 2001 that, while parties were actively considering scenarios under which the feedstock Pool would be broken up and the joint venture would be transitioned into a manufacturing joint venture, with Dow being responsible for bringing its own ethane to E3, Dow management was confused about what Dow's share of E3 production was at the time. Mr. Fergusson testified that virtually every Nova invoice had some error, so that there was a constant process of reconciling what Dow had received simply from what Nova had charged.

[193] In December 2001, Mr. Fergusson indicated that he knew E3 was running below capability, and he understood it was as a result of an ethane shortage. It is implied from this that Mr. Fergusson knew that ethane allocation was continuing in these months, but it is clear that he did not realize what that actually meant.

[194] Mr. Fergusson was clear and credible in his evidence that he never understood that Nova was imposing some sort of "site optimization" or "utilization".

[195] In February 2002, E3 began a high rate trial. There was no ethane allocation in that month. On March 6, 2002, Mr. Broenink advised Ms. Eastman that ethane allocation would again be necessary. Mr. Tulk gave a presentation on "Joffre short-term feedstock supply" at the March 18, 2002 E3 Management Committee meeting that is noteworthy for what it indicated about ethane allocation:

...all feedstock supply to Joffre (excluding tolls) is pooled and each plant receiving pro-rata share of supply based on ethane name plate...E3 share of the Joffre ethane pool is [about] 51.2 percent, E1 17.2%. E2 31.6 percent Dow's share of the ethane pool is [about] 22.8 percent .. amendment to [OSA] not anticipated to be required. [emphasis added]

[196] Thus, while Dow's representatives on the E3 Management Committee were advised that ethane allocation was in effect, and Ms. Eastman may have thought that under ethane allocation Dow could be receiving ethylene from E1 and E2, they were advised that each plant received its *pro rata* share of supply based on nameplate. Mr. Tulk conceded that he knew that this was not true, that most of the time under ethane allocation, E3 was receiving more than that. When

ethane allocation was imposed between September 2001 and June 2002, Nova misrepresented how it actually operated.

[197] Ethane allocation was not imposed from July through the end of September 2002. During that period of time, Mr. Fergusson refused to execute the agreements that Nova had drafted and provided in August 2002 that would have had Dow agreeing to ethane allocation. Nova submits that Dow was only rejecting propane as an alternate fuel when it declined to execute these agreements, but I accept Mr. Fergusson's testimony that he told Nova that the proposal of site optimization was not something that Dow would agree to. I further accept his testimony that he did not understand that Nova was already implementing "site optimization" through ethane allocation, and that he would "push back" whenever Nova raised the idea of site optimization or of managing the three crackers as it saw fit. The idea that Dow might agree to combine the operations of the new, very efficient E3 with Nova's two older plants does not make commercial sense.

[198] In October 2002, Mr. Fergusson made it clear in an email to Nova senior management that he considered an inability to supply ethane to be a *force majeure* and that "in no way have we agreed to amend the terms of the E-3 Contract and amend Nova's obligations to supply...we do not accept...that our supply of ethylene can be reduced by Nova as it sees fit."

[199] Mr. Fergusson was clearly pushing changes to the joint venture arrangements in order to resolve the issue of feedstock supply, and he continued to do so throughout November and December 2002 when ethane allocation was not being imposed.

[200] In January 2003, ethane allocation was again imposed. Mr. Fergusson testified that he was advised that Dow had offered ethane to Nova and that Nova had declined it on the basis that it did not need it. He was told by Ms. Eastman that E3 was not running at full capacity due to a minor mechanical issue. In response to an email of January 8, 2003 from Mr. Henson with the comment that Nova's goal was "to create value for yourselves and ourselves, while also meeting our other customer obligations," Mr. Fergusson responded that Nova's other obligations were not Dow's concern, and that if Nova could not supply ethane to E3, it should declare an event of *force majeure*. It cannot be said that at this point in time, Mr. Fergusson accepted the concept of ethane allocation, even in the form described to Dow.

[201] It appears from an email exchange on March 3, 2003 between a Nova employee and Mr. Miller, an employee at Dow's Fort Saskatchewan plants, that Mr. Miller became aware that Nova was transferring "ethane feed from E1/E2 to reduce Site energy by making use of E-3's lower specific energy requirement". When Mr. Miller responded that he assumed that this meant that Dow's share of ethylene would increase consistent with Dow's understanding of how ethane allocation would work, he was advised that, under ethane allocation, Dow got the same production split regardless of which plant was providing the ethylene. The email exchange was sent to Mr. Fergusson, and therefore, it appears Mr. Fergusson had some knowledge that ethane allocation did not work as described to them in March 2002 by Mr. Tulk. However, ethane allocation was not in effect in March 2003, and was not imposed again until July 2003. While Mr. Fergusson executed a one-month streaming agreement with Nova in May 2003 that contained language acknowledging that, in that month, E3 would be on ethane allocation and would only be entitled to a percentage of the total ethane produced at Joffre, he did so in the context of constant complaints about the alleged ethane shortage and for a one-month period.

[202] The agreement is ambiguous, indicating that Dow E3 was to receive its EPP of E3's ethylene produced from the ethane supposedly being "allocated" *pro rata* by Nova for the three plants (85,013 "E3 Share" x 0.44484 Dow EPP x 166,185 "Joffre total" = 22.75607%).

[203] In the meantime, Mr. Fergusson continued to press for a different form of joint venture and the break-up of the Pool. After a month of ethane allocation in July 2003, it was not imposed again until July 2004, after Mr. Fergusson was replaced by Mr. Ramachandran.

[204] Whatever Mr. Fergusson may have gleaned from the streaming agreement, in April 2004, Mr. Flint presented a pictorial explanation of ethane allocation to senior Dow management, including Mr. Fergusson, that Nova concedes was "inaccurate, in that [it] did [*sic*] not disclose that Nova was actually allocating more ethane than disclosed to E3 and taking a larger share of the ethylene produced at E3 for itself." Therefore, at a senior level, Nova was again failing to represent the true nature of the ethane allocation.

[205] Mr. Broenink's testimony that there were no objections from Dow between 2001 and 2004 is not credible. It is clear from Mr. Flint and Mr. Henson's conversation with Mr. Foy in October 2003 that Nova knew that it would not get Dow's express agreement to ethane allocation, and it is clear that during much of that time, the true nature of ethane allocation was misrepresented to senior management of Dow.

[206] Nova submits that the Feedstock Cost Statements (FCS) sent to Dow Europe's accounting staff in Switzerland every month clearly showed E3's production and Nova and Dow's share thereof.

[207] The point is illustrated through an example taken from an FCS for October 2001. On page 4 of that statement, the following appears:

Feedstock Fraction Calculation

| October 2001 Actuals | <u>E3 Total</u> | <u>Nova</u> | <u>UCC</u> |
|---------------------------|-----------------|-------------|------------|
| Ethane Consumption (bbls) | 2,412,564 | 1,422,930 | 989,634 |
| Ethylene Production (Lbs) | 225,408,695 | 132,946,922 | 92,461,773 |

[208] However, on the same page, under "Assumptions", numerical entries for "E3 Ethylene Production Split" indicate Nova and UCC/Dow's respective EPPs, as are 55.516% for Nova and 44.484% for UCC.

[209] Nova's submission is therefore that Dow accounting personnel ought to have ignored the assumption and performed a calculation that would have indicated that the assumption was incorrect for these months in which ethane allocation was imposed. This would be in the context of what was being represented to senior Dow management about the operation of ethane allocation.

[210] An FCS issued for the month ended February 28, 2001, before ethane allocation was introduced, was also put into evidence. In this statement, UCC's share of the ethane fixed cost was calculated on the basis of its Feedstock Fraction, and, by contrast, UCC's share of ethane variable cost was calculated on the basis of volume used. The volume of ethylene produced was shown as divided between the Co-owners in accordance with their ownership shares or EPPs.

[211] Beginning in 2001, Dow's accounting team prepared spreadsheets entitled "E3 Ethylene Summaries", which reflected, among other things, Dow's calculation of the amount of ethylene it had received compared to what Nova had received as a percentage. These summaries did not, however, indicate production from E3 ethane.

[212] In summary, the only month that Dow could be considered to have had sufficient and uncontradictory information about the nature of ethane allocation during Mr. Fergusson's tenure was in June 2003. Although shortly thereafter, Mr. Flint presented a description of ethane allocation that contradicted what Mr. Ferguson could have learned from Mr. Miller, I find that Dow's claim for allocation loss in June 2003 is barred from recovery for limitations reasons. This is discussed later in these Reasons.

[213] In May or June 2004, Mr. Ramachandran became President of Dow Canada, and he immediately started to question what ethane allocation was all about. The evidence indicates that from the beginning of his term, Mr. Ramachandran made it clear that he disagreed that Nova had the authority to impose ethane allocation. It is also clear that ethane allocation was described to Mr. Ramachandran in a misleading and misrepresented manner in Mr. Flint's emails of August 12, 2004 and August 14, 2004. Mr. Ramachandran did not learn until the fall of 2004 that Nova was taking the position that Dow was not entitled to 50% of E3's actual output.

[214] Thus, Dow did not know about the true nature of ethane allocation from May or June 2004 until the fall of that year, and did not consent to it at any time during Mr. Ramachandran's time as President of Dow Canada.

3. Misrepresentations

[215] It is clear from the evidence that, with certain exceptions, as noted, what Nova said to Dow about its ethane allocation scheme was not entirely accurate:

- a) It was not true that demand for ethane exceeded supply. There was always enough Pool ethane to fill E3, and what was characterized as "demand" was a false premise constructed on the basis of the nameplate capacities of the three plants, when Nova often did not require the ethylene to meet its actual demands. A truthful description would have been "nameplate capacity, a substantial part of which Nova is not using on account of lack of ethylene demand." Nova has not established, as it would have been required to do had this been a relevant issue, that it ever had insufficient ethane to meet its needs. This defence of justification would fall upon Nova to prove, and the supporting documentation advanced by Nova in the form of E3 monthly reports record feedstock as a constraint for only five days over the six years of the damages period after commencement of litigation in 2006. Many Nova documents reflect that it was generally able to satisfy all of its internal and external needs for ethylene by a combination of (a) improperly imposing ethane allocation on Dow and taking some of Dow's E3 ethylene; (b) running the three plants at low conversion; and (c) cracking a small amount of propane. By these actions, Nova bridged its own ethylene gap while leaving Dow short. There may have been a provincial shortage of ethane compared to the nameplate capacities of all facilities, but that is not Nova demand; and
- b) It was not true that Nova was rationing Pool ethane to the three Joffre plants so that each received what Nova called its proportionate share. Nova said Co-owners were cut back equally at E3 and were sharing the pain, however Nova's needs were being

met. Almost always, Dow received less than its EPP of E3's production and Nova received more.

[216] While Nova's demands for ethylene would not be something that would need to be disclosed in a joint venture in the ordinary course, the issue is whether they can be misrepresented without consequence.

[217] When Nova proposed "Joffre Site optimization" to Dow, which is what Nova had been doing all along, Dow's response was negative but Nova continued anyway. Nova tried several times to get Dow to agree to its ethane allocation but Dow would not do so.

[218] The evidence discloses that, had Nova acquired more ethane and run E3 at its available capacity, an additional 5,225,930,000 pounds of ethylene would have been produced. To produce this additional volume, approximately 13,000 BPD of ethane would have been required. Mr. Flint estimated Nova's so-called ethane "shortfall" at 10,000 to 15,000 BPD. I am satisfied by the evidence that Nova could have acquired such volumes at prices less than it paid for ethane 12 years later.

[219] Even if Nova had been able to establish an ethane shortage, that was no justification for failing to fill E3 to capacity as required by the joint venture agreements. As noted by Mr. Fergusson, Nova's requirements for E1 and E2 were its own concern.

F. Analysis of Ethane Allocation as a Breach of Contract

[220] I find no justification in the joint venture agreements for Nova's imposition of ethane allocation. First, Nova's theory of ethane allocation depends on the idea that E1, E2 and E3 are each somehow entitled to a notional share of the Pool ethane, which it equates to Feedstock Fractions. However, while Feedstock Fractions exist under the joint venture agreements, plants do not have Feedstock Fractions; only the E3 Co-owners do. Second, the OSA contemplates only three purposes for Feedstock Fractions: to calculate the Co-owners' respective responsibilities to pay Ethane Fixed Costs; to adjust for inventory costs and credits; and to divide up the Pool ethane supply contracts between the Co-owners in the event the Pool is unwound. Third, in non-allocation months, Nova did not distribute ethane to the plants in accordance with Feedstock Fractions, but in accordance with EPPs as provided by the agreements. The OSA does not restrict E3 to any particular share of Pool ethane.

[221] Nova submits that its use of Feedstock Fractions was justified because it is consistent with provisions in the Post 1998 Agreement, which, it submits, forms part of the factual matrix within which the OSA was negotiated and can properly used as an interpretive aid. A prior contract is not dispositive of the meaning of a later contract where the contract at issue differs from the earlier contract *prima facie*. In this case, the fact of the earlier contract merely demonstrates that, had the parties intended to follow the method of allocating ethane on a site-wide basis, they had a clear example to follow, and did not adopt it.

[222] In an amendment to its pleadings, Nova denied that it, as Operator, is bound by any contractual duty to preferentially load E3. The issue, however, is Nova's duty as Operator to comply with the nominations of the Co-owners when it had the ability to do so, and it did, and to conduct the operations with the objective that the Plant will optimize Product production. In actuality, preferentially loading E3 was the sensible thing to do in order to maximize efficiency. In any event, there can be no question of preference. The Operator's only obligations under the OSA are in respect of E3.

[223] One of the fundamental duties of an agent is not to deceive or mislead its principal. To the extent that Nova was acting as Operator in implementing ethane allocation, it was improper for Nova to deceive or mislead Dow about both the premise of its “ethane allocation” scheme, including purported “demands” for ethane that exceeded supply, and about what Nova was doing when it imposed the scheme – taking for itself some of Dow’s E3 ethylene: *Harland v Fancsali* (1994), 21 OR (3d) 798 (Div Ct) at para 8; *Bhasin v Hrynew*, 2014 SCC 71 at para 73.

[224] The *force majeure* provision in the OSA and other contractual provisions expressly contemplate that ethane might be in limited supply. These terms are an answer to Nova’s submission that an ethane shortage was unforeseen, that the OSA did not provide for such a situation, and that Nova was somehow entitled to invent and impose its “ethane allocation” scheme. Nova senior management directed that *force majeure* not be declared in connection with feedstock supply issues. The evidence leads to the conclusion that the real reason for ethane allocation was Nova’s own interests, its lack of a need for further ethylene to satisfy its requirements and a strategic plan to control a competitor. There is nothing *prima facie* wrong with such a strategy, unless it breaches contractual obligations.

[225] I also find that Dow has established that it did not know, nor ought it have known the specific circumstances that give rise to its allocation claim before the fall of 2004, and that its allocation claim is not statute-barred, as will be discussed more fully under the heading “Limitations of Actions.”

[226] The effect of ethane allocation as actually practiced by Nova allowed Nova to take for itself a portion of Dow’s contractual EPP on the basis of a theory that the joint venture agreements that governed E3 were subordinate to an unsubstantiated obligation of site optimization. Also, when ethane allocation was implemented, the amount of ethylene obtained by Dow depended in part on how much Nova chose to produce at E1 and E2, even though there was no contractual provision that made Dow’s take of ethylene from E3 dependent on how much ethylene Nova produced from its other facilities.

[227] Nova as Co-owner is in breach of both section 3.2(c) of the OSA under which it covenanted not to do any act or thing that would cause it or the other parties, to the agreement to be in breach of the agreement, and also in breach of Section 3.11 that requires it to act honestly and in good faith and in accordance with the provisions of the joint venture agreements

[228] Thus, under either Nova’s description of Dow’s theory of the claim of breach arising from ethane allocation, or Dow’s more nuanced theory, Dow has proved its claim. Nova’s defences of justification and knowledge fail, except for a single month in the period. I find that Nova’s imposition of ethane allocation is also a breach of section 3.02(a) of the COA and section 3.2 of the OSA, both of which mandate that Dow receive its EPP of the products produced at E3.

G. Analysis of Ethane Allocation as Conversion

[229] From the evidence, I am satisfied that Nova’s imposition of ethane allocation, with the result that it deliberately took for itself some of the ethylene and co-products that Dow was entitled to, was a repeated course of conduct in the nature of conversion.

[230] Nova as Operator deferred decisions on ethane allocation to the EBT. Thus, Nova as Co-owner committed the tort of conversion arising out of the operation of E3 during periods of ethane allocation as the EBT directed.

[231] Dow advances a claim of conversion. This court has set out the elements of the tort of conversion in *Drew Oliphant Professional Corp v Harrison*, 2011 ABQB 216 at paras 58 and 59, as follows:

In *Boma Manufacturing Ltd. v. Canadian Imperial Bank of Commerce*, [1996] 3 S.C.R. 727 (S.C.C.) the S.C.C. defines conversion as “the tort of conversion involves a wrongful interference with the goods of another, such as taking, using or destroying these goods in a manner inconsistent with the owner’s right of possession.”

G.H.L. Fridman, [T]he Law of Torts in Canada, (2nd Ed.) (Toronto: Carswell, 2002) identifies the following elements as forming the tort of conversion:

1. “A wrongful act”;
2. Involving a chattel;
3. Consisting of handling, disposing or destruction of the chattel;
4. With the intention or effect of denying or negating the title of another person to such chattel.

[232] These elements are all satisfied in this case.

VII. Optimization Claim

A. Introduction

[233] Dow’s claim for damages for failure to run E3 at its full rates is based on the following allegations:

- a) E3’s productive capability was always more than its initial design guarantee of 2.81 BPY;
- b) after the COP, E3’s productive capability was more than ■■■ BPY;
- c) Nova breached its duty as agent to meet the Co-owners’ nominations for ethylene;
- d) there were no mechanical reasons for Nova’s chronic underproduction at E3;
- e) Nova breached sections 4.3 (b), 4.4(a) and 7.3 of the OSA, section 3.2(c) of the OSA and section 3.11 of the COA.

[234] Dow submits that Nova’s trial theory that it had a broad discretion with respect to production under the joint venture agreements is wrong.

[235] Nova submits that, in responding to an ethane shortage, it has to make decisions relating to how to optimize production at E3 so as to manufacture the most ethylene per barrel of ethane, among other things.

[236] Since I have found that there was always enough ethane to fill E3 to capacity, and that Nova was not entitled to impose ethane allocation, the specific operational strategies deployed by Nova to maximize ethylene output at the Joffre Site as a whole and to optimize ethylene yield at E3 while under-supplying ethane are not relevant to the optimization claim. Dow does not allege that the E3 operations staff did not do a good job of maximizing ethylene production from the ethane available to E3. Nor does it accuse Nova of failing to be a safe or skilful Operator. Dow

submits that E3 should have been run to capacity with the adequate ethane that was available to it.

[237] Nova also submits that it encountered unforeseen and unavoidable mechanical constraints that affected production at E3, and that, in view of these constraints, Nova as Operator produced as much ethane as was mechanically possible at E3. It submits that E3 had to be “run to constraint” because of various unanticipated mechanical issues.

[238] Nova submits that it was innovative and resourceful in prudently resolving these issues.

[239] The evidence is clear that E3 rarely ran to capacity. It is also clear that Dow, constantly and consistently, complained about E3’s productivity, and that E3’s production rates were set by the EBT, not by the Plant operational personnel.

[240] Both Co-owners almost always nominated their full entitlement of E3’s production. When they did so, Mr. Broenink understood that Nova’s responsibility was to run E3 at full rates. Section 4.3 of the OSA sets out the duty of the Operator in that regard. It is to:

... [c]onduct the Operations with the objective that the Plant, subject to the direction of the Management Committee, will optimize Product production and achieve first decile performance when compared to other ethylene plants in North America.

B. Evidence of Productive Capacity

1. Sanjeev Kapur

[241] Sanjeev Kapur, an independent consultant to the petrochemical industry, was called by Dow as to give opinion evidence as an expert in the design of ethylene plants and the assessment of their performance and capability.

[242] Mr. Kapur completed a bachelor’s degree in Chemical Engineering in 1980 at Panjab University in Chandigarh, India. He has more than 30 years of experience in working for engineering, construction and technology companies. His responsibilities have included technology management, process design and development, marketing and business development, commissioning and start-up, and the hiring, training and development of process engineers.

[243] Mr. Kapur has worked on numerous major projects as a technology consultant and as an expert conducting feasibility and configuration analyses. As an independent consultant, his focus is olefins-based petrochemical businesses and the deployment of technologies for building best-in-class facilities. He has authored and presented papers on topics related to olefins, integration and process technologies, and is an active member of the Ethylene Producers Committee of North America.

[244] In Mr. Kapur’s opinion, the productive capacity of E3 was, at a minimum, ethylene at the average rate of 2.81 BPY from its performance test in May 2001 until the Plant’s mini-turnaround in September 2001; ██████ BPY from the September 2001 mini turnaround until the mechanical completion of the COP in August, 2003; ██████ BPY from August 2003 until the September 2008 turnaround; and ██████ BPY post-2008 turnaround. In his opinion, the ethylene nameplate capacity (ENC) of E3 is ██████ BPY post COP.

[245] Mr. Kapur also was of the opinion that Nova did not achieve first decile performance for production of products.

[246] Mr. Kapur defined productive capability as the ability of the Plant to produce ethylene as it is mechanically set in the ground. He indicated that his concept of productive capability is very similar to the model set out in Schedule E of the OSA, which provides a sample calculation for determining plant capacity from a rate trial, and that the methodology he used to come to his opinion was very similar to the Schedule E methodology.

[247] Mr. Kapur started with E3's test against performance guarantees from May 7 to May 10, 2001 which indicated that E3 met or exceeded the performance guarantees and was proven to produce the equivalent of 2.81 BPY during the test.

[248] He noted that the main factors impacting annual ethylene productive capability are as follows:

- a) Hourly plant capacity for seven furnaces operation – This represents the capacity that can be handled in the plant's back-end separation section when furnace capacity is not limiting and the plant conditions correspond to the first year of operation after turnaround. This capacity was used in calculations when seven furnaces are available.
- b) Hourly plant capacity for six furnaces operation – When one of the furnaces is unavailable due to decoke or maintenance, the plant runs with only six furnaces in operation. This hourly plant capacity represents the capacity that can be handled with six furnaces in operation, and, in this case, plant capacity will normally be limited by the maximum capacity of each furnace.
- c) Conversion of ethane to ethylene – Conversion of ethane to ethylene is one of the parameters in maximizing production, as the unconverted ethane is recycled back and therefore artificially increases the load on processing steps involved.
- d) Ethane content in fresh feed – Ethane content in the fresh feed influences the ultimate ethylene yield.
- e) On-stream factor, availability – The following factors influence plant availability for production:
 - (i) annual on-stream factor for non-turnaround year – The annual on-stream factor accounts for any unplanned shutdowns of the plant that represent loss of production during a non-turnaround year. A higher on-stream factor represents higher capacity utilization.
 - (ii) turnaround cycle between major plant turnarounds – The plant requires planned turnarounds for maintenance and inspection. Longer turnaround cycles normally represent higher capacity utilization.
 - (iii) turnaround duration for major plant turnaround – The duration of turnaround has an influence on the availability of the plant and therefore productive capability.
 - (iv) furnace availability for seven and six furnaces in operation – Furnace availability is influenced by run length between two decokes, decoke duration, number and duration of mini-shutdowns, and number and duration of major shutdowns.

- f) Fouling rate – Fouling of plant equipment between turnarounds can influence the plant productive capability over time. Productive capability of a plant decreases due to fouling in the separation/feed separation sections.

[249] Mr. Kapur calculated hourly capacity rates in Mg/hr for seven furnaces and for six furnaces based on contributing factors that impact the availability of furnaces, such as run lengths, decoke duration, mini/major shutdowns and on-stream factors. He used a single furnace maximum feed rate of [REDACTED] Mg/hr, with a run length of 40 days at maximum feed rate, 50 days with normal feed rate, two decoke days, an on-stream factor of 99%, a turnaround cycle of five years, a turnaround duration of 35 days, mini-shutdown of 12 days, major furnace shutdowns of 32 days, mini-shut downs once every two years with furnaces having one mini turnaround in four years, major shutdowns once every four years per furnace.

[250] He used a figure for loss of plant capacity due to fouling of 0.2% per year.

[251] Nova criticized Mr. Kapur for not using plant data. He confirmed that he reviewed the Plant monthly reports where they had information relevant to a particular time frame. He reviewed the E3 Management Committee minutes. He noted that daily operating logs did not provide much information, other than with respect to specific issues. He stated that he had sourced each input for his calculations from Nova documents, E3 operational data, or both, and demonstrated this through his testimony.

[252] Mr. Kapur noted in his report that the rate trials in February and March 2002 indicated that E3 was capable of producing more than [REDACTED] Mg/hr ([REDACTED]% of original design capacity). The average capacity was [REDACTED] Mg/hr (six furnaces with a feed rate of less than [REDACTED] Mg/hr) and it appeared that operations with six furnaces did not limit capacity.

[253] Mr. Kapur noted that the documentation demonstrated an annual on-stream factor of 99%. Thus, in his opinion, the Plant was capable of producing [REDACTED] BPY from mini-turnaround in 2001 until mechanical completion of the COP.

[254] He indicated that the COP was designed and implemented to increase the productive capability of E3, to utilize some of E3's in-built over-design to achieve [REDACTED]% of hourly design capacity. He noted that the rates achieved by the COP during a rate trial in 2004 exceeded the project objectives, and the results from the rate trial were considered a success.

[255] Mr. Kapur's report states that the rate trial established that hourly capacity with seven furnaces, post-COP, was based on [REDACTED] Mg/hr. However, the Plant had demonstrated sustained higher rates of [REDACTED] Mg/h (during May 11 to 26, 2004) and daily average rates as high as [REDACTED] Mg/h (on May 14, 2004) based on actual operational data.

[256] His six-furnace hourly capacity is based on the data from rate trials for individual furnace capacity at [REDACTED] Mg/h and 65% ethane conversion.

[257] Nova submitted that Mr. Kapur's choice of 2002 rate trial days to calculate hourly capacity was not rationalized, but he testified that, if he had taken the full range of days from the rate trial, his hourly capacity number would have been higher, so he decided to use a lower, conservative number.

[258] While Nova is correct that Mr. Kapur's hourly capacity of [REDACTED] Mg/h has not been proven during six-furnace operation, Mr. Kapur explained how he had translated the data available from seven-furnace operations during rate trials to arrive at his six-furnace hourly

capacity. The fact that Nova had not chosen to operate six furnaces at this capacity does not mean that the Plant was not capable of doing so, given the results of the rate trials. Mr. Kapur's opinion relates, not to how the Plant was operated, but how it was capable of operating.

[259] The total furnace feed of [REDACTED] Mg/h for six furnaces corresponds to [REDACTED] Mg/h ethylene capacity (based on average of 2004 high rate data, which was nearly [REDACTED] Mg/h of ethylene capacity corresponding to almost [REDACTED] Mg/h of furnace feed, taken from actual operation data). Using average data from rate runs, six-furnace capacity is based on [REDACTED] Mg/h as an alternate approach. [REDACTED] Mg/h capacity was used for six-furnace operation.

[260] Thus, Mr. Kapur calculated ethylene productive capability for a turnaround duration of five years (2003 to 2008) after implementation of COP, which would result in [REDACTED] BPY.

[261] Mr. Kapur noted that E3 went through a turnaround in 2008 to address regular maintenance, inspection and cleaning. His calculation of productive capability for this period is based on a capacity run in early 2009. In his view, this productive capability was corroborated by industry experience based on creep, or the tendency of the productive capability of a plant to increase over time due to better operational skills.

[262] Mr. Kapur testified that, in general, his industry experience is that the increase in productive capacity due to creep always more than compensates for the decline in capacity due to fouling. Even so, he did not use any factor for creep in his calculations.

[263] The hourly capacity based on seven-furnace operation and run length were the only changes relative to the previous period. He summarized the reasons for these changes:

- a) Seven-furnace hourly capacity was changed from [REDACTED] to [REDACTED] Mg/h based on a rate trial from March 13 to 16, 2009. During this rate trial, the Plant could achieve [REDACTED]% capacity without by-passes open; and
- b) run length basis for normal feed was changed from 50 days to 70 days and this change was based on Nova's own assessment as well as actual operating data.

[264] He therefore calculated ethylene productive capability for a turnaround duration of five years (2008 to 2013) as [REDACTED] BPY. This is much higher than E3's initial design guarantee of 2.81 BPY.

[265] Mr. Kapur noted that E3 could achieve higher productive capability post-COP, based on plant maximum rates and Nova documented performance. He reviewed the following operation parameters, which in his view have been demonstrated through E3's historical performance:

- a) hourly capacity – seven furnaces: [REDACTED] Mg/h ([REDACTED]% of original design);
- b) run length for maximum feed: 50 days;
- c) furnace mini-shutdown: eight days; and
- d) furnace major-shutdown: 21 days.

[266] Based on these historical performance levels, Mr. Kapur was of the opinion that post-COP, E3 had achievable productive capability of [REDACTED] BPY.

[267] Mr. Kapur indicated that, in his view, his productive capability determinations are conservative. His analysis of available operating and performance data confirmed his opinion, as did his industry experience and reference to Nova's internal analysis. He also calculated E3's

ethylene nameplate capacity (ENC) using Schedule E methodology from the OSA and came up with a value of [REDACTED] BPY.

[268] Mr. Kapur testified that the methodology that he used for his opinion is a “fairly common” and “fairly well accepted” methodology in the industry, and is similar to the methodology that Nova itself used from time to time in its analysis of plant capacities.

[269] Nova submits that Mr. Kapur failed to account for actual conditions encountered. This is not accurate: it is clear that Mr. Kapur distinguished in his opinion between productive capability and utilization. As he noted in cross-examination, what he did was to analyze all the data that was available to him, which included details of mechanical constraints from time to time. From that information, he assessed the capability of E3. By way of example of what his opinion identified, he referred to the allegation of lack of ethane. If that constraint existed, the Co-owners of E3 would not be able to use the productive capability of the Plant, but the productive capability would still exist. The lack of ethane would be a utilization issue.

[270] Mr. Kapur was also very clear that his opinion was not a theoretical opinion, that he looked at all the data available on E3, and that his analysis was “very much based on the E3 capability, and it is not a standard design basis; it is based on what E3 is actually physically on the ground and how it has operated.”

[271] He acknowledged that certain mechanical issues may have occurred in E3’s operational history that decreased the utilization of the Plant, but pointed out that “if the business requires you to do certain things, you will make all efforts to get there. But if business doesn’t require you to achieve certain capacity or require you to run at higher levels, you can wait. It all depends on what the motivation factors are.”

[272] Mr. Kapur testified that his industry standard methodology accounts for all the operational maintenance issues that normally would be seen in the industry and how plants would normally achieve their capabilities “if you do all the maintenance and operation in a timely fashion.” He also noted that his methodology reflects all expected and normal industry practices, that it is expected that problems will be fixed, but “it can happen the business really doesn’t require that capacity. In those cases, you may not address the problems because you’re trying to minimize your costs on maintenance or – if you don’t have the need”.

[273] Mr. Kapur was cross-examined extensively on his opinion, but was unshaken. Nova submits that his opinion suffers from the following defects:

- a) Mr. Kapur’s lack of operational experience caused him to overlook mechanical limits on E3’s capacity.

While he acknowledged that he had never operated an ethane cracker, Mr. Kapur has extensive experience in process design, process development, and implementation of that design in the field. He has worked on around 50 projects similar to E3, about one-third of which involved ethane as a feedstock. He has provided assistance to engineers in the field, helping with performance test evaluations, helping to expand or debottleneck existing facilities, looking at constraints and advising how to remove them. It was clear from his testimony, as well as his resume, that Mr. Kapur is eminently qualified to give an opinion on productive capability, and also clear that he did not overlook the mechanical issues in E3’s performance history. As he indicated, the methodology he used is

solid, and it “allows for all the regular maintenance, and if you address these issues on a proactive timely basis, you should be able to achieve the productive capability, so it’s not a theoretical number”. Nova suggests that accepting Mr. Kapur’s assessment would require that the evidence of the plant witnesses be rejected. That is not the case. The admissible evidence of the plant lay witnesses relates to the actual utilization of E3, not its productive capability.

- b) Mr. Kapur’s on-stream factor of 99% was far higher than E3’s actual on-stream time.

In his testimony, Mr. Kapur demonstrated from documentary evidence that, once *force majeure* issues are removed from the calculations, his opinion that E3 consistently achieved better than 99% onstream time in non-turnaround years was valid. His opinion was supported by the testimony of Mr. Gent, who was acknowledged to be Nova’s most qualified lay witness. As Mr. Kapur explained, 99% is not a theoretical number:

We started off with this plant in the process basis of design, which was 98 percent with overall 2 percent provision for the unplanned outages as we saw a moment ago in the process design basis. And then we look at various documents, which [have] Nova’s internal assessment in there, and those were 99 percent. So we’re talking about these numbers very specific to the facility E3 here...

- c) Mr. Kapur’s fouling factor was far below the fouling actually experienced at E3.

The fouling factor of 0.2% was also used by Mr. Wilke of Nova in his ENC redetermination proposal. Mr. Kapur explained his use of the 0.2% fouling factor in his calculations. He noted that, from the COP time frame on, fouling was only a limiting constraint when E3 was operating with seven furnaces because that was when the Plant’s back-end separation section was limiting in capacity. Mr. Kapur supported his use of the fouling factor with plant production data. When pressed on cross-examination, he noted that the time Nova actually took to address the fouling issue was “unprecedented in my experience in the industry”. He suggested methods by which the fouling issue could have been mitigated, and noted that he struggled to understand why the problem was allowed to go on for as long as it did. Other witnesses have commented on the extent that fouling actually interfered with productive capability of E3 in a manner that supports Mr. Kapur’s use of the 0.2% factor.

- d) Mr. Kapur used furnace capacity and feed rates that were higher than E3 was capable of achieving.

Mr. Kapur demonstrated through his testimony and use of testing documentation from 2002, 2003 and 2006 that the rates he used were achievable. Again, he emphasized the difference between productive capability and utilization, and emphasized that productive capability can be present even when it is not utilized. When challenged on cross-examination about whether he would respect the judgment of the operators, he responded that, as he had done, he would look at all

the documentation in coming up with productive capability numbers that were achievable. He referred to documentation that demonstrated that Nova personnel had come to the same conclusion with respect to furnace capacity and feed rates including in their dealings with the Solomon Surveys and Submissions to the Alberta Government. He noted that Nova had made no attempts to test a [REDACTED] Mg/hr feed rate after the COP implementation.

e) Mr. Kapur did not take into account five-furnace operation.

Mr. Kapur explained that, in his view, avoidance of five-furnace operation was a matter of scheduling. Testimony from Nova lay witnesses indicates that Nova took a relaxed view in bringing furnaces on line when high production was not required by the EBT. I cannot disagree with Mr. Kapur's opinion that, for the most part, five-furnace production could be avoided by planning and by diligent normal maintenance.

[274] When asked whether he would accept it if the operators told him that they could never have achieved [REDACTED] Mg/hr through six furnaces, he responded:

I would at least expect that, if there are written COP objectives on which the whole COP debottlenecking was done, that it would have been attempted, and even if it was not attempted, to ... before the Callidus burner replacement, it should have been at least attempted after the Callidus burner replacements, and -- well, you did show [me] times they were running less than six furnaces. I didn't see any of those time frames the furnaces were attempted to run at [REDACTED][Mg/hr]... with due respect, these are one-line statements, and normally I have done all my calculations based on a lot of data, and that tells me more.

[275] Mr. Kapur was clear that his productive capability opinion was not maximum capability, but the productive capability that could be achieved easily by E3, based on a conservative approach. From his testimony, tested by cross-examination, I accept his opinion as valid and reasonable.

[276] Mr. Kapur's opinion that Nova did not achieve first decile performance for production of products was based on his view that the Solomon benchmark of "capacity utilization" is the appropriate method of determining whether Nova met the objective set out in section 4.3(b) of the OSA. He noted that capacity utilization measures the percent of ethylene capability that is utilized by a plant in a given year and that this is the indicator of success in optimizing product production. Solomon groups plants in four segments, each representing 25% of the participating plants. These segments are referred to as quartiles, with the first quartile being the best performers.

[277] E3 participated in Solomon Benchmarking Surveys for 3 years (2003, 2007 and 2011) since start-up. Nova provided the information for these studies. Mr. Kapur noted that in all survey results, E3 did not achieve first decile performance when compared with other ethylene plants in North America.

[278] In 2003, between 51 and 75% of the participants performed better than E3. The data reflects that approximately 63% of the participants outperformed E3.

[279] In 2007, between 51 and 75% of the participants performed better than E3. The data reflects that approximately 60% of the participants outperformed E3.

[280] In 2011, between 76 and 100% of the participants performed better than E3. The data reflects that approximately 80 to 90% of the participants outperformed E3.

[281] E3 was ranked 33 out of 36 participants in North America for ethylene capacity utilization.

[282] It is clear from the analysis of the data that Nova did not achieve first decile performance in capacity utilization, which I accept from Mr. Kapur's opinion is the appropriate metric for measuring productive capability.

2. Chris Wallsgrove

[283] Chris Wallsgrove was called by Nova and was qualified to give opinion evidence as an expert with respect to the design of ethylene plants, including the assessment of plant performance and capacity.

[284] Mr. Wallsgrove obtained a Bachelor of Chemical Engineering at the University of Bradford, UK in 1969. Since then, he has had jobs and projects in Europe, the US, Canada and the Middle East, and has been involved with the evolution of ethylene technology. His experience includes petrochemical and refining technology development, plant operations, process design, marketing, business development, commissioning, startup, plant and project troubleshooting, training, project engineering, engineering management, research, conceptual process configuration, and proposal preparations and presentation.

[285] Mr. Wallsgrove has been an independent consultant since 2013. He was involved in the E3 design, and in considerations about expanding ethylene production at the Joffre Site.

[286] Mr. Wallsgrove was retained to review and provide a rebuttal report to Mr. Kapur's report in light of his experience and knowledge of industry-accepted practices.

[287] In his report, based on his review of limited documents provided by Nova counsel, Mr. Wallsgrove estimated E3's capability to be █████ BPY. At trial, he testified to an alternative calculation that suggested a capability figure of █████ BPY.

[288] Mr. Wallsgrove used the term "available capacity" in his report, a different concept of capacity from the one that Mr. Kapur used. He defined available capacity as "... on a long-term basis, how often, as a fraction of a year, say, is the plant delivering the designmental [*sic*] revenue to the customer, the owner, and that includes running at lower throughput. It includes off-spec operation, and it includes anything that detracts from the ability to run at nameplate."

[289] Mr. Wallsgrove's opinion on effective availability was 95.7%, which he reached initially from his experience, and then corroborated by taking data from an April 2015 article by HB Solomon Associates LLC entitled "Top 7 Causes for Lost Olefin Production". He added the data from the article together and subtracted the resulting 4.3% from 100%, although he conceded that the plants discussed in the article are not directly comparable to E3.

[290] As Mr. Kapur points out in his response report, the 99% that he used in his opinion was based on the historical performance of E3.

[291] In calculating E3's capacity, Mr. Wallsgrove used 8400 hrs per year of production, even though in the 2003 COP, the Co-owners used the design number of 8500 hours. He used a 40-day turnaround number, even though the process design basis for E3 uses 32 days, and the COP and Mr. Kapur use 35 days. Mr. Wallsgrove was aware that Nova's own proposal for

redetermination of E3's ENC in 2007 prepared by Mr. Wilke used 8500 hours and an onstream factor of 99%, and that Nova had recorded an onstream factor of 100% in 2006 and 2007, but he testified that, without a persuasive explanation, those numbers did not coincide with his definition of effective availability.

[292] As noted by Dow's expert, John Holloway, Mr. Wallsgrove's conclusion that E3, as it exists today, could be expected to produce [REDACTED] BPY uses an on-line availability that is less than E3's actual performance and less than E3's COP design. Correcting Mr. Wallsgrove's calculated on-line availability to E3's actual availability over the evaluation period results in an E3 productive capability of [REDACTED] BPY, which is consistent with Mr. Kapur's opinion with respect to productive capability. Mr. Wallsgrove failed to consider Nova's own reported capacity for E3, including E3's rate trial results that demonstrate E3's productive capability greater than Mr. Wallsgrove's reported capacity.

[293] Mr. Wallsgrove stated he had no reason to disagree with Mr. Holloway's comment mathematically. Given that I accept Mr. Kapur's use of 99% annual on-stream time, there is effectively little difference between Mr. Kapur's productive capacity and Mr. Wallsgrove's adjusted calculation.

[294] Mr. Wallsgrove's opinion on the meaning of "first decile performance" was based on a limited review of documents, and relied not on the language of the OSA, but on the original design project objectives. For that reason, I prefer the opinion of Mr. Kapur.

[295] Mr. Wallsgrove agreed that keeping plant maintenance costs down for a period of time can have implications elsewhere. He noted that:

... if you neglect maintenance, ... [the] primary job of maintenance is preventive and spotting when things reach the end of their life and changing them before they reach the end of their life. If you minimize that work, in other words, you don't necessarily analyze every pump, every compressor, eventually the plant is going to come crashing down because something breaks, and yet, the objective of cost-effective maintenance should be to prevent those breakdowns.

[296] He acknowledged that one way of saving money on maintenance would be by deferring it or by extending furnace decoke cycles beyond their design lengths. When that happens, Solomon metrics, such as capacity utilization, can slip. He referred to this as "common sense."

[297] Although Mr. Wallsgrove "strongly disagreed" with Mr. Kapur's feed rate of [REDACTED] Mg/hr as non-sustainable, the evidence is clear that E3's furnaces operated regularly with capacities higher than the 53 Mg/hr that Nova submits is appropriate. In the absence of rate trials that would test the rate feed, Mr. Wallsgrove was of the opinion that a feed rate of [REDACTED] or [REDACTED] Mg/hr would be possible for E3. In fact, the furnaces operated at those rates and higher from time to time.

C. Nova Defence of Mechanical Constraints

1. Introduction

[298] As previously noted, Nova submits that E3 was plagued with a series of unanticipated mechanical constraints that impacted production at the Plant. Both parties led expert evidence on the issue of mechanical constraints. Nova also led evidence from Plant operations personnel that it submits demonstrates that Nova was innovative and resourceful in prudently resolving these

constraints. Nova submits that, at all times, it produced as much ethylene at E3 as was mechanically possible with the available ethane feedstock.

2. John T. Holloway

[299] John Holloway testified as an expert on behalf of the Dow plaintiffs. He was qualified to give opinion evidence on the operation and maintenance of ethylene plants, including the effect of such operations and maintenance on productive capability.

[300] Mr. Holloway earned a Bachelor of Science and Masters of Science in mechanical engineering in 1966. Upon graduation, he joined Dow Chemical Company, where he worked for more than 30 years. He had various positions with responsibilities in operations and maintenance, engineering and technology management. He also played a role in evaluating potential ethylene plant acquisitions and in the expansion of existing Dow facilities.

[301] He now lives in central Texas and has been a Senior Technology Consultant with the Sinclair Group, Ltd. since 1998, providing services to industries including the petrochemical industry. The majority of his work involves major mergers and acquisitions, assisting in the due diligence process.

[302] Initially, Mr. Holloway and the Sinclair Group were retained to evaluate E3 and to respond to any expert reports submitted by Nova with respect to E3's operations and maximum production capability. Mr. Holloway was asked to independently evaluate whether there was anything apparent from the E3 operational documents produced in the litigation that indicated that E3 could not have achieved its maximum production capacity from the performance tests in 2001 through 2012.

[303] Mr. Holloway indicated in an opinion dated January 16, 2014 that he did not find any uncommon operational issues. In his opinion, the operational issues identified in the produced reports and documents should not have prevented E3 from operating at maximum production capacity over the time period in issue. He noted that prudent operators expect the kinds of operational issues identified and plan for them accordingly.

[304] Mr. Holloway's first report was based on a review of all of the following produced documents among others:

- a) Joffre Olefins/Polyolefins Weekly Reports and OPO Bi-Weekly Reports;
- b) JPPT Meeting Highlights;
- c) Ethylene 3 Management Committee meeting minutes;
- d) E3 Daily Status Updates;
- e) E3 Daily Production Reports;
- f) E3 Monthly Reports;
- g) Solomon Study Reports from 2003, 2007 and 2011;
- h) Process flow sheets; and
- i) E3 Historian data.

[305] He or a member of his four-person team also reviewed presentations made by Nova personnel, some emails and pre-trial questioning transcripts.

[306] Mr. Holloway testified that, after reviewing documentation and providing his report, he received rebuttal reports from ESI and Mr. Wallsgrove in April 2014. After commencing a review of these, he received a second ESI report that was different from the first. He issued a sur-rebuttal report dated September 24, 2014. For the purposes of his second report, Mr. Holloway and his team made a list of the issues that were identified in the rebuttal reports and analyzed them.

[307] After his second report in December 2014, Mr. Holloway and his team received tens of thousands of additional documents from Nova. He and his team members reviewed these new documents. Some of them they had already received. The new documents included the entire operating logs, including actual operating instructions, which had not been included in the initial production. They also included summary documents prepared by Nova personnel on some of the major issues at E3.

[308] Mr. Holloway testified about various issues that had been identified in the rebuttal reports, Nova's opening statement at trial and the questioning of Yost Kieboom, one of Nova's lay witnesses.

[309] Mr. Holloway defined productive capability as a plant's ability to produce ethylene over at least a year, perhaps five years, between planned turnarounds.

[310] It was Mr. Holloway's opinion, stated in his sur-rebuttal report, that, with few exceptions, Nova has not operated E3 in a manner that achieves its productive capacity. He noted that Nova has run E3 at reduced furnace operating rates, both with respect to feed rates and conversion rates. In addition, Nova's mode of furnace operation has never tested the true productive capability of E3, but rather placed an unnecessary load on the finishing section, primarily the C2 Splitter, while producing ethylene at lower-than-productive capability rates. It was Mr. Holloway's opinion that E3's productive capability is much greater than what Mr. Wallsgrove and ESI have reported.

[311] He supported Mr. Kapur's capacity opinion, and found his methodology and data to be correct and consistent with common industry practices and the operating data and experience of E3. He agreed that E3's mechanical availability was 99%. He explained that the Stone & Webster manufacture original process guarantee stipulated a guarantee of 98% availability. He noted that within the first three years of operation, E3's availability was actually a little greater than 98%, and "then after operating the plant for three years, Nova decided that ... the real availability should be 99%, and lo and behold, they demonstrated that".

[312] Mr. Holloway noted the difference between 99% availability, which Mr. Kapur explained is availability between major turnaround years, and 97 or 98%, which would include all outages, planned and unplanned, such as power failures.

[313] He noted that he had reviewed the outages that occurred at E3 during the period at issue and concluded that an average of 11 days per year off-line as a design basis and as used by Mr. Kapur in his productive capability calculations is reasonable and achievable. Under lengthy and vigorous cross-examination, he explained and maintained his opinion.

[314] Mr. Holloway reviewed the operational issues that had been raised by Nova as constraints to production in the Wallsgrove and ESI reports, the Nova opening statement and Mr. Kieboom's questioning, analyzing each as follows:

- a) He explained why weather did not constrain E3, since the design of E3 had included a number of features that suited it for cold temperatures. He also noted that there was only one minor mention of weather issues in the operating documentation;
- b) He explained why size did not constrain E3, and why size was in fact an advantage, and the design of E3 was an improvement over older plants;
- c) He identified two design issues that he considered to be of note: the depropanizer tower issue and the problems with the furnace burners. Mr. Holloway acknowledged that the depropanizer tower problem was a design issue. He noted that ineffective modifications had been attempted in 2000, but that the problem with the depropanizer tower and the furnace burners had been dealt with in the September 2001 mini-turnaround. He gave credit to Nova for identifying the problems and fixing them. Mr. Holloway acknowledged that while the depropanizer issue may have caused a loss of production early on, E3 could still operate at a high rate. He testified that he had not identified any significant design-related issues with the operations at E3 after 2001;
- d) He addressed power outages. He identified four power failures in 12 years of operation and analyzed them on a time line. Three of the outages occurred by January 2004 and one was in March 2011. He did not find the fact of four power outages surprising, but the real point for him was “if you look at the availability of E3, it was not impacted by power outages”. In his opinion, power outages may have impacted plant utilization, but not productive capability, which is measured in years, and not weeks or months. He noted that the reliability data he reviewed indicated that, over time, power outages were not a problem;
- e) Mr. Holloway discussed overheating of the acetylene reactor. He conceded that there had been two incidents, that these incidents indicated an issue with the plant operators being able to react in time to the problem, and that this led to operator retraining and improvements in the process control system. He noted the problem was resolved in 2000, with a final solution in 2001, and that the issue has never shown up as a production constraint since;
- f) He reviewed the C2 splitter fouling issues, and ESI’s claim that capacity was reduced to 95% between June 30, 2010 and October 19, 2010, and then limited to █%. Mr. Holloway again analyzed the issue on a timeline, noting that fouling in E568 was noticed by staff in October 2007 but that it took over two years to come up with a solution, which he characterized as fundamentally slow. In his view, the reason for this was that Nova did not need the ethylene. The E568 issue was finally resolved by changing the E568 core in October 2010. He noted that, in the meantime, in March 2009, E3 ran at █% of design nameplate, so the problem was obviously not a restriction at that point in time. E3 ran at █ BPY actual production in June/July of 2012. In July, fouling in E565 was discovered, but it was not resolved until 2014, which again, Mr. Holloway noted, was “just slow”.
In summary, Mr. Holloway characterized the C2 splitter fouling issue as a restriction, but not as a constraint, because, in his view, Nova never tested the constraint. Over the time period, E3 averaged 2.6 BPY of production. He noted that the claim that E3 was limited to 95% between June 30 and October 19, 2010 was never tested because the plant never reached 95% during this period. Mr. Holloway did not agree with the

submission that the plant was limited to █████% thereafter, because he indicated that there were operational fixes, such as increased conversion, that could fix the problem.

- g) With respect to the TD405 issue, Mr. Holloway noted that this piece of equipment operated from start-up to 2003, and that then, minor wear was fixed. It then operated from mid-2003 to 2008, and showed wear, so the lift rods were changed. He did not feel that this was unusual, and noted that pieces of equipment that show wear should probably be changed at every turnaround. In July 2010, Nova discovered the rods were wearing because E3 was being operated at such low rates. He indicated that there would be no issue at the high operating rates. ESI claimed production was limited to 100% in October/November 2011, and the rods were changed for a third time. Mr. Holloway's concern was that it took a long time to solve a problem that could have been easily fixed. In his opinion, there was no impact on E3's productive capacity. He pointed out that Nova had never tested the alleged constraint;
- h) The next issue that Mr. Holloway addressed was the ethane superheater, E650. ESI alleged that fouling in the E650 constrained production. Mr. Holloway noted that the issue was discovered in 2003, a solution was found that made a major improvement, fouling continued and in June 2005, Nova did a more thorough cleaning and the E650 was back to design conditions with a slight but acceptable pressure drop. It continued to foul, and Nova came up with an experimental operating procedure that was acceptable. In 2008, Nova cleaned the fouling again. Mr. Holloway suggested an operational fix, but pointed out that he had never seen this fouling show up as a production constraint in the Nova documentation;
- i) Mr. Holloway commented on the issue of debris in the cooling water system, and ESI's comment that, in 2011, "it appears capacity was lost but the problems have been intermittent". He described this as an isolated occurrence with no evidence of how it had affected production, other than the Plant being down for a short period of time to clean the exchangers;
- j) The next issue was the de-ethanizer exchanger, E502, and the concern of excessive vibration during a pre-COP rate trial, which, he noted, had been raised by Nova for the first time during the trial. Mr. Holloway was of the view that this issue was a major part of the COP and that, following replacement of the exchanger, it was never a problem. He indicated that this had no impact on production, before or after replacement;
- k) Mr. Holloway addressed the complaint that the K400 seals had leaked on four occasions during the period at issue. He attributed the problem to operator error and natural wear, and noted that, other than the four occasions when the plant was down due to this phenomena, the failures did not limit production;
- l) Nova submitted in its opening statement that heat transfers in the C2 refrigeration unit caused a small loss in November 2008. Mr. Holloway investigated this, and found a note in documentation that indicated that on one day, there was a process control issue within the C2 refrigeration system. He noted that the report that mentioned the issue listed "nomination/business plan" as the major constraint;

m) Mr. Holloway discussed the variety of furnace issues raised by Mr. Wallsgrove, ESI and Nova in detail. He characterized as maintenance issues the USX nozzle issue, the issue of the burners, including tips, the coils issue, the crossover piping issue and the variable frequency drives (VFD) and fan bearing issues. He addressed ESI's availability comments separately. His comments on the maintenance issues, in summary, are as follows:

- (i) USX nozzles – eventually all were changed, and he would expect them to be changed. If this is done in conjunction with a coil changeout, there should be no impact on production;
- (ii) burners, including tips – this caused serious problems in early days, and, as acknowledged previously, was a design issue:
 - by the September 2001 mini-turnaround, the burners were modified and functioning normally;
 - after that, some secondary burner tips were plugging, which is not unknown to occur. In Mr. Holloway's opinion, this could be remedied by removing and cleaning them, but he conceded that this is "a nuisance;"
 - the burners were changed to Callidus burners over roughly a three-year period. This may have been a safety concern, but not a limit on production when production statistics during these years are considered, and there were no problems after the change-out;
- (v) coils – Mr. Holloway noted that these need to be replaced every four years and issues of blisters, high metal temperature and bulges are not unusual. The pattern of coil changes at five to six years indicated to him that Nova was not pushing their furnaces hard enough and was "babying" the furnaces. His assumption was that Nova did not need the ethylene.

On this issue, he noted that Nova was not following the proper procedure when experiencing high tube metal temperatures, that it should have been decreased conversion and decoked as soon as possible. Nova was extending runs between coking too long, for an average of 73 ½ days when it should be about 40. This was also an issue of feeding coils less on lower conversions, or "babying" the furnaces;

- (vi) crossover piping – This was raised by Nova since the trial began. Nova had concluded that reducing sulphur in the system had led to leaks in piping. In Mr. Holloway's view, this did not impact production. This was done between 2010 and 2012. Since 2011 and 2012 were, from the data, good production years, no matter how complex the changeover was, it was managed effectively and did not impact furnace availability; and
- (vii) VFD and fan bearings – This was also raised by Nova since the trial began. Mr. Holloway indicated that this equipment can be spared. If it is a continuing problem, the equipment should be changed before it failed. However, in his review, this does not appear from data to have impacted furnace availability.

[315] With respect to ESI's discussion of furnace availability, Mr. Holloway noted that he accepted ESI's numbers for the purpose of his opinion, even though he knew that there were periods of time when the furnaces were not maintained or worked on in a timely manner, when furnace maintenance was delayed or stretched out to save maintenance costs. Mr. Holloway and his team took the ESI "furnaces available" numbers, raised the conversions of the furnaces to the design conversion of 65%, and calculated production in BPY at three different feed rates. They assumed in the September report a full year of operation of 8,760 hours, but for the purpose of his opinion at trial, he changed to an 8,500 hours per year basis, or 97% of what was originally in his report. At 53 Mg/hr, the original design basis, average production was █████ BPY. At █████ Mg/hr, it was █████ BPY. At █████ Mg/hr, the COP design basis, it was █████ BPY. Mr. Holloway compared in graph form the time set out in the COP objectives for furnace turnaround, when coils were changed (being 32 days under COP objectives, 30 days under Schedule E and Nova's demonstrated change time of 21 days) to the longest actual downtime per furnace in the time period at issue. The actual production numbers were far higher than even the 32 days of the COP objective. Mr. Holloway's opinion from this data was that Nova did not need the furnaces, and therefore left them down from time to time.

[316] Mr. Holloway's conclusion was that furnaces were not a production constraint to E3, that the furnaces were not operated to maximize production, that the furnace issues, though complex, were not unusual and were managed, and that furnace availability was more than sufficient to meet E3's needs.

[317] Finally, Mr. Holloway graphed the mechanical issues on a timeline and compared them to actual production at E3, and noted that there was no relationship.

[318] Mr. Holloway was a highly professional and candid witness. He was clearly very knowledgeable about the operation and maintenance of ethylene plants. He referred to work done by his team when it was appropriate, and displayed no bias against Nova in his evidence.

[319] He explained the errors in his September report's Statement of Unnecessary Days Off-line by pointing out that he and his team had not received the full disclosure of operational documents until after his report had been completed. As he noted, they did not receive the entire "operators log" until a few months before trial, months after he had completed his original report relying on "raw" data. He did not attempt to argue the point when the new disclosure appeared to contradict the data on which he had relied.

[320] I do not accept Nova's submission that Mr. Holloway was a biased witness. He had been, of course, a long-time Dow employee and in the late 1990's was a consultant to Dow. His particular experience, first with Dow in best practices and trouble-shooting, due diligence in evaluating the acquisition of new plants and working with plants to identify incremental expansion, and later with the Sinclair Group in consulting on mergers and acquisitions, verifying the assets, determining whether they were capable of producing, whether there were plant health issues, how much it would cost to repair the issues, energy performance and opportunities to improve plant performance, all made him an excellent candidate for the opinion he was asked to give.

[321] I did not detect that his experience with Dow imbued his opinion with anything inconsistent with good maintenance and operations practice. He certainly had a fulsome and detailed knowledge of the mechanical issues that Nova submits affected the productive capability of E3.

[322] Dow points out that Nova made no objection under Rule 5.36 of the *Alberta Rules of Court*, AR 124/2010, to the admissibility of Mr. Holloway's report. As noted by Cromwell, J in *White Burgess Langille Inman v Abbott and Haliburton Co*, 2015 SCC 23 at paras 40 and 53, independence and impartiality bear not just on weight but also on admissibility of the evidence. Concerns about independence and impartiality are best addressed at the qualification stage. Mr. Holloway was cross-examined at that stage about his relationship to Dow, but no argument was made about bias at that time. I agree with the Court in *South Yukon Forest Corp v R*, 2010 FC 495 at paras 1202-1207, rev'd on other grounds 2012 FCA 165, leave to appeal to SCC refused, 34936 (December 6, 2012) that, as a matter of trial fairness, Mr. Holloway should have had an opportunity to address the allegation of lack of independence during his testimony. However, this failure does not prejudice Mr. Holloway in this case, as I perceived no failure to give his evidence professionally, based on his experience and a thorough review of the operational documentation, despite having to cope with successive waves of production.

[323] Nova makes the argument that, in the absence of any analysis of operational issues in Mr. Holloway's first report, "Nova did not consider the mechanical constraints to be the issue [Dow] made of [them] until Mr. Holloway's sur-rebuttal report in September, 2014". This is odd logic: Mr. Holloway did not consider the operational issues to be constraints on productive capability until Mr. Wallsgrove and ESI raised them, and therefore did not analyze them in detail until they were raised by Nova's expert witnesses.

[324] Nova submits that Mr. Holloway was in error for some references he made to the "Plant Production Restrictions" portions of the Manufacturing West Reports. These monthly reports provided by Nova to Dow are acknowledged by Nova as having the most accurate reports of what Nova says were constraints on production. Nova submits that Mr. Holloway used the wrong table in the reports for identifying constraints. Mr. Holloway testified that he used the "Plant Production Restrictions: Explanation" rather than the "Plant Production Restrictions: Constraints" table. He testified that the latter table, which appears to measure "constraints" in hours of constraint rather than in pounds of product lost, gives no measure of the severity of the alleged constraint or whether it had a material effect on production in the period, and it didn't "make sense" to him to use it. Later evidence at trial from Mr. Wilke disclosed that in July 2012, near the end of the damages period, Nova stopped including the table used by Mr. Holloway, which measured constraints in terms of pounds of product. It was not until January 2015, that Nova moved to a new system to report constraints as a production shortfall in pounds against maximum production capacity.

[325] I accept that, given Mr. Wilke's testimony of the difference between the tables, Mr. Holloway was mistaken in referring to the one he did, but that does not, as Nova submits, indicate that Mr. Holloway improperly failed to identify any constraints to achieving Mr. Kapur's productive capacity. Although he referred to this table, it was clear that he made an exhaustive review of the E3 records in coming to his opinion that there had been no unusual operational issues impacting Nova's ability to run E3 at its productive capacity. When ESI's rebuttal report suggested otherwise, Mr. Holloway made a second exhaustive review of the records, and he further confirmed that each of the issues identified by Mr. Wallsgrove, by ESI and by Nova at trial were overstated, or that Nova failed to address them expeditiously, or that no actual constraint was ever demonstrated. He confirmed again that these issues should not have impacted Nova's ability to run E3 at its productive capability.

[326] Nova seeks in part to contradict Mr. Holloway's opinion through the inadmissible opinion evidence of Nova lay witnesses. The issue is not the credibility of the witnesses, but the fact that, had Nova sought to have them give opinion evidence, they should have been qualified as experts, subject to cross-examination on their qualifications, advance notice of their opinions and scrutiny of the basis on which they formed their opinions.

[327] Nova also faults Mr. Holloway for what it characterizes as omissions in his September 2014 report, despite the fact that Mr. Holloway described a massive receipt of records from Nova after the report was issued, and addressed all of the issues from his review of the newly produced records at trial.

[328] The following is an analysis of Nova's additional criticisms of Mr. Holloway's opinions:

- a) Nova suggests that Mr. Holloway was unaware of the instability in the C2 splitter system at an early period of time, and he ignored an issue of acoustic vibrations in E-502. However, Mr. Holloway testified about both these issues in his examination-in-chief and in cross-examination. He was clearly aware of them, but was of the opinion that they were not listed in the documentation as a constraint.
- b) Mr. Holloway testified that fouling in the C2 splitter system was a restriction but not a constraint because Nova "never got to 95% during that time". Although Mr. Holloway was not cross-examined on that issue, Nova submitted in its written argument that the Nova Historian shows that E3 reached 95% of hourly nameplate capacity for nine days in August 2010, with Mr. Kieboom later testifying at trial that this was a test of the constraint.
- c) Nova submits that Mr. Holloway was confused about his task based on a cross-examination about production goals. Read in context, this exchange during cross-examination does not indicate that Mr. Holloway was mistaken about his retainer to produce an opinion on whether there were constraints on E3's productive capability.
- d) Nova counters Mr. Holloway's suggestion that there was an operational fix to the problem of polyethylene fouling in the reboiler with Mr. Kieboom's later opinion on the issue. Mr. Kieboom was not qualified to give expert evidence, and I accept Mr. Holloway's expert opinion on this issue.
- e) Nova faults Mr. Holloway for indicating that he had not seen the E3 joint venture quarterly report in which the reboiler constraint was documented. On cross-examination, Mr. Holloway indicated that, while he had seen the monthly reports, he had not seen or reviewed the quarterly reports. While it was suggested to him that at a certain point, the monthly reports were replaced by quarterly reports, Mr. Holloway was firm in his testimony that he and his team had monthly reports for the period at issue. The quarterly report at issue was for the third quarter of 2012, near the end of the damages period. In written argument, Nova submits that the quarterly reports were produced before Mr. Holloway issued his written opinions. I found Mr. Holloway to be a credible witness, with a remarkable memory for thousands of reports produced over an eleven-year period. I believe that, for whatever reason, he had not received this quarterly report for review. However, he addressed it when he was presented with it, and it did not affect the validity of his opinion.

- f) Nova submits that Mr. Holloway's calculation of the reboiler limitation was incorrect mathematically, and that it should be ██████% instead of ██████%. This is an issue of methodology and is not a major issue that would affect his opinion or his credibility.
- g) Nova submits that Mr. Holloway's calculation that a feed rate of ██████ Mg/hr would have been sufficient to run E3 at its full COP productive capability was false by his own admission in cross-examination. This is a mischaracterization of Mr. Holloway's evidence. He was clear that his calculations were an example of furnace capability at different feed rates. He noted that E3 had operated with six furnaces at 53 Mg/hr for extended periods of time and ethane vaporization was not a limitation, but that Nova had never operated at ██████ Mg/hr.

[329] Mr. Holloway was the most experienced and convincing expert witness with respect to the issues on which he was asked to opine. He answered questions directly and thoughtfully. I accept his opinion that each of the mechanical issues identified by Mr. Wallsgrove, by ESI or by Nova at trial were overstated, or that no actual constraint was demonstrated. I also accept his opinion that Nova failed to address mechanical issues expeditiously, which was corroborated by the testimony of several of the Nova lay witnesses.

3. Scott Ferrigno

[330] Scott Ferrigno was the author, with Mark Woods and Shane Steagall, of a report dated January 14, 2014 relating to Nova's counterclaim against Dow, which will be referred to in the counterclaim decision. The authors also prepared a rebuttal to the expert report of Mr. Kapur dated April 15, 2014, and an update to their report dated June 15, 2015, responding to Dow's damages expert, Charles Mikulka. The three authors operate under the aegis of Ethylene Strategies International, LP (ESI), a consulting company run by Mr. Woods.

[331] Mr. Ferrigno earned a Bachelor of Science in Chemical Engineering, as well as a Master of Science in Chemical Engineering, focussing on modelling and simulation work, from the University of Connecticut.

[332] Mr. Ferrigno testified that 100% of his work relates to ethylene. He has been an independent consultant in the petrochemicals industry since April 2007, mainly working for ethylene plants in the US Gulf Coast, with the exception of this litigation. He has more than 20 years' experience in ethylene production technology and optimization, as well as ethylene unit operations, ethylene production simulation and modeling, and ethylene unit fouling / failure analysis and resolution. Most of his work (approximately 80-85%) is spent physically sitting in a control room or an administration building on a plant site. Mr. Ferrigno has never been responsible for the design or building of an ethylene plant, and has never been responsible for the initial commissioning of an ethylene plant.

[333] Mr. Ferrigno was cross-examined extensively on his qualifications, and the scope of and limitations to his ability to give expert opinion evidence as originally described.

[334] After submissions on the issue, I allowed Mr. Ferrigno to give opinion evidence as an expert with respect to the operations of an ethylene plant, limited to the assessment and mitigation of constraints; the optimization of an ethylene plant, including plant rate testing; and the simulation and modelling of an ethylene plant, including plant troubleshooting and the creation of mass and energy balances.

[335] Mr. Ferrigno described himself as the technical expert and Mr. Woods as the commercial marketing expert. He advised that he wrote the entirety of the rebuttal to Mr. Kapur's report.

[336] Mr. Ferrigno was asked to assume the following in giving his opinion with respect to the rebuttal report:

- a) that the ENC of E3 is 2.81 BPY, and that it has never been changed by the parties;
- b) that in November 2007, the parties agreed that if they were to set a new ENC for E3, it would have been [REDACTED] BPY with bypass valves closed, or [REDACTED] BPY with bypass valves left open (which would require capital investment);
- c) that Nova as Operator only had available to it the amount of ethane actually delivered to the Joffre Site from 2000 until present; and
- d) that ethane was to be made available to the Operator of the Joffre Site to be used with the objective of maximizing efficient, flexible and safe operation of the Joffre Site as a whole without discrimination on the basis of ownership of any particular manufacturing unit at the site and:
 - (i) that all ethane contributed to the Pool was to be made available to all Pool Users in accordance with the Feedstock Fractions of E1, E2 and E3;
 - (ii) in the alternative, that all ethane contributed to the Pool was to be made available to E3 first until it was operating at its maximum capacity, except to the extent that E1 and E2 need to operate at or above stable false load points; or
 - (iii) in the further alternative, that ethane was to be directed to E3 first until it was operating at its maximum capacity, regardless of other Joffre Site ethane requirements.

[337] In order to establish "stable false load", Mr. Ferrigno was asked to assume that E1 and E2 would not operate below a point where the likelihood of tripping would greatly increase. With respect to whether E1 or E2 had to be shut down under assumption d)(iii), E1 would be shut down first. Mr. Ferrigno made no independent investigation to verify the reasonableness of any of the four assumptions.

[338] Given my decision on ethane allocation, I will not address Mr. Ferrigno's opinions with respect to assumption d)(i). Nor have I considered his opinion with respect to the first assumption, that all ethane contributed was to be made available to all Pool users in accordance with the feedstock fractions of E1, E2 and E3.

[339] With respect to the first alternative assumption in d)(ii) that all ethane contributed to the Pool was to be made available to E3 first until it was operating at its maximum capacity, except to the extent the E1 and E2 need to operate at an above stable false loads, Mr. Ferrigno did not use the actual experience of E1 or E2 when he assumed that false load was 55%. Operational data exists that established 40% or 45% for E1 and 50% for E2 as actual false load percentages. Mr. Ferrigno acknowledged that all plants are different, and that there was no doubt that E1 could operate at 45% but used the 55% number as more "sustainable" in his experience.

[340] With respect to the second alternate assumption, where E3 is filled to maximum and E1 and E2 divide the rest, he was of the opinion that E1 would often not have enough ethane to run,

and would have to be shut down repeatedly and restarted when the situation changed. Mr. Ferrigno acknowledged that he was aware that Nova had considered putting E1 on block operations, essentially shutting it down, and that, before E3 was built, Nova had put E1 on block operations for a month or two in the summer to balance its production with actual demand. He also acknowledged that modifications can be made to a plant to allow lower operations.

[341] He calculated the amount of ethane produced at the Joffre Site for each of these two scenarios as follows:

| | E1 Ethylene billion pounds | E2 Ethylene billion pounds | E3 Ethylene billion pounds | SUM billion pounds |
|---------------|-------------------------------|-------------------------------|-------------------------------|-----------------------|
| Alternative 1 | 11.649 | 13.466 | 35.717 | 60.832 |
| Alternative 2 | 7.763 | 15.667 | 36.452 | 59.881 |

[342] Mr. Ferrigno acknowledged that the difference between alternative 1 and alternative 2 is about 735 million pounds, a relatively small number. He also acknowledged that, if his false load figures were lower, the difference between the two alternatives would be even less.

[343] He was asked to address the following questions:

- e) whether Nova performed in a manner as would a prudent operator of a like-petrochemical facility, so as to conduct operations with the objective that E3, subject to the direction of the E3 Management Committee, would optimize product production and achieve first decile performance when compared to other ethylene plants in North America; and
- f) what ethylene could have been produced by E3 over the period of this litigation given the various alternative scenarios. Given my decision on ethane allocation, the surviving questions are the difference between the actual volumes produced at E3 and:
 - (i) scenario d)(ii): E3's ENC of 2.81 BPY from E3's performance test run in May, 2001 until the effective date of the agreement between the parties in November 2007 regarding a new ENC, and thereafter, the difference between the actual volume produced at E3 and the new ENC agreed upon by the parties; and
 - (ii) scenario d)(iii): the amount of ethylene that would have been produced using E3's maximum sustainable capacity from the inception of E3 to the present.

[344] These scenarios were selected for Mr. Ferrigno by Nova counsel.

[345] Mr. Ferrigno further divided the scenarios into five, as follows:

- a) E3 nameplate capacity of 2.81 BPY during the performance test in May 2001: an assumption he was instructed to make;
- b) E3 nameplate capacity of 2.81 BPY changing in January 2008 based on an alleged agreement of the parties at the November 2007 E3 Management Committee Meeting, as follows:

- (i) with bypass valves closed, E3 nameplate capacity of [REDACTED] BPY, and
- (ii) with bypass valves open, E3 nameplate capacity of [REDACTED] BPY;
- c) E3 nameplate capacity set to maximum sustainable capacity:
 - (i) based on the three formal rate trials (2001 performance test, 2002 rate trial and 2004 rate trial); and
 - (ii) based on the three formal rate trials and the two periods of high production rates (April 2004 and May 2009).

[346] For each of the five different scenarios above, Mr. Ferrigno calculated the effective capacity (what the plant could do), the available capacity (what the plant can do reflecting actual reliability issues, outages, etc) and the resulting ethylene production shortfall for the defined period July 2001 through December 2012.

| Scenario # | Effective Capacity | Available Capacity | Ethylene Production Shortfall |
|------------|--------------------|--------------------|-------------------------------|
| | Billion Pounds | Billion Pounds | Billion Pounds |
| 1) | [REDACTED] | [REDACTED] | [REDACTED] |
| 2)a) | [REDACTED] | [REDACTED] | [REDACTED] |
| 2)b) | [REDACTED] | [REDACTED] | [REDACTED] |
| 3)a) | [REDACTED] | [REDACTED] | [REDACTED] |
| 3)b) | [REDACTED] | [REDACTED] | [REDACTED] |

[347] Actual production of E3 during the time period from July 2001 through December 2013 was [REDACTED] billion pounds.

[348] Mr. Ferrigno was not aware that Mr. Wade had testified that Nova had never prepared a determination of ENC in accordance with Schedule 3, or that the E3 Management Committee had never purported to establish E3’s ENC. He noted that, in the ethylene manufacturing industry, it is standard practice to change the nameplate capacity after the plant has demonstrated the new capacity. He also noted that normally, after turnarounds or expansions, the real capacity would change.

[349] He was instructed to select the three main scenarios by Nova; the subsets of the second and third scenario were his idea.

[350] With respect to the first question, Mr. Ferrigno’s opinion was that it was not the intention of the original owners that E3 would always be in the top decile of North American ethylene plants during the 80-year life of the OSA. In his view, “top decile” was an “objective” and was stated in the OSA as a goal not a requirement. He conceded during cross-examination that this was beyond the scope of his opinion.

[351] He also acknowledged that he had performed his analysis on the understanding that, once the design and construction of E3 were complete and operations began, the objective was to optimize product production.

[352] With respect to the second question he was asked to address, he compared his calculation of ENC to that performed by Mr. Kapur, as follows:

| E3 Ethylene Nameplate Capacity Operation Periods | Kapur – Annual Productive Capability, BYP | ESI - Annual Productive Capacity, BPY* |
|---|--|---|
| Start-up to performance test run in 2001 | no analysis performed | no analysis performed |
| From performance test run until mini turnaround in 2001 | 2.81 | 2.81 |
| From mini turnaround in 2001 until mechanical completion of COP | ████ | ████ |
| From COP mechanical completion until 2008 turnaround | ████ | ████ |
| Post 2008 turnaround | ████ | ████ |

*corrected for hydrocarbon losses

[353] Mr. Ferrigno testified that the most significant differences between his numbers and Mr. Kapur's are as follows:

a) E3 maximum furnace capacity

[354] Mr. Ferrigno used 53 Mg/hr, instead of the █████ Mg/hr used in the Kapur report. He acknowledged that tests demonstrated that individual furnaces were able to sustain the rate of █████ Mg/hr for one run, but was of the opinion that there were "numerous technical issues" with operating multiple furnaces at █████ Mg/hr. I note that Mr. Wallsgrove conceded that a feed rate of █████ or █████ Mg/hr was possible, and that E3 furnaces operated regularly with capacities higher than 53 Mg/hr. For these reasons and the reasons set out in the discussion of Mr. Kapur's opinion, I accept █████ Mg/hr as reasonable and achievable and find that Mr. Ferrigno's use of 53 Mg/hr for his calculations is inappropriate.

b) Average furnace availability

[355] Mr. Ferrigno was of the opinion that the annual on-stream factor of 99% used by Mr. Kapur was overly optimistic and did not represent the historical performance of E3. Mr. Kapur demonstrated from plant documentation and data that his 99% availability figure in non-turnaround years was achievable and in fact had been achieved by E3. On cross-examination, Mr. Ferrigno's calculation of plant availability indicated errors in calculation and use of data.

c) E3 plant availability

[356] On cross-examination, it became apparent that Mr. Ferrigno's calculation of E3's average furnace availability suffered from a number of errors in the numbers used in his model, and was unreliable for that reason. He also used subjective and opaque reasoning to get to the furnace availability number used in his calculation. His evidence indicated mathematical manipulation of the data that was based, not on Nova data, but on the perception of constraints. This led to unrealistic numbers for furnace availability.

d) Hydrocarbon losses

[357] It appears from the cross-examination that Mr. Ferrigno's calculations double-counted hydrocarbon losses.

e) Fouling factor

[358] I find that Mr. Ferrigno's use of a fouling factor of 0.6% is far too high. He chose to ignore Nova documentation that used a fouling rate of 0.2%, and attributed too much loss of capacity to the fouling issues.

[359] Mr. Ferrigno criticizes Mr. Kapur for deviating from the Schedule E calculations. However, Mr. Kapur used Schedule E as a validation check of his independent assessment of productive capability. Mr. Ferrigno also deviated from Schedule E in his opinion in certain places.

[360] One of Mr. Ferrigno's criticisms is that Mr. Kapur updated E3's actual capacity prior to the actual trials that corroborated the change of capacity. Mr. Ferrigno stated that it is standard practice in the industry to change the ENC only after a plant has demonstrated the new capacity in a trial. However, Mr. Kapur was measuring actual capacity changes, not when it may be appropriate to make a formal change in ENC, which, at any rate, was never done with respect to E3. Mr. Ferrigno's comments, however, raise the issue of why rate trials did not follow more closely after an event that might be intended to increase capacity. For example, the rate trial after the September 2001 mini-trial was not completed until March 2002.

[361] I accept Mr. Kapur's method of measuring capacity as being more realistic than Mr. Ferrigno's method.

[362] Mr. Ferrigno analyzed the results of five rate tests he had found in the documentation for E3. He acknowledged that he was surprised not to find any sort of formal reports of rate trials after January 2004.

[363] Mr. Ferrigno criticized Mr. Kapur for using a COP objective number in some of his calculations, but he conceded on cross-examination that Mr. Kapur had used actual data, including yield data from all the post COP high rate runs, which gave an average ethylene yield figure of 76.6%, rather than the 75.93% used by Mr. Ferrigno.

[364] Mr. Ferrigno initially testified that he had reviewed many of the same documents reviewed by Mr. Kapur and Mr. Holloway, including the operator logs that were only disclosed to the Dow experts after their reports had been completed. He noted that, originally, he had relied on the E3 Furnace Production Plan, which is a live document, but later discovered that there were some differences between the plan and the raw data from the Nova historian of operations. He noted that there were some errors in the data where furnaces were down when they were recorded as being up, but that the errors largely cancelled out. Mr. Ferrigno was not given unlimited access to Nova documentation, but he testified that he had reviewed thousands of

documents. He conceded that he had reviewed some of the documents he listed in his testimony after his reports were written and that these documents were “brought to his attention”. These new documents, including operator logs and daily status reports, were shown to him shortly before the commencement of the trial. He conceded that he did not review them all. He commented that “[w]hat happened during the reports is where I was missing information or information I speculated existed, but I didn’t have available to me, I was forced to use my industry experience.”

[365] ESI was asked to determine the following with respect to the Holloway reports and the report of Dow’s damages expert, Charles Mikulka:

- a) Were there any operational issues experienced by E3 that limited its ability to produce at its capacity? If so, provide an assessment of E3’s capacity in light of the operational issues.
- b) Were there any mitigation strategies that the plaintiffs could have pursued to limit or reduce the lost volumes of ethylene set out in the Mikulka report?
- c) Mr. Mikulka assumes that TDCC would always have purchased the plaintiffs’ ethylene derivative products manufactured with E3 ethylene. Please assess TDCC’s ethylene derivative demand to determine the reasonableness of this assumption.
- d) If the plaintiffs had received the additional ethylene from E3 set out in the Mikulka report, would the resulting ethylene derivatives have realized the prices used in the Mikulka report?

[366] Mr. Ferrigno addressed questions a) and b), and Mr. Woods addressed questions c) and d). Their opinions with respect to questions b) through d) are discussed later in this decision.

[367] With respect to question a), Mr. Ferrigno’s April 15, 2014 rebuttal report to Mr. Kapur’s report included the following disclaimer:

The authors acknowledge that there were specific plant operational and reliability related issues that occurred from time to time at E3. Investigating each of these issues and determining their effect on the calculated capacity numbers was beyond the scope of this report.

[368] Mr. Ferrigno conceded that, when he issued his June report responding to Mr. Holloway less than eight weeks later, in which he commented on a number of Pleavlant operational issues, he had not received any new documents from Nova.

[369] Mr. Ferrigno described his approach to his opinions with respect to Mr. Mikulka’s report as follows:

So what you have to do when you calculate the capacities is kind of what I’ve done here You go through and you figure out from the rate trials what the plant could do. You put in the availabilities, and you put in the fouling, and you do the various things. And I think that’s pretty much what I did.

Now, if you’re going to come back and ask me what shortfalls are you going to get from that? Well, now I’ve got to dig a little bit deeper into what would have prevented them from achieving those capacities that they clearly demonstrated during certain rate trials. So one of them, then, would be I would look carefully at

plant availability. And I would subtract the availability that was in the capacity calculations and then reapply the actual plant availability.

For me, actually I did them both the same. I used the same for both. But you could see where Mr. Mikulka took away 99 percent and then put in actuals. The next step is you look at actual constraints that would have prevented achieving that capacity. The capacity is still there. It doesn't change anything in the April report. The plant trial tells us what it can do. The problem is when you calculate a shortfall, you have to then account for those things. So those pounds couldn't have been made. [emphasis added]

[370] He said that he had been working on an operational analysis, but that it was not completed in time to be included in the April report. He conceded that he had never been the lead operation of any petrochemical plant, and had never actually worked at an ethane-only ethylene plant, but only flexible ones that also use naptha.

[371] Mr. Ferrigno concluded that there were a number of "uncommon operating issues" at E3 that limited E3 during some periods of time from operating at maximum production capability. He testified that he identified the operational issues that he referred to in his June report from Nova's manufacturing updates, other than the issues with the E-502 vibration, which Nova personnel brought to his attention. He noted that, originally, before he received the operator logs and incident reports, it was very difficult to find the mechanical issues that he later commented on in the data that he had.

[372] The "uncommon" operational issues identified by Mr. Ferrigno were as follows:

- a) furnace burner issues – Mr. Ferrigno agreed that there were no further problems after the original burners were replaced with Callidus burners;
- b) depropanizer tower issues – Mr. Ferrigno acknowledged that the problem was resolved in the September 2001 turnaround;
- c) fouling in C2 splitter recycle ethane vaporizer – Mr. Ferrigno acknowledged that E3 had produced ethylene at a very high rate during the period surrounding the discovery of the fouling and the attempts to resolve it. He was not aware of the operational fixes to this problem that had been suggested by Mr. Holloway. He had not been apprised of Nova witness Mr. Kluthe's assessment that E3 could still run at rates of [REDACTED] to [REDACTED] % of nameplate in the June 2012 time frame, and that certain operational fixes would compensate for the fouling;
- d) reactor catalyst changeout – Mr. Ferrigno acknowledged that the problem was resolved during the September 2001 turnaround; and
- e) the TD-405 - Mr. Ferrigno identified a concern of two months duration in 2011.

[373] Mr. Ferrigno does not mention as constraints the many other mechanical issues that Nova submits affected capacity.

[374] Mr. Ferrigno was cross-examined about his opinion that the E3 furnaces could not be operated at [REDACTED] Mg/hr, and his criticism of Mr. Holloway in that regard. He was referred to a Stone & Webster report to Nova dated September 2003 at a time when the furnace coils and burners had not been replaced, and the venturis (which Nova submits were a problem) were in their original condition. Mr. Ferrigno admitted that he had not read the document. The report

refers to Nova's desire to optimize the operating capacity of E3, and its query about whether the furnaces could be operated "at a sustained continuous target capacity of [REDACTED] Mg/hr of ethane feed." The report includes the following comments:

... Nova has already demonstrated that the furnace can be operated at [REDACTED] Megagrams an hour without any hydraulic constraint.

...

The performance of the furnaces with the existing burners were at or very close to meeting Nova's criteria of acceptability at the required capacity of [REDACTED] Megagrams an hour. It, therefore, follows that only a modest investment to achieve a modest improvement in burner performance can be justified.

[375] This document was referred to in Mr. Kapur's report. Mr. Ferrigno was referred to other Stone & Webster documents that had been cited in Mr. Kapur's report, including one entitled Nova E3 Furnace Capacity Increase Study, that indicate that [REDACTED] Mg/hr had already been successfully achieved under previous furnace test runs. He did not alter his opinion, commenting that the trials referred to were individual furnace trials, and that he would need to see a six-furnace trial to affect his opinion. He referred to the lack of a formal furnace trial at [REDACTED] Mgs/hr. As noted in Mr. Kapur's opinion, data from the seven-furnace run can be used to calculate a six-furnace operating number.

[376] Mr. Ferrigno was also referred to numerous emails and presentations during which Nova internally referred to much higher capacities for E3 than in his opinion. He attributed this, unpersuasively, to "optimism by managers".

[377] For the reasons set out herein, I accept Mr. Holloway's opinion with respect to the issue of mechanical constraints over that of Mr. Ferrigno.

4. Nova Lay Witnesses

a) Admissibility of Evidence of Lay Witnesses

[378] Many pages of Nova's written argument consist of detailed monthly analyses of E3's capacity and alleged mechanical constraints encountered throughout periods of time. Much of this detail refers to actual production from month to month. Some of that production was "constrained" by ethane feedstock availability. Nova submits that evidence of actual production during periods other than when ethane allocation was imposed indicates "maximum rates achievable" by E3, because of a list of mechanical constraints. The written argument includes a number of opinions expressed by Nova lay witnesses about the maximum rates achievable during these periods. For example, Nova relies on testimony of Ron Just, E3's Optimization Engineer, about operations that occurred in September 2001, describing certain mechanical constraints and operational decisions. Then, Nova states that "[i]n summary, Mr. Just gave evidence that E3's maximum capability in September 2001 was [REDACTED] MMLbs".

[379] Dow submits that much of what Nova's lay witnesses had to say about E3's capacity was impermissible opinion evidence.

[380] This issue arose during the trial and I addressed it in *Dow Chemical Canada ULC v Nova Chemicals Corporation*, 2015 ABQB 401.

[381] I referred to the Alberta Court of Appeal decision in *Alberta (Minister of Justice and Attorney General v Echert*, 2013 ABQB 314 at para 28, Russell Brown, J. (as he then was) refused to admit a police officer's evidence that activities involving two vehicles were consistent with drug transactions. Justice Brown gave two reasons for inadmissibility of the evidence: the opinion was not one that ordinary people with ordinary experience would be able to form and it was not "merely a compendious mode of stating ... "facts [that] were too evanescent in their nature to be recollected, or too complicated to be separately and distinctly arranged"" [citations omitted]. In other words, facts cannot be too subtle or complicated to be narrated as effectively without resort to an opinion.

[382] With respect to the specific objections that were before me at the time, I found Mr. Just', testimony with respect to the maximum rates achievable by E3 from a mechanical constraint point of view from September 2001 until June 2003, post-COP, inadmissible. I indicated that the question he was asked to answer was, in essence, hypothetical, since Mr. Just conceded that Nova had not tried to run the plant at maximum capability during this period. I found that the answer did not depend on personal knowledge of observed facts; nor was it a compact way of stating facts that are too complicated to be narrated effectively; nor was the question one on which a conclusion could be reached by a person of ordinary experience. I also disallowed Mr. Just's testimony on maximum capability in circumstances where such a determination had not been made at the time, and evidence that was an opinion that could not be given by an ordinary person. My conclusion was as follows:

In summary, Nova's operational witnesses may give evidence of observed facts, including how E3 was run, descriptions of mechanical or operational constraints, the impact of a constraint on E3's productive capability as they observed it at particular points of time, observations with respect to constraints that were recorded in the course of employment and the impact of a particular mechanical or operational constraint on the maximum productive capability of E3 if such an assessment was made at the time of the constraint. In addition there may be instances where a common sense inference about productive capability that could be made by an ordinary person can be drawn from the observed facts described by the witness. What generally would not be admissible would be an opinion from a lay witness about the productive capability of the based on a hypothetical premise, such as the maximum capability of E3 if ethane allocation had not been imposed at a particular point in time, or the maximum capability of E3 in a situation where no attempt had been made to run to such capability. This type of evidence would be impermissible lay opinion evidence that does not fall within the exception to the rule. Specifically such evidence would not be evidence that persons of ordinary experience are able to give, nor would it be merely a compendious mode of stating subtle acts that could not accurately or adequately be described separately: at para 25.

[383] Nova submits that, after this decision was released, the Court of Appeal in *Kon Construction Ltd v Terranova Developments Ltd*, 2015 ABCA 249 "clarified this area of the law, confirming the appropriateness of a judge relying on the type of evidence that Mr. Just, Mr. Wilke and Mr. Dennehy provided".

[384] There is nothing in *Kon Construction* that would change my analysis of admissibility in this case. The question in *Kon Construction* was whether certain evidence from officers and

employees of corporate litigants was subject to the expert evidence Rules of Court relating to expert evidence. The evidence at issue was described as follows:

- a) evidence from a supervising surveyor that he confirmed amounts certified in invoices by analyzing certain raw data processed and compiled by a computer program that generated reports that were sought to be put in evidence as exhibits. These exhibits were found to be admissible and admission of the surveyor's evidence on the use he made of the data was found not to be a "miscarriage of justice": para 42;
- b) evidence from the surveyors about which surveys they selected and which computer programs they used was not inadmissible as expert evidence because the litigants "alleged that they had not properly exercised their expertise, and they were entitled to defend themselves by explaining why they did what they did": at para 43.

[385] Thus, these witnesses could give evidence on why they did what they did at the time at issue in the litigation. The case does not provide a blanket exemption for officers and employees of corporate litigants to give testimony that is hypothetical or does not depend on personal knowledge of observed facts or is not a compact way of stating facts that are too complicated to be narrated effectively or opinions that cannot be reached by a person of ordinary experience.

[386] As noted previously, Nova, in its written argument, makes extensive use of the testimony of its lay witnesses to support its submissions with respect to the productive capability of E3. Much of this evidence is opinion evidence about what would have been achievable had E3 been run at its capability, instead of being constrained on the direction of Nova's EBT. As indicated in my 2015 ruling, this kind of evidence is inadmissible. Nova details the evidence of its lay witnesses in its written argument with respect to what was produced on a month-by-month basis and then often summarizes that evidence as an opinion with respect to maximum capability during that month. This neither reflects the actual evidence of the witness, nor would it be admissible if it was given in that form. However, I have analyzed the admissible evidence of the following Nova lay witnesses: David Gent, Ron Just, Jeffrey Kluthe, Kevin Wilke, Randy Saunders, David Craig, Yost Kieboom, William Wade and John Dennehy.

b) David Gent

[387] David Gent was Nova's process team leader for process engineering and process control during the design phase of E3, and technical leader in the commissioning and start-up of the Plant. He was then promoted to a specialist role as Technical Advisor supporting all of Nova's ethylene plants. Mr. Gent was generally conceded by both Nova and Dow witnesses as the person who was most knowledgeable about E3.

[388] To be clear, Mr. Gent was not qualified as an expert, but he had made and been involved in assessments of E3's productive capabilities at a number of points in time between 2001 and 2012, and was thus able to testify about those assessments.

[389] Mr. Gent testified about the various rate trials of the Plant and the furnaces. He had the following comments with respect to E3's productive capability:

- a) After the guarantee performance test in May 2001, he was satisfied with the burner combustion performance at E3. He authored a paper with Mr. Wade in the summer of 2001 that indicated that furnace availability could significantly exceed design. The paper indicates that E3 had been running at 100% onstream time for a period of more than seven months, and that "significant success" had been achieved.

- b) Depending on the circumstances, he would have portrayed E3 as having more than the design capacity of 2.81 BPY. Leading up to the COP, his assessment of E3's capability at the time was in the range of [REDACTED] BPY.
- c) During the high rate trial of 2002, which was part of the lead-in to the COP, Nova was able to move the operation of a single furnace up to an ethane feed of [REDACTED] Mg/hr, although it observed some localized overheating of the coils and hotspots that appeared to be due to flame rollover and a steam capacity issue. It also observed an issue with the venturis. He noted that he was of the view at the time that the tested furnace "was proven out reasonably well at the [REDACTED] Mg/hr rate in terms of a lot of its associated equipment." The steam capacity issue was reasonably fixable. The fundamental concern was the apparent flame rollover, creating hot spots. He commented that there were modifications that could be done with respect to the venturis.
- d) Mr. Gent referred to the plant high rate trial between February 11 and March 6, 2002, which was terminated early due to an unrelated plant trip. He noted that the rate was increased gradually to where E3 was running at a range of [REDACTED] to [REDACTED] % of nameplate rate. He indicated that Nova observed a number of constraints "that were starting to come into play at that capacity;" but that these rates were achievable with seven-furnace operation. He indicated later in his testimony that, had the test continued, it may have demonstrated a higher rate, which, he testified, was subsequently demonstrated by the COP. Mr. Gent testified that, in order to get to the maximum rates that were observed, the venturi issue had to be addressed. He did not note any other significant issues, although he indicated that various items in the Plant would need to be rectified or modified to allow long-term operation at these rates.
- e) Mr. Gent referred to the furnace rate trials that took place later in 2002 as being "a mixed bag" of results, indicating that some work needed to be done to sustain [REDACTED] Mg/hr furnace operation in the long term.
- f) The COP target was [REDACTED] % of design capability, [REDACTED] to [REDACTED] BPY based on 8,400 hours per year, or [REDACTED] BPY based on 8,500 hours per year. Mr. Gent was comfortable with that assessment, and believed it to be achievable. He noted that it was based on "the concept of having 99% reliability" in terms of operating the Plant. He testified that:

...when we developed the E3 design, we used 8,400 hours, which historically had been based on the 98 percent number, so yeah, we were comfortable with going to 99. That was somewhat based on our history with our other ethylene plants at Joffre that had been capable of that kind of reliability performance.

He said that he considered 8,500 hours and 99% achievable. He noted that the tests had indicated that [REDACTED] % could be achieved, and that [REDACTED] % was achievable when Nova did some further engineering work. He commented that modifications to the feed vaporization system were not included in the COP because "the team that evaluated that part of the plant felt there would be enough ... capability to

accommodate the █% with the data they had". To run at █ Mg/hr required some changes to the burners.

- g) Mr. Gent agreed that the work scope for the COP was "low-hanging fruit" that it was not specifically capacity-related, but more a case of fixing operating spot problems and safety concerns. He gave as examples the acetylene reactor issue, which he said was only used in emergencies, and the E-502 exchanger issue, about which he commented, "one can debate that that's a capacity-related issue". He testified that Nova was not really looking to upgrade capacity because the capacity was there from a thermal point of view. He characterized the goal of the COP as being able to sustain existing capacity, but conceded that this type of "revamping" generally resulted in making more capacity than the target.
- h) Mr. Gent was referred to an internal email dated July 2002 in which he commented:

E3 has demonstrated the ability to run at an instantaneous capacity of up to █% of nameplate. However, there are some operating and reliability issues that would prevent this type of capacity from being sustained on an annualized basis. The 2003 turnaround presents an opportunity to address these issues with some minor capital changes to the current plant design.

He agreed that this referred to the E3 high rate trials in 2002, which involved seven furnaces. He agreed that the reason for performing a rate trial with seven furnaces was to test the finishing or back end of the plant. In the same email, Mr. Gent indicated the following:

Furnace Modifications

The primary issue for Furnace capacity is the performance of the burners at higher rates. A single Furnace high rate trial has identified the occurrence of a significant flame impingement onto the pyrolysis coils. This had previously been a problem at the original Furnace design rate, but was resolved by a re-design of the burners and the associated combustion air systems. It is anticipated that further combustion design modifications will allow acceptable operation of the burners without flame impingement at higher rates. This will involve working with the furnace designer, Stone & Webster, and the burner manufacturer, John Zink, in order to develop an appropriate set of modifications. Stone & Webster have drafted a preliminary proposal for the conceptual phases of this effort. [emphasis added]

The email set out a potential schedule for resolving this issue that would take two years and two months. Stone & Webster is the ethylene process and furnace technology licensor responsible for the design of E3.

- i) As indicated later, furnace modifications were delayed until the burners were replaced between 2006 and 2009 by Callidus burners. Mr. Gent acknowledged that the final COP report indicated that the Stone & Webster study was initiated as a consequence of the high rate trial on the first furnace, referred to previously, but that subsequent high rate trials on other furnaces in late 2002 and early 2003, when the furnaces were

able to attain 40 days of run length at ■■■ Mg/hr and 65% conversion, were unable to show a repetition of the impingement.

- j) In the report, Mr. Gent indicated that Stone & Webster was unable to discover a mechanism for the flame pattern. He testified that Nova was of the view the study was inadequate.
- k) In an email dated October 8, 2003 to Mr. Miller at Dow, Mr. Gent commented that Stone & Webster had made a recommendation on an avenue to pursue for burner modification, but:

... I don't believe that we have sufficient confidence in the conclusions of this work to agree with pursuing their recommendation at this time. We believe that we need to understand the problem better and to be able to have some quantitative way of measuring it. One possible approach involves the use of a CO sampling probe to allow us to measure the flame shape in terms of incomplete combustion. We are looking to pursue options such as this in order to move forward on this issue.

As you know, we have had some success in running the Furnaces at higher rates without seeing the same problem that we saw on the original Furnace rate trial. On the other hand, we have also seen some blistering problems low down on the coils that cause some concern, although these are not necessarily rate dependent. So we will continue to pursue several options including potential burner tip upgrades to avoid plugging and potential coil material changes. [emphasis added]

Mr. Gent indicated that the reference to "rate dependent" meant feed rate.

- l) In April 2004, Mr. Gent made a presentation to the E3 Management Committee on E3 expansion opportunities. In the presentation, he noted the rate test to ■■■% of the plant design rate at the completion of the COP, and his assessment of a "likely instant rate" of ■■■%. He commented in his slides that "furnace availability is the key to long-term sustainability" and that furnace concerns were tube failures and burner performance (flame rollover). He acknowledged that these were the same issues that had been under consideration since the January 2002 high rate trial. He conceded that this did not mean that it was not possible to run at the COP rate, that "[i]t would certainly be possible to run at the COP instantaneous rate with seven furnaces operating". He also acknowledged that he expected that at the time, coil replacements were being undertaken, and that when that began, E3 would be capable of improved performance.

The presentation contemplated further expansion above the COP targeted productive capability, and considered the addition of an eighth furnace. Mr. Gent's slides indicated that there were two ways to potentially expand beyond ■■■ BPY: increasing the capacity availability and increasing the feed rate.

With respect to availability, he suggested changes to coil material and modifying or replacing the burners. With respect to increased feed rate, he listed limits to going beyond a feed rate of ■ Mg/hr, and increasing the feed rate to about ■ Mg/hr.

Mr. Gent explained the difference between capacity availability for furnaces, which was 92% at the time of his presentation, and plant onstream time of 99%. Furnace capability percentages account for time offline for recoking and maintenance.

Mr. Gent's summary slide indicates the following:

- (i) with six furnaces running at COP design rate of ■ Mg/hr and the existing furnace availability of 92.5%, the average annual rate is ■% of the original design annual rate of 2.81 BPY;
 - (ii) with seven furnaces running at ■ Mg/hr and furnace availability of 92.5%, the average annual rate was ■%;
 - (iii) with seven furnaces at a feed rate of ■ Mg/hr and availability up to 96.1, the average annual rate was ■%; and
 - (iv) with seven furnaces at an increased feed rate of 63.6% and 92.5% availability, the average annual rate was ■%.
- m) Mr. Gent acknowledged that E3 was designed for full production of 2.81 BPY with one furnace down, although, when all furnaces were available, they would be operated at a lower feed rate, increasing their run length, which he described as a milder operation of the furnace. He also acknowledged that the seventh furnace allowed additional capacity if Nova increased the feed rate. He confirmed that, depending on furnace availability, seven furnaces would be available about 50 to 60% of the time, and six furnaces 40 to 50% of the time.
- n) He also testified that his assessment at the time was that when seven furnaces were available, it was not necessary to have a feed rate of ■ Mg/hr to achieve the COP rate of about ■% above original design capability. He acknowledged that, after the 2003 turnaround, it was his assessment that when E3 was running seven furnaces, it could produce well in excess of the COP rate of ■%.
- o) Mr. Gent was referred to a comment in the minutes of the E3 Management Committee meeting at which he made the presentation to the effect that "E3 has never been able to operate the furnaces at ■ Mg/hr due to the current condition of our furnace coils". He clarified that this referred to the condition of the coils at that time, which were due for replacement. It is also noteworthy that, while the minutes reflect that Mr. Flint indicated that Nova was not interested in further expanding ethylene manufacturing capability at E3, and Mr. Fergusson agreed, Mr. Fergusson's agreement was in response to Mr. Flint's reference to the need for ethane supply to increase.
- p) Mr. Gent confirmed his opinion expressed in a June 8, 2004, email about replacement of venturis that:

The overall plant rate effect of periods at 6 Furnace operation and periods at 7 Furnace operation may still be consistent with achieving COP (■%) plant production. This is because it has been

demonstrated that the plant can be operated well in excess of COP rates (to approx. [REDACTED]%) when 7 Furnaces are online and the 6 Furnace impact may be mitigated to just a few percent below COP.

This is what Mr. Gent described as “saw-tooth operation”, when the plant operations alternate between seven-furnace operation and six-furnace operation.

The email related to the replacement of venturis, which Mr. Gent indicated could be combined with a coil change-out to minimize cost. He pointed out that two coil replacements were scheduled in 2004. However, the venturis have still not been replaced to date.

The email also referred to another way of addressing the issue, methods of addressing the E-650 exchanger fouling, which was also not pursued.

- q) Mr. Gent was cross-examined about a request he had received from Ms. Apuzzo to provide an estimate of the capital that would be required for Dow to expand its LHC-1 facility. In his report dated July 12, 2004, he made the following comment about E3:

E3 underwent some minor capital modifications at its first full turnaround in 2003. These were designed to exploit capability that was essentially already built into the plant. This ... has added about the same percentage increment ([REDACTED]%) from original design nameplate.

He also prepared a chart comparing capacities of LHC-1 with E1, E2 and E3, including “debottlenecks” that had been completed (in bold), being the original design and the COP, and those contemplated for E3. The E3 numbers are as follows:

Nova/Dow E3

| Capacity BPY | % Design |
|-------------------------|-----------------|
| 2.81 | 100% |
| [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] |

- r) In a May 3, 2005, internal email, Mr. Gent commented that:

It has been identified that the E3 COP nameplate capacity of [REDACTED] billion pounds per year cannot be sustained based on current operation of the furnaces. This is primarily because of a long-standing (since original startup) combustion issue that leads to flame impingement on the furnace coils and a consequent reduction in coil life, run length and operating capacity.

This was before the burner change-out that commenced in late 2006, which he noted had not yet been approved by Nova for full funding. He also referred to the need to replace the venturis. In the email, Mr. Gent estimated the cost for the modifications of

the burners plus the venturis to be between \$7 to 10 million, and noted that these were “capital expenditures that are in line with sustaining capital budgets”.

- s) Mr. Gent was referred to an email from Randy Saunders dated January 2, 2008, in which he indicated suggested that the E3 furnaces were capable of ethane feed rates between ■ and ■ Mg/hr.

[390] Mr. Gent’s testimony underlined that Nova failed to move quickly on a number of operational resolution issues. By way of examples:

- a) In July 2002, Nova was still evaluating potential bottlenecks at E3 that had been identified by the 2001 performance tests, nine months earlier.
- b) The proposed furnace modifications identified in the July 2002 email were scheduled to occur over the space of 28 months. This period of time was referenced in the October 25, 2002 initial draft of the COP Owners Objectives, which set out the intent of the project as being to ensure that E3 could reliably operate at a capacity that is consistent with the highest operating rate that has been demonstrated to date. The document also indicates that the project would implement any modifications that are deemed necessary to support this goal, subject to acceptable economics, and set out the same 28-month schedule to implement furnace modifications.
- c) In later months, there were furnace rate trials in which there were three successful runs of 40 days or more at ■ Mg/hr feed rate and 65% conversion, albeit with some hot spot issues.
- d) In February 2003, the revised COP Owners’ Objective removed the reference to furnace work timing and instead indicated that furnace modifications “can be completed during the individual furnace turnarounds while the plant is in operation”.
- e) A few months later, at the February 25, 2003 E3 Management Committee meeting, Dow was informed that: “[n]o definitive path forward is available at this point to improve furnace capabilities beyond that which is currently available. Once the planned scope has been executed further high rate trials will enable a better understanding of whether furnace modifications will be warranted”.
- f) Despite this, the burners were not replaced until between the end of 2006 and 2008, four years or more after Mr. Gent’s first email identifying the issue.
- g) Between the Plant turnaround in June 2003 and the email to Mr. Miller in October 2003, Nova had not run any further trials on the furnaces. In fact, no further attempts were ever made to run the furnaces at any rates between ■ and ■ Mg/hr.
- h) The venturis still have not been replaced, even given Mr. Gent’s June 2004 recommendation.

[391] In summary, however, Mr. Gent’s testimony supports both Mr. Kapur and Mr. Holloway’s opinions with respect to E3’s productive capability to a far greater degree than it supports those of Mr. Ferrigno or Mr. Wallsgrove.

c) Ron Just

[392] Ron Just was a Nova engineer who was involved in the design of E3 as a senior process engineer. He was posted to Stone & Webster's design offices in Houston from December of 1996 to the end of February 1998 as part of Nova's process engineering team.

[393] Mr. Just's primary responsibility was the cracking furnaces, the crack gas compressor system, the C2 splitter, the heat pump and some of the utilities.

[394] After the Houston phase, the project team worked with Fluor Daniel in Calgary. Fluor Daniel was responsible for the detailed engineering.

[395] After August 2000, Mr. Just remained on the project team for the E3 start-up as optimization engineer, remaining in that position until August 2003. He took on a position with Nova unrelated to E3 at that time, and left Nova at the end of August 2004.

[396] Since 2012, he has been hired as a consultant by Nova to review historical data and records.

[397] As previously discussed, the scope of Mr. Just's evidence was the subject of objections by Dow, leading to my decision about the admissibility of Nova's lay witness evidence. The following is a summary of Mr. Just's admissible evidence. Mr. Just gave extensive evidence of early mechanical issues. He testified that:

- a) After the first phase of the furnace high rate trial, "we were not prepared to operate individual furnaces at above 53 Mgs/hr, other than on a test basis," given the burner performance issues that Nova was encountering at E3. Mr. Just testified that, of the seven furnace tests, four did not meet the minimum run length criteria, although Nova thought it had an explanation for the shortest of the runs. He testified that another issue with burner performance was plugging in one of the furnaces.
- b) Mr. Just testified about comments he made in a Nova application to the Canada Revenue Agency in 2003 that referred to the history of flame rollovers in the furnaces. In the application, he commented that, in August 2000, E3 was limited to running at feed-rates of 34 Mgs/hr rather than the design rate of 53 Mg/hr as a result of the flame rollover issues. However, the application indicated that work done by January 2001 allowed the furnaces to be operated at design production rates, and further changes in February 2001 demonstrated acceptable flame performance. In a paper prepared in March 2004, he concluded that, about eight months after the initial furnace test, final successful burner modifications had been proven and furnace performance had exceeded design run length at design conditions of 53 Mgs/hr at 65% or 68% , although he did indicate in the paper that long-term effects were unknown.
- c) Mr. Just was taken to the Stone & Webster engineering study of September 2003, specifically the following paragraph relating to a simulation that took place at E3 on October 24, 2002:

The results of the simulation were inconclusive. In other words, there were no obvious and clear distinctions between the simulation of operations at 53 metric tonnes, deemed to be good, and the operation at ■ metric tonnes,

deemed to be bad. Such conclusions were quite consistent with the site observations. No consensus could be reached between witnesses on whether the furnace operating at 53 metric tonnes was better or worse than the furnace operating at ■ metric tonnes.

Mr. Just agreed with these observations, indicating that it was a concern that they did not have a good way to see the difference in the flame performance.

Mr. Just also confirmed on cross-examination that there were periods of time during which Nova ran the furnaces at higher than 53 Mgs/hr. He acknowledged that there was little or no re-testing of the furnaces, even the ones that had passed the test.

He noted that by April 2001, E3 had acceptable flame patterns, leading to a replacement of all furnace burners tips by September 2001.

- d) After the plant high rate trial, and up until the June 2003 turnaround, Nova was not prepared to run above the design parameters for E3 because of vibration on E-502, except for a few days of testing in the August 2002 time frame. He acknowledged that the E-502 was replaced in the COP, and he did not know the results.
- e) It was difficult for him to comment on what E3's capabilities were after he left E3 in August 2003.
- f) When "ethane" or "business plan" was shown as a constraint in the operators' log, that meant that the plant could have produced more but for lack of ethane. Mr. Just testified that the daily report, the monthly reporting to the Co-owners and the E3 Manufacturing West reports were a more accurate indication of what the plant constraints than the operators' log entries.
- g) When monthly reports indicate no internal operational constraints, but the plant highlight section of the report refers to operational issues, that meant that the operational issues may be of concern, but they were not a constraint on production.
- h) In the calendar year 2001, about 4.2% of constraints as reported to the Co-owners were attributable to operational internal constraints: the number was about 7.5% in 2002 and about 8.6% to August 2003.
- i) He could see from E3's early operations that it was able to operate above design annual production without having to execute any significant scope or spend any significant dollars.
- j) With respect to the venturi issue, he conceded that he had noted in his furnace maximum rate trial report dated July 8, 2003 that the venturis were not anticipated to be a run length constraint at higher rates.
- k) He conceded that during his tenure as optimization engineer, Nova frequently ran its furnaces at extended length, surpassing the design contemplation of 42 days.
- l) Mr. Just was cross-examined about his closing reports on the furnace tests, and issues with respect to the decoking of the furnaces that may have affected the tests. He conceded that the TMTs that were of concern in the report did not exceed design parameters for TMTs except with a few exceptions. He also conceded that during the

secondary tests, Nova reduced the feed rate at the direction of the JPPT on one of the furnaces that had not passed the test, due to an ethane shortage situation. He also conceded that, of the three furnaces that were not in the high-rate trial, one was run for very long periods of time at feed rates not exceeding 53 Mg/hr during his tenure, one was only run at a rate exceeding 53 Mg/hr for a few hours during the Stone & Webster simulation and the third was run for very long periods of time lower than design rates and conversions.

- m) He and his team never considered resolving the C2 splitter problem by increasing conversion rates.
- n) After the rate trials were completed in the spring of 2003, Nova rarely ran the furnaces at the design conversion rate of 65%, instead running at a lower conversion rate to maximize ethylene yields under ethane allocation.
- o) Mr. Just was referred to an email he authored dated January 14, 2003 that noted as follows:

Attached are summaries of the performance of H220 and H260 during the high rate trials that were performed on each of the furnaces in November/December of last year. Each of these furnaces exceeded the 40 day run length target that is required at the higher operating rates (■ Mg/hr) to support the Capacity Optimization Project. The decoke on H220 was much longer than what would be acceptable to meet COP rates, but I think we may have extended the decoke beyond what was required.

[398] Mr. Just was asked why the next revised version of the COP Owner's Objectives dated February 10, 2003 had deleted its references to furnace modifications. He stubbornly refused to acknowledge that the documentation indicates that, after the COP was completed, and as result of further testing, further furnace work could be accomplished, or that Dow was advised through these revised Owners' Objections that the COP targets could be met without furnace modifications. In this area, as in others, Mr. Just showed himself to be a partisan witness, intent on promoting his present view that mechanical restraints interfered with E3's productive capability in the early years.

d) Jeffrey Kluthe

[399] Jeffrey Kluthe worked at Nova from August 2005 to the end of 2006 as an optimization engineer at E3. He then became an improvement engineer until the end of 2009, and after that, an optimization engineer working in simulations, developing an optimization computer model for E3.

[400] Mr. Kluthe testified about the C2 splitter fouling, which he indicated was "deemed to be" the constraint that would most restrict E3's ability to produce ethylene between April and the summer of 2013. He noted that, since July 3, 2012, E3 had been operating with seven furnaces online at the design conversion of 65%, so that furnaces were not a plant constraint. He testified that the Plant ran at a rate of ■% of nameplate capacity on July 3, 2012, with the C2 splitter as a constraint. He extensively described the computer modelling he did to investigate the issue. The model produced at a rate of ■%. To provide "wiggle room", he changed this to ■%.

[401] Mr. Kluthe confirmed that the directions on how much ethylene to produce at E3 came from the business people at Nova.

[402] He was the person who completed the Solomon Study in 2007, and he confirmed that he made efforts to submit accurate information. He entered an annual capacity for E3 in the Solomon Study of █████ BPY, and he confirmed that this was its capacity when everything was functioning correctly and there was enough feedstock to run it at capacity.

[403] Mr. Kluthe was cross-examined about the 2009 rate trials in which rates in the range of █████% of design capacity were achieved. He acknowledged that these results had been reached at about the same time as concerns were expressed about the E-568 ethane vaporizer in the C2 splitter, and had been achieved before that piece of equipment was changed in October 2010.

[404] Mr. Kluthe also acknowledged that, for a period of time at the end of June into July 2012, E3 operated at rates over █████% of design. This was at a time when the fouling in the C2 splitter had gotten progressively worse.

[405] When asked if, during his tenure up until the end of 2012, there was any obvious reason why E3 could not run at a higher rate than 65%, he responded:

I would agree that if we were able to thoroughly test operation at above 65 percent and confirm that it was a safe and reliable operation and that it actually did achieve what we expected it to, then after doing a test or tests like that, then certainly, it would be the right thing to do if it was more profitable, more ethylene production, if those were the results of doing so.

[406] He conceded that he had never seen anything to suggest that it was not worth testing, but that no one during his tenure had tried to run the Plant at greater than 65%.

[407] Mr. Kluthe also confirmed that his modelling showed that the Plant could run at █████% of nameplate, and that his conclusion in April 2013 was that any observed reduction in C2 splitter reboiler throughput capacity could be compensated for by the increase in the vapor/liquid ratio, such that the C2 splitter would be able to operate at the same production limit that was achieved at the Plant back in June and July 2012.

[408] After the modeling, Mr. Kluthe and his team did some testing at E3, resulting in production of about █████% of design rate, or █████ BPY. Mr. Kluthe conceded that the optimization modelling proved to be somewhat disappointing.

e) Kevin Wilke

[409] Kevin Wilke was the E3 optimization engineer between the summer of 2003 and the summer of 2005. He testified that he considered himself the “Operator”, although there was never any formal designation of that position. He is also a member of the Nova litigation team, and since the summer of 2011, his primary role has been to prepare for this litigation, assisting Ms. Appuzo, Mr. Flint and the other members of the litigation team.

[410] Mr. Wilke testified about mechanical issues, indicating the vibrations in E-502, which he said limited running E3 to the design rate of 318 Mg/hr from the September 2001 turnaround until August 2002. He also testified about fouling in the C2 Splitter System, which was not resolved until the June 2003 turnaround.

[411] Mr. Wilke testified that he generated the data on the Manufacturing West E3 monthly reports that were sent to Dow. He explained that the table in the reports entitled “Plant Production Restrictions – Constraints” listed constraints to production in hours. Thus, Mr. Wilke explained, the “Constraints” table was the proper source for determining constraints.

[412] He advised that the table entitled “Plant Production Restrictions Explanation” compares actual production against the budget for the month, and only those constraints that kept production below the budget are recorded. Mr. Wilke conceded that this particular table “probably created more confusion than value”, and he had a lot of discussions with Dow explaining this. Mr. Kieboom referred to this table as “goofy,” but noted that this was the way that the operations people chose to record things. This table was dropped in the third quarter of 2012 when Nova moved to quarterly reports.

[413] Mr. Wilke acknowledged that decisions with respect to whether E3 would be run at high or low conversion would be made by members of the ethylene business team and that he was not involved in decisions as to how much ethylene would be made at E3.

[414] He testified that the highest rate Nova reached with seven-furnace operation between July 2003 and June 2005 was in May 2004 during the rate trial, but said that in order to achieve that rate, Nova was doing a number of things that it normally would not do on a day-to-day basis. In June 2004, E3 sustained █████ Mgs of total furnace feed, █████% of nameplate.

[415] Between July 2005 and March 2006, the maximum rate reached was █████% of design capacity. From April to July 2006, the maximum rate reached was █████%. From August 2006 to October 2006, the highest rate reached was █████%. From November 2006 to February 2007, the maximum rate reached was █████%. From March 2007 to April 2007, the maximum rate was █████%. For May 2007 to July 2007, █████% was reached.

[416] With respect to six-furnace operation between July 2003 and August 2007, the highest rate reached was █████%, and between September 2007 to August 2008, █████%. When there were only five furnaces in operation, between July 2003 and August 2008, the highest rate reached was 87.1%.

[417] Mr. Wilke was asked to describe the “constraint” for each of these periods, using a spreadsheet that he had recently prepared. It is very difficult to determine from Mr. Wilke’s testimony whether he was referring to observations he made at the time, whether he was merely describing mechanical issues that may or may not have had an impact on productive capability, whether he was referring to documents that were not prepared by him and of which he has no personal knowledge, and when he was crossing the line into inadmissible opinion evidence. There were a number of objections about this: Mr. Wilke would begin to identify the source of what he was saying for a short period of time, and then the issue would arise again.

[418] In fact, it was often made clear that Mr. Wilke was being asked to give a current opinion about the impact of the constraints identified in the records that he summarized. As pointed out by counsel for Dow, that is something an expert does, and Mr. Wilke was not qualified as an expert. His evidence was only admissible and given weight when it referred to assessments he made at the time.

[419] Mr. Wilke acknowledged a number of errors in his spreadsheet.

[420] Mr. Wilke was asked on cross-examination whether his work and evidence was an effort to support Nova’s position, or a genuine effort to produce a fair and balanced depiction of what

happened in particular months. He indicated that he believed his work was fair and balanced. However, on cross examination, it became apparent that he had not reviewed what had been reported to Dow, and that many of the alleged “constraints” he testified to were not reported as constraints impacting production to Dow. He suggested that, in what was reported to Dow, only the “primary” constraint for a given period was reported. In fact, in at least one case the “constraint” that Mr. Wilke referred to in his evidence was described in the Manufacturing West monthly report as having no significant impact on production. Mr. Wilke conceded that at least one of the “constraints” that he testified about did not cause a loss of production.

[421] Mr. Wilke agreed on cross-examination that Nova made a deliberate effort to extend furnace run lengths, and that if an operator wanted to “baby” the furnaces, the way to do it would be with reduced feed rates and lower conversion. He conceded that if an operator did not really care how much ethylene it made, it could make run lengths go quite a long time by doing these things.

[422] Mr. Wilke agreed that when he used the words “we ran to constraint”, that sometimes that meant a level that Nova constrained itself to, specifically with respect to the furnaces.

[423] Mr. Wilkie conceded that, when he suggested that from the fall of 2002 until the middle of 2003 that E3 ran to constraint when there was sufficient feedstock, he was not considering that Nova imposed ethane allocation in all of those months. He also conceded that sometimes Nova ran E3 at high rates because one of the other plants was down, it ran E3 at high rates, although he suggested that it was a matter of good luck that no problems arose.

[424] Mr. Wilkie testified on cross-examination that he had no role in setting metal temperature limits for the furnace coils at E3, nor did he have direct involvement with the E-568 concerns and the E-565 C-2 Splitter concerns.

[425] He conceded that the acetylene reactor issue was resolved during the 2001 mini-turn around. Mr. Kieboom was the primary person involved in the investigation of the E-650 fouling. Others were involved in the debris issue. The E-502 deethanizer exchanger vibration issue was rectified as part of the 2003 COP. Others were involved in the K-400 seals issue and the USX nozzle issue.

[426] Mr. Wilke acknowledged that, although there were a number of people advocating for the replacement of the venturis through the years, including him, and even though the cost of doing so was a relatively minor \$350,000, and the sums of money budgeted for maintenance that had been unspent over the years were greater than the cost of the venturi replacement, that replacement had never taken place.

[427] Mr. Wilke was taken to a presentation he had made in January 2004 entitled “Ethylene 3 Performance Test”. The Summary slide indicates that the COP target of █████% was validated and yields were better than expected. It notes “[t]hrough the plant wasn’t pushed to an ultimate constraint, the data will help identify creep capacity opportunities. Clearly improving furnace availability will reap the greatest benefits.” [emphasis added]

[428] In an email sent to Mr. Wade and others on January 30, 2004 commenting on the COP performance test, he indicated “[o]verall, the trial was a success.” He indicated that some of the major scope items from the COP project that were validated were:

- a) TD405 thrust bearing and steam map – the cracked gas compressor was not constrained at design rates;

- b) E502 vibration – the new exchanger did not experience any acoustic vibration problems;
- c) TD575 thrust bearing – no temperature limits were reached on the new bearing;
- d) Boiler feed water pumps – the new rotors had all been installed and the pumps met performance requirements;
- e) Deaerator performance – although the V920 testing was not complete, preliminary results looked good; and
- f) Acetylene reactor blow down system – the time required to depressure the acetylene reactors had met requirements.

[429] The email noted that, although operation at elevated rates would not be considered “efficient” and further work was required to evaluate the various trade-offs made to address area equipment limitations, it was clear that E3 could operate at COP rates if required for business reasons. Mr. Wilke commented that the key limitation to this internally would be furnace availability and capability, and that this would have to be the primary focus for future creep opportunities.

[430] He acknowledged that there were many periods of time when E3 had capacity that was not being used.

[431] In a presentation he made in October 2006 about the MAC project, he included in the proposed budget the replacement of the venturis at a total cost of \$350,000, which he described would raise E3’s base capacity rate from ██████% to ██████%. In November 2006, he made a presentation with respect to the E3 MAC optimization program that indicated that “E3 has demonstrated over ██████% but is limited to < ██████%. With these modifications, [E3] could achieve over ██████% of design capacity.” His estimate of the cost of the work was \$1.8 million, the venturi portion being \$350,000.

[432] He acknowledged that, in 2007, E3 produced more ethylene than it had ever done, slightly over ██████ pounds, in the fourth year of a turnaround cycle when it would normally have been expected to have some decline, and still with the old burners and prior to any MAC work. He conceded that in April 2008, Nova killed the MAC project.

[433] Mr. Wilke also conceded that Nova increased E1 and E2’s nameplate capacities after rate trials, even though it refused to do so at E3. He said he remembered that Mr. Flint said something about there being inadequate feedstock anyway.

[434] Mr. Wilke was aware that Dow wanted E3’s ethylene nameplate capacity formally set at a number that took into account the new expanded capacity from the COP. He was referred to the minutes of the May 24, 2007 E3 Management Committee where Dow formally requested a change to E3’s nameplate. Nova indicated that, in its view, a nameplate redetermination had no relevance or bearing on the productive capability of the Plant. The “Operator”, presumably Mr. Wilke, suggested that performance tests were necessary, and further that a response could wait until October 2007. Dow disagreed and indicated that it wanted work done by the end of July. The Operator indicated that he would attempt to meet this timing, with input from Dow employees.

[435] Later in 2007, Mr. Wilke made a presentation on nameplate capacity. It was not a full Schedule E calculation, but an attempt to come up with a figure that the parties might be able to agree on to be in place for the 2008 turnaround of the Plant.

[436] Mr. Wilke's presentation indicated that any nameplate capacity figure settled on in 2007 was to be short-term until the 2008 turnaround, with the ability to address perceived mechanical issues, including the bypass issues, in the 2008 turnaround, and that they would aim for a higher nameplate number after that.

[437] Mr. Miller of Dow sent a subsequent email dated October 12, 2007 that indicated Dow's support:

Dow supports your alternative method as contained in the attached spreadsheet. This results in an E3 nameplate of [REDACTED] bpd through the turnaround cycle or [REDACTED] percent of original nameplate. This is based on operating with the bypasses open until the 2008 turnaround, at which time the [REDACTED] percent MAC project scope case will be implemented, allowing the bypasses to be closed going forward.

As discussed in the last management committee meeting, another rate determination will be made after the 2008 turnaround to determine if incremental improvements during the turnaround result in an increase in plant capacity.

[438] However, Mr. Wilke's proposal was not implemented. Mr. Wilke acknowledged that, when the E3 Management Committee approved an expense budget, it was not approving the idea that E3's ethylene production for the coming year had to be the production forecast number, no more, no less.

[439] With respect to the 2003 Solomon study, Mr. Wilke, who was one of the individuals responsible for coordinating the input to the E3 portion of the plant data, confirmed that E3's historical data was reported to be 2.49 BPY in 2001, 2.62 BPY in 2002 and 2.47 BPY in 2003.

[440] Projected capacity for 2004, 2005 and 2006 was reported to be the equivalent of [REDACTED] BPY, which was the COP target. On an earlier page of the study form, Mr. Wilke had reported a [REDACTED]% ethylene capacity increase from year-end 2002 to year-end 2003, with the increase being effective June 30, 2003. He used a 99% onstream factor for a non-turnaround year, being the COP design basis, a 65% conversion rate. His estimate of annual plant capacity as of year-end 2003 on a sustainable basis was [REDACTED] BPY. He provided these figures shortly after the January 2004 rate trial.

[441] Mr. Wilke did his best to try to qualify these numbers, but his testimony in that regard lacked credibility.

[442] Mr. Wilke was questioned about the data presented in a chart as part of the response to the Solomon study entitled "Causes of Lost Production Opportunity During 2003". The two largest entries were plant downtime during the COP, and lack of product demand or inventory control. Lack of feedstock was not reported as a reason for loss of production. The reason for the timing of the most recent turnaround was indicated to be a "[f]avourable business climate to take a turnaround, eg, spare capacity." Mr. Wilke acknowledged that he was aware that Nova was not running E3 to constraint all the time.

[443] As indicated previously, Mr. Wilke's evidence with respect to constraints was really a litany of Nova's positions. It was difficult to determine when he was indicating constraints as he observed them at the time, or at a later time prior to trial when he was assisting the litigation team. In this respect, his evidence was sometimes crossed the line of admissible evidence. He was reluctant to acknowledge observations he had clearly made at the time that contradicted his present view, or interfered with his message.

f) Randy Saunders

[444] Randy Saunders has been involved with E3 since the design phase latterly as a Technical Services Specialist, particularly with respect to its furnaces. He testified extensively with respect to the problems Nova experienced with the furnace burners, including bulges on tubes, hot-spots and flame rollovers, resulting in shorter than expected run lengths. Mr. Saunders testified about the percentage of time that Nova was able to operate with seven furnaces in 2004 (37%) and 2005 (48%). He spoke about the furnace and coil changeouts.

[445] He confirmed that the JPPT told the operations group at E3 what amount of ethane it would have to use to run the Plant, and what conversion rate and feed rate to use.

[446] Mr. Saunders characterized the 2003 furnace rate trials as "inconsistent". However, he admitted that the rate trials involving three of the furnaces were examples of sustainable operation at COP rates.

[447] He agreed that, of the six rate trials, three had clearly passed. One did not pass on its second go-around because of a flue gas diverter problem and the fact it had undergone an extended decoke and 24 hours in hot steam standby. One continued at ■ Mg/hr and 65% conversion for 36 days. That one had its rate reduced slightly, and two days later, the TMTs were within limits, and the furnace continued to operate.

[448] Mr. Saunders conceded that, when the trials were halted due to TMT constraints, those restraints were lower than the design limits, since Nova itself imposed a lower limit. He agreed that formal retesting had never been done when the furnaces were equipped with new coils. Therefore, the tests had been done with old burners and old coils.

[449] Mr. Saunders testified that in May 2004, Nova tested two furnaces at ■ Mg/hr at design conversion. One operated for 15 days at ■ Mg/hr, and was then reduced to ■ Mg/hr because of a concern with the feed values and with TMTs. A second run achieved about the same results with the other furnace. Mr. Saunders commented that "we'd proved pretty conclusively that we couldn't sustain that kind of operation on the furnaces and expect a reasonable run length."

[450] The other furnace was run, first for about 11 days and then about 17 days, at ■ Mg/hr and design conversion. Mr. Saunders attributed this to TMTs, although the operator log indicated a different reason. Mr. Saunders testified that "we" concluded that ■ Mg/hr at conversion rate was not an achievable rate.

[451] However, Mr. Saunders acknowledged that during the period of April through June 2004, all seven furnaces were in operation, and E3 had the highest ethylene production to date in its history, with the original burners and coils in place, and despite suspicions of some early damages to the coils due to flame impingement.

[452] Mr. Saunders also acknowledged that the flame rollover issue was likely resolved before Stone & Webster did its investigation and report in September 2003. He also acknowledged that,

despite the coil issues he described, the coils were actually operational from four to six years before changeouts took place, albeit with repairs.

[453] Mr. Saunders confirmed that the coils were replaced over a three-year period of time, 2004 to 2006. He was referred to the fact that, for these three years, maintenance costs were significantly below budget, to the extent of roughly \$4.7 million. \$1.88 million of that number had been budgeted for furnaces. Mr. Saunders indicated that Nova had challenges obtaining materials to perform the changeouts.

[454] While Mr. Saunders referred to safety issues with the burners prior to changeout, he conceded that these issues made no difference to how hard the furnaces could be run.

[455] Mr. Saunders also acknowledged that he was under no pressure from the JPPT or Nova management to get the burner issues resolved; further, he only received approval of funding in April 2006, with the last Callidus burner being installed in June 2009.

[456] Mr. Saunders also acknowledged that the conversion rate of 58% was an operating strategy designed to cope with an ethane short environment, that “[b]usiness needs may not allow the furnace to be operated continuously at high conversion” with respect to a 2006 rate trial of one furnace after it had received its new coils.

[457] Mr. Saunders was referred to a presentation he had made at the E3 Management Committee meeting on November 30, 2005. The presentation indicated the following:

Unable to operate at COP rates, ■■■ Mgs/Hr and 65% conversion, and achieve 40 day run lengths.

Currently unable to achieve “desired” run lengths at original name plate capacity of 53 Mgs/hr. (We have met the original guarantee point of 40 day run lengths at design conditions, however with the improved coil technology we expect increased run lengths).

Premature tube failures at current plant rates. Failures started to occur after 2.5 yrs operation and would be more frequent at COP rates. Failures have been primarily in the lower portion of the tubes.

E3 has generally been operating at low conversion rates, 58%, to improve ethylene yield. Tube life and run lengths will further deteriorate as we operate at increased conversion rates.

[458] He made basically the same comments in a presentation on April 13, 2006.

[459] Mr. Saunders acknowledged that the December 2006 trial of one furnace that had received new coils but not new burners indicated it could run for over 40 days at either ■■■ or ■■■ Mg/hr and design conversion before hitting any TMT constraint, which was significantly better than what had been achieved in previous high rate trials.

[460] In January 2008, Mr. Saunders reported internally that, over seven years after the time that Mr. Gent had first identified the problem:

H240 has been operating at design feed and conversion (53MG/hr, 65% Conversion) for 119 days on the first run since installation of the burners. Based on present TMT's this furnace should be able to operate at design for another 1 to

2 weeks. This will be a significant record run length for an E3 furnace at design conditions.

H210 has been operating on the new burners for 88 days on the first run. The first 62 days the furnace was operated at █% above design feedrate (█MG/hr, 65% Conversion), and the remaining days have been at design conditions. Based on present TMT's there should be a significant number of days left on this run. [emphasis added]

[461] Mr. Saunders was referred to an application that Nova had made to Alberta Environment on February 6, 2008. He agreed that Nova would want to ensure that the underlying facts were as accurate as possible. The application states that E3's annual capacity is █ kta, or █ BPY. Mr. Saunders indicated that part of this number was what Nova hoped to produce, but this qualification was unconvincing.

[462] He acknowledged that once the Callidus burners were installed, they did not prevent a furnace from running at █ Mg/hr and 65% conversion.

[463] On April 15, 2008, Mr. Saunders finally reported positive results to the E3 Management Committee.

[464] On August 19, 2008, Mr. Saunders and another Nova employee made a presentation to the E3 Management Committee setting out the E3 Re-Coil Strategy, which was a plan to replace coils with improved coils, indicating that the first set of coils would be on-site for installation by the third quarter of 2009, and that burner change-outs were still in progress and would not be complete until 2009.

[465] One of the slides indicated that the average run length with the new ANK 400 coils was about 105 days at 61.7% conversion and 51 Mg/hr feed, which was more than double the run length at design conversion and feed rate. Mr. Saunders confirmed that, after the 2003 test, Nova had never tested the new coils with the original burners at a feed rate of █ Mg/hr and 65% conversion, other than one test of one furnace in late 2006 which, as previously noted, indicated that the furnace ran at █ or █ Mg/hr for over 42 days before hitting constraint.

[466] Thus, while Mr. Saunders' testimony confirmed the issues that Nova was experiencing with the burners and the steps it took to resolve the problem, it also indicated that the steps taken were very slow, and that the furnaces were, as Dow alleges, run mildly and well below their maximum capability while these steps were taken. Mr. Saunders and his group received no pressure from management to resolve the problem, despite Nova's covenant to run E3 with the objective of maximizing production.

g) David Craig

[467] David Craig started at E3 in December 2009 to take over the role of rotating equipment specialist. He testified about issues with respect to the equipment for which he had responsibility at that time:

- a) There were two outages involving seals in the K-400 compressor in the summer of 2012. Mr. Craig acknowledged that the effective cause of the failures was that Nova was operating the K-400 for many hours in excess of the 30-40 hour design limit. The seals were replaced. Mr. Craig was not aware that Dow was not claiming damages for these periods when the Plant was down. Mr. Craig acknowledged that the down-time

was used for furnace decoking, and that, coming out of the repair of the seals, E3 had seven freshly decoked furnaces;

- b) There were failures in the induced draft fan bearings in one of the furnaces in November 2010 and April 2011, leading to furnace down-time of two to three weeks each time. He acknowledged that the bearing at issue had been in service since the furnace start-up, and that Nova did not record any business interruption losses due to these incidents. He also acknowledged that he had made recommendations to resolve the problem after the November 2010 problem, but these recommendations were not followed before the April 2011 incident, and in fact were not implemented until November 21, 2011; and
- c) There was a deterioration in how much steam could be fed into the TD-405. He noted that the TD-405 had been overhauled in 2003 and 2008 as part of normal operating maintenance procedures. Five months following the 2008 overhaul, the performance of the V1 rack of the unit was deteriorating, resulting in some uncalculated decline in the power of the turbine. He conceded that if the Plant was run hard, there would be no wearing issue with respect to the rods. During the 2009 high rate trial, the Plant ran at █% of nameplate capacity with the rods installed in 2008, with no constraint from the TD-405. Mr. Craig testified that, during a Plant outage not related to TD-405 in October 2011, maintenance was done on the TD-405. Shortly afterwards, there was a problem. It is not clear whether this was related to the maintenance. Notwithstanding the problem, the Plant was still capable of operating at 100%. Mr. Craig had noted in documentation that the cost of this outage was most significant to Dow, as Nova was able to do some production management at E1 and E23. Work was performed to replace and improve the TD-405 valves and rods in 2014. Mr. Craig conceded that the work could have been undertaken many years prior to 2014.

h) Yost Kieboom

[468] Yost. Kieboom was a contract engineer for Nova at E3 from 2003 to 2012, working primarily in the finishing area. He testified with respect to problems encountered in E3's E-650 heat exchanger during the 2003 plant turnaround, leading to fouling. He noted that the first attempts to resolve the issue were unsuccessful. Over the course of the next two years, this caused a pressure drop in the heat exchanger that "we knew was going to limit us". In making that comment, Mr. Kieboom did not refer to any observations that were noted at the time. Mr. Kieboom acknowledged, however, that during April and May 2004, E3 was able to achieve rates in the █% range.

[469] In June 2005, Nova tried another method of fixing the problem, but a tornado in Alberta interrupted the process. Mr. Kieboom commented that "we didn't have enough ethane to run the three crackers at Joffre, and so E3 was taken off line". Nova used that time to try to clean the fouling at E-650, in addition to other maintenance. One of the strategies to work around the problem was to open a by-pass, but Mr. Kieboom commented that this was not a normal way to operate, as someone has to manually operate it.

[470] After this cleaning in June 2005, the E-650 was operating close to its design level. However, in August 2006, the problem re-emerged. Mr. Kieboom's group came up with another

idea to fix it, which they did not attempt until the fall of 2006 when there was maintenance planned on a furnace.

[471] Mr. Kieboom commented that Nova's strategy was never to run at less than six furnaces, but to attempt this new fix, they decided to drop to a five-furnace operation. The new idea did not work, so they resurrected what had worked in 2005. Reverting to the 2005 process worked, although not perfectly, but was something that Nova could deal with online and would not impair the production of the Plant. Nova continued to use this method to control the pressure drop from time to time; it became "our mode of practice." However, this led to further problems in the C3 refrigeration system. Despite this, Nova continued with this method of controlling the problem until the 2008 turnaround. At that point, a project initiated in 2006 was implemented, which modified some equipment to make the cleaning process easier.

[472] Mr. Kieboom confirmed that the 2008 maintenance and improvements brought E-650 back to near design pressure and in a clean state. It did not foul "enough" during 2009 up to the high rate trial of March 2009 to interfere with production. After that, Nova would fix the fouling as it occurred using the 2005 process.

[473] Mr. Kieboom testified that "we" had noticed a decline in E-568's operation as early as 2007, but it was not restricting Plant rate. Nova thought the fouling was similar to the fouling in E-650. Nova did not consider increasing the conversion rate as a method of resolving this issue. Finally, in June 2008, Mr. Kieboom's group attempted the same solution that they had tried on the E-650, but it did not work. They then discovered that what was happening in E-568 was also happening in E-565, namely, a problem with the reboiler in the C2 splitter. However, they had not prepared to do work on the E-565 during the turnaround, so they were unable to fix it. They did attempt a cleaning of the fouling on E-568, but this failed. Samples of substances recovered during the cleaning were sent to the Nova research centre but the results did not come back until October or November 2008.

[474] In a presentation made to Dow dated March 2009, Mr. Kieboom indicated that "feedstock availability prevented testing until February 2009." He noted that the E-568 and E-565 in the C2 splitter had "experienced a large change or hit a physical limit". He testified that, after the unsuccessful attempt at cleaning in June 2008, Nova abandoned any further attempts to clean the fouling using the 2005 process. During the high rate tests in March 2009, the E-568 prevented the test from going any higher than █%. However, Mr. Kieboom's "Preliminary Conclusions" slide in his presentation indicates as follows:

Preliminary Conclusions

- Key differences before turnaround versus after:
 - Before turnaround E650 fouling had a large influence on the C2R/C3R refrigeration loads
 - resulted in bypasses in the C3R system being opened
 - E568 was also becoming a limit for the C2 splitter prior to turnaround due to fouling
- Why were we able to achieve █% w/o bypasses open, though not able to before turnaround?

- E650 was cleaned during turnaround and E568 was partially cleaned during turnaround
- A clean E650 resulted in lower refrigeration loads at [REDACTED]% which the existing control valves could handle
- E568 performance also improved slightly after turnaround.

[475] Mr. Kieboom indicated that, after the cleaning failure in June 2008, the plan was to come up with a solution to be implemented in 2013, the next Plant turnaround. Instead, Nova decided to try to clean E-568 during an outage in June 2010 to repair the steam rack in the turbine. In the minutes of a meeting dated June 8, 2010, it was indicated that E-568 “has been slowly losing duty over the past 10 years of operation. Maximum plant rate and ethylene variable cost are being impacted by the fouling in this heat exchanger. Currently, the maximum plant rate is estimated to be [REDACTED] – [REDACTED]% of nameplate.”

[476] Mr. Kieboom did not identify who was the author of this comment.

[477] The attempt at cleaning in 2010 was unsuccessful, and in fact, made things worse. A comment in the incident report indicated:

At this time it is estimated that it will take approx. 12 Weeks to build a replacement heat exchanger (Best Case) E3 will have to be shut down and restarted and the replacement will take approx. 48 hours.

[478] Under “Planning,” it stated: “Inadequate assessment of needs and risks”.

[479] Finally, in July 2010, a request was made to fund a new E-568. The replacement took place in October 2010, but Mr. Kieboom indicated that the Plant was run at a maximum of 95% until then. In May 2012, E-565 began to experience seal issues. Mr. Kieboom indicated that “we put on our work list to install a valve to isolate the seal pot if there was ever an opportunity between 2012 [and 2014]”. Mr. Kieboom conceded that the timing of fixing the issue of E-565 was governed by the prospect of Nova’s R3 project coming on-line in 2015 and its demand for ethylene.

[480] In November 2013, the E-565 problem obviously had not yet been resolved, but this is outside of the damages period applicable in this litigation.

[481] It was put to Mr. Kieboom that he had indicated during his questioning in February 2015 that neither E-565 nor E-568 were a constraint on production until 2008. He answered that it was not a constraint in 2008, but that the splitter reboiler started to show signs of a problem in 2012. He then agreed that neither E-565 nor E-568 were a constraint in 2008. He also confirmed that, during the March 2009 trials, the C2 splitter was only a constraint at [REDACTED]%. He was taken to the monthly reports, where it was indicated that the C2 splitter was only a constraint in 2009 for 48 hours, and not at all in 2008.

[482] Mr. Kieboom was referred to an email from a Dow engineer dated July 7, 2010. She indicated in her email:

Thanks again for your time and detailed review yesterday of the issues with E568.

We were looking at the impacted exchangers in the splitter system (E565 and E568) on the PFDs.

I've been unable to locate spec sheets for this equipment but the PFDs have the design duty (175 and 38 GJ/hr respectively). At first glance it appeared that E565 should have more than enough duty to compensate for E568 (not for nameplate, but certainly for higher than 65% nameplate rates). I then clued in that you needed a way to get rid of the ethane from the bottom of the tower:

If you take conversations back up to the 65% design (instead of the ultra low 56-58%) there will be considerably less ethane and we estimate you should be able to take the plant up to 80% of nameplate ... I believe there is no drawback to moving conversions immediately.

[483] Mr. Kieboom emailed another Dow employee, asking that person to respond, and noted:

Hi Kerry, I will leave it to you to answer. The penalty we continue to pay for providing a little information to Dow.

Currently we have been asked to reduce plant rate not increase. We are also holding conversion low to improve ethylene yield. This has been our operating strategy for some time now.

When the time comes to increase plant rate I am quite sure we will be able to figure out how to maximize ethylene rate given the operating constraints.
[emphasis added]

[484] When asked at trial whether he would disagree with the suggestion that it is a common industry practice to ramp up conversion rates when a reboiler is having issues, he responded that, "[w]hen I read this, it was blatantly obvious to me that she didn't understand how the C2 splitter worked."

[485] It was pointed out to him that, after the email, Nova did increase the conversion rate to between 62 and 65% for a number of days. This appeared to allow E3 to improve to around 95% of nameplate. Mr. Kieboom indicated that this was a "simplistic view".

[486] Mr. Kieboom confirmed that the commercial people would direct the operations group with respect to amount of available ethane and conversion rate.

[487] He acknowledged that, when he gave Plant tours from time to time, he would include in his materials that the Plant would produce ■■■ BPY, or ■■■% of nameplate. For example, Mr. Kieboom was referred to a presentation he had made that indicated that the Plant was debottlenecked in 2003 so that it could produce ■■■ BPY. He said that he "mistakenly believed that this was a sustainable number" until he was corrected by Mr. Wilke (who is also a member of the Nova litigation team) at a meeting. He later did his own calculation and decided that he had been wrong in his assessment of sustainable Plant operation. This explanation was not credible. I am satisfied that Mr. Kieboom's present view that the number is incorrect is prompted by loyalty to his employer.

[488] On cross-examination, Mr. Kieboom was taken to the sections of the E3 Monthly Reports that listed Plant restrictions from December 2001 to December 2011, and the fourth quarter of 2012. He confirmed that, until late 2006, by far the largest constraint recorded was feedstock availability.

[489] For example, refrigeration constrained production at E3 in 2004 for only 6% of its hours of operation.

[490] However, from the fall of 2006 when the litigation began, feedstock was reported as a zero constraint from 2007 to 2009, for only 5 days in 2010, and again for zero hours in 2011 and 2012. However, other constraints were recorded at much higher levels. For example, refrigeration was noted as a constraint for 23% of E3's hours of operation in 2006, and 29.6% in 2007.

[491] Mr. Kieboom suggested this was a coincidence. He also confirmed that, after the litigation commenced, Nova reported some kind of constraint every day in the monthly reports. He acknowledged that "that's what I was doing". Again, this is not credibly a "coincidence" I am satisfied that the notations Mr. Kieboom made in the monthly reports about constraints after this litigation commenced were colored and prompted by the litigation.

[492] I also note, that despite these much higher hours, Mr. Kieboom indicated that the 2005 method of addressing the fouling was something Nova could deal with and would not impair production. It is also noteworthy that Nova did not attempt another method of addressing the problem between the fall of 2006 and the 2008 turnaround.

[493] Given that Mr. Kieboom was not credible in many of his answers on cross-examination, and given his clear animus towards Dow, expressed in his disdain for the advice given by the Dow engineer, I find that his evidence with respect to how mechanical issues affected E3's productivity was coloured by his loyalty to Nova. It was unpersuasive for that reason. What his testimony does illustrate is that Nova did not diligently pursue solutions, but instead took a very relaxed position with respect to addressing mechanical issues.

[494] For example, it was only when the prospect of R3 coming online and requiring ethylene prompted it that Nova took the step of accelerating the resolution of the E-565 issue. Mr. Kieboom's testimony supports the inference drawn by Mr. Holloway that Nova did not need more ethylene.

i) William Wade

[495] William Wade has worked for Nova for over 36 years. He became a manufacturing team leader within the E3 project team, working in design and construction and later as a manufacturing leader at E3 from 2000 to 2003 and plant leader for E1, E2 and E3 until 2006.

[496] Mr. Wade viewed himself as the designated Operator, and would organize and chair the E3 Management Committee Meetings. However, he had nothing to do with how much ethylene was going to be made at E3 each month, what conversion rate was going to be used, and whether ethane allocation would be imposed. He had nothing to do with designing ethane allocation or deciding how much ethylene Nova would deliver to Dow in any month. He conceded that someone other than the Operator was making those decisions. He confirmed that the EBT people decided on ethane availability and conversion rates and prepared production plans that were brought to the JBTT to be blessed. When asked what "side" he was on with respect to contentious issues between Nova and Dow, he replied "I was a Nova employee. I still am".

[497] Mr. Wade testified to a long list of operational issues in 2000, indicating that the Plant was more stable moving into 2001. He was taken through the yearly budgets, and confirmed that they had been approved. He commented on reasons why budget numbers had not been achieved in some years. He noted there were "a variety of Plant issues that you would expect in a new plant".

[498] Mr. Wade confirmed that, after the E3 performance test, he believe that E3 had some upward capability of a couple of percentage points over the performance guarantees on a sustained basis. He also confirmed that, at the time the COP was being structured, Nova had no current demand for the ethylene that would be produced. He noted that, certainly after mid-2004, Nova was receiving enough ethylene from the Joffre Site to operate its derivative plants at the capacity it wanted to operate them. He was aware that Dow's demands were not being met. The fact that Nova's demands were being met led to operations at E2 at low level rates and the possibility of block-operating E1. There were conversations beyond 2001 about shutting down E1 or instituting block operations. He acknowledged that how hard E3 would be run depended on how hard Nova was running E1 and E2. There were periods of time when E3 was not run particularly hard because of a lack of Nova demand.

[499] Mr. Wade also spoke about his instructions to reduce production to minimize inventories and reduce operating costs at year-end.

[500] Once the manufacturing people knew how much ethylene they were going to have available at E3, they had some discretion on how to run the furnaces. For instance, in October 2001, a newly decoked furnace was left inoperative "as business needs can be met without it". At that time, since two Nova facilities were late coming online, Nova had considerably more capacity to make ethylene than it had demands. Laying up of one of E3's furnaces for the winter would not be a problem, and so it was laid up, despite the nominations of the Co-owners. The business imperative that brought the laid-up furnace back into service was the Plant guarantees rate trial.

[501] Mr. Wade noted that, although you could "make nameplate with six furnaces online", there would be periods of time that one of those six would have to be dropped for decoke and maintenance.

[502] In January 2002, the reports indicate that one furnace had a 122-day run cycle, as opposed to the 42-day design length. In the fall of 2001, run lengths ranged from 62 days to 93 days.

[503] Mr. Wade also identified furnace run length in 2005 ranging from 126 to 143 days, which he noted cut back on maintenance costs. He acknowledged that decoking of furnaces every 40 days reduced the likelihood of high tube metal temperatures occurring; however, he conceded that his operating instructions were to process the amount of feedstock they had available to minimize the number of decokes and extend the life of the coils. He acknowledged that Nova's goal was not to run the furnaces hard for 40 days and then decoke them, but to run enough to meet Nova's needs and get the maximum run length out of the furnaces.

[504] Mr. Wade conceded that Nova ran the furnaces at about [REDACTED] Mg/hr on a more continuous basis at times, rather than the 53 Mg/hr limit that Mr. Just referred to. Mr. Wade identified some periods of time in 2003 when the feed rate of 318 was distributed over 5 3/4 furnaces at around [REDACTED] Mg/hr, before burner or coil changeouts. In 2004 and 2005, there were instances of Nova running at an overall feed rate of [REDACTED], and then running four furnaces at about [REDACTED] Mg/hr and design conversion of 65%. Later that spring and summer, furnaces were run at [REDACTED] – [REDACTED] Mg/hr and design conversion, once again before burner or coil changeouts. Sometimes when Nova was operating less than seven-furnaces, it redistributed feed rates, and sometimes it did not.

[505] Mr. Wade acknowledged that, if feedstock was available, E3 could have been run harder.

[506] He was referred to the performance of one of the furnaces after the burner change. This furnace ran from November 17 until December 29 at ■ or ■ Mg/hr and 65% conversion.

[507] Mr. Wade confirmed that he felt the COP objective of increasing capacity to ■% and running for 8500 hours a year with 99% onstream time was achievable, and “without a doubt, the COP increased the capability of E3”, in his view, in the neighbourhood of ■ – ■% of 2.81 BPY. The constraint prior to ■% was that they had to operate with the control valves in by-pass mode, which was not typical.

[508] Mr. Wade commented that when he reported on “constraints” to the E3 Management Committee in July 2004, he was “just pointing out that there were a few things that, if we were to run those on a continuous basis, I would have like to spend some money on”. They were fixable issues.

[509] At the July 2004 E3 Management Committee meeting, the following discussions occurred:

E3 Capacity Options

Dow would like to understand the option (of further E3 expansion) and keep it open at this time, however, Nova does not have the resources assigned to do further investigation at this time. An agreement with regards to expectations and milestones needs to be reached between Dow and Nova. An action for the next management committee needs to be captured. At that time Nova will need to know if resources will be needed to carry this work forward.

Note: Graeme Flint confirmed (later in the meeting) that Nova sees no justification for further E3 expansion work at this time.

It was requested [by Mr. Miller] that now that the project is essentially complete, the E3 nameplate should be adjusted to show the current capacity and full production rate. Dow indicated that it is common practice that whenever Dow spends capital to increase capacity, the plant is re-rated to acknowledge the capacity change achieved by the upgrade. Dow indicated that the LHC1 has been re-rated to a nameplate capacity of 2.8 billion pounds per year.

Schedule E of the Operating and Services Agreement provides a process/methodology for calculating a revised nameplate capacity for E3. Cec Miller and Eric Wade will review this procedure & bring the issue forward to the next management committee meeting.

...

Commercial updates

There are commercial matters that are being dealt with outside of the JV Committee, however they are unrelated to the operation of the plant & performance. Dow is pleased with E3’s current operation and record production achievement.

Cec [Miller] asked whether with regard to feedstock fraction calculation whether there a need for Dow and Nova to sign off? This issue will be addressed during the current discussions outside of the management committee. Nova has offered

to temporarily adjust the feedstock fraction to reflect Dow and Nova's 50/50 ethylene production proportion as a show of good faith during the balance of 2004. Any long term resolution which would have the effect of modifying the feedstock fraction, would need agreement / sign-off by the management committee.

[510] Mr. Wade agreed that the discussion over changing nameplate capacity continued for some time.

[511] He was referred to an email he had received from Mr. Gent on June 20, 2001 as follows:

One of the things that is in the UCC contract that we (you and I) haven't established a gameplan for is the determination of E3 nameplate capacity. I don't know if you recall, but Bob Nabata and I did some work with Keith McGee on this and it is contained within an attachment to one of the contracts (can't remember which). This might also be considered the High Rate Trial, at least there should be some identified operating constraint that sets the nameplate of the plant. We could use the High Rate Trial as the means to develop the basis for plant nameplate i.e. it wouldn't be necessarily be the highest rate achieved but would be derived from it.

[512] In an internal audit report dated July 31, 2001, prepared for Nova by Ernst & Young, it was noted that E3 Management Committee approval was required to establish nameplate capacity, "which is expected shortly now that plant trials have been completed". It was recommended that E3 Management Committee approval be obtained for this. There was no response to the recommendation from Nova.

[513] Mr. Wade merely confirmed that, if the work was asked for, he and Mr. Gent "would be the individuals to do it", but conceded that at no time did Nova ever bring this before the E3 Management Committee, or prepare a determination of the E3 ENC in the manner provided for in Schedule E.

[514] Mr. Wade was referred to an internal presentation made by Mr. Foy, the commercial contracts person assigned to E3, in November 2001.

[515] The presentation notes that "[w]ith the exception of ethane allocation, Dow's interests are aligned with Nova's". It also noted that "under ethane allocation, any changes to the ethylene nameplate capacity could impact each Co-owner's share of allocated ethane". Mr. Wade indicated that there were differences in opinion with respect to this within Nova, but he conceded that a higher Feedstock Fraction for Dow would mean that Dow would get more ethylene.

[516] However, in a presentation revised from Mr. Foy's earlier internal presentation presented to the February 11, 2004, E3 Management Committee Meeting, Mr. Foy's language was changed. It now indicated in capitalized, bolded and underlined words that there was no impact on Feedstock Fractions by changing the ethylene nameplate capacity. Thus, Nova failed to present the other view held within Nova.

[517] Mr. Wade referred to his objective as being running the Joffre Site "as one plant, well-spaced" although he conceded that was not the same thing as optimizing production at E3.

[518] He was referred to a JBBT memo that indicated that, in February 2004, Nova turned down ethane spot purchases because it was running out of storage, and was operating at “higher than desired” rates. This kind of thing was not shared with Dow.

[519] Mr. Wade was taken to three months of exceptionally high production in 2004. He confirmed that these three months, when Dow requested extra ethylene because LHC1 was down for turnaround, were “one of our best campaigns through the time that I was there”, but cautioned that he was not able to do his regular maintenance during that time. He agreed that these things did not affect the ability of the Plant to run at its demonstrated sustained capability for that period. He confirmed the Plant was running at the COP target rate, some days slightly higher. On May 14, 2004, the Plant reached ██████%.

[520] Mr. Wade was taken to the “Plant Constraints” information in the monthly report for June 2004, one of the high production months. Nova reported furnaces for the first six months of 2004 as being a constraint on production more than half the time, however, the effect of this constraint in megagrams of ethylene was only 19.04 Mg against the budget, compared to 120,000 Mg of production for the month, less than 1/2 of 1% of a day’s production.

[521] He was referred to the equivalent report for December 2006, where refrigeration was recorded as a constraint 23% of the time. The year end figures confirm that this amounted to a constraint against budget of only 551 Mg, which is less than 15% of a single day’s production.

[522] Mr. Wade described the intent of the restriction summary as follows:

Well, the intent of the restriction summary is to understand on a monthly, yearly period of time as to what is constraining the plant so you can make decisions around, do I need to do something about that constraint? So the records are accurate in showing what we as the operator wanted them to show, which is, what is the percentage of time that a particular item constraints the plant. And then as you point out, you would look at the volume of constraint to determine whether or not you wanted to actually actively do something about that constraint.

Q If there is one, we really need to look at these Megagrams; right?

A No, you need to look at both because the one – the one is the impact of that constraint. The other is that I couldn’t push beyond that constraint. So if I’m constrained by refrigeration for 23 percent of the time for the next month, that means I can’t push beyond that constraint to see what the next constraint is.

[523] Mr. Wade described this as a tool so that he could request funds from the E3 Management Committee to work on the constraint. He conceded that it appeared from these examples that sometimes, Nova recorded constraints purporting to indicate why production could not get to budget in months in which budget had been exceeded. Therefore, sometimes the constraint reference hindered E3 from achieving some higher levels than the levels it had already reached over budget, and was there to assist in monitoring areas for future improvement.

[524] Mr. Wade confirmed that this high production period was before Nova began to change the E3 burners, and before coil changeout, at a time when the coils and burners were coming to the end of their working life. He confirmed that E3 achieved record production in the first half of 2004, and then strong production in the fall of 2006 before the burners were changed.

[525] Mr. Wade confirmed that blistering on the coils was an event that they had seen before, and it had also occurred at E1 and E2. He also confirmed that coil leaks were not uncommon, although they were happening more frequently in E3 in 2002 to early 2004 time frame. He confirmed that leaks would be monitored and furnaces could be run with coil leaks, although Nova did not like to operate like that.

[526] He acknowledged that there was no pressure to get replacement burners in place more quickly. He agreed that there was pressure to keep repair and maintenance costs down and to spread capital expenditures like coil replacement over a number of years, given Nova's financial situation at the time.

[527] Mr. Wade was taken to internal reports that indicated that, despite the fact that design maximum tube metal temperatures were increased when the new coils were inserted, a decision was made not to increase maximum operating temperatures because "we would likely never operate above the current condition".

[528] Mr. Wade confirmed that the E3 Management Committee minutes went through an editing process at Nova before they were set out to Dow. Internal documentation with respect to the November 23, 2004, minutes indicates that Mr. Foy added "builds" to the minutes, and asked for builds from Mr. Wade, Mr. Flint and Ms. Appuzzo. The comments that were added improved the minutes from Nova's prospective on contentious issues. Mr. Wade conceded that at the time "there was concern that we were in a litigation situation and people were sensitive to the wording that [the person taking minutes] put in". The "commercial people" wanted to review the minutes before they were sent to Dow.

[529] It was noteworthy that, although the litigation did not commence until 2006, Mr. Ramachandran had asked hard questions in the summer of 2004. Mr. Wade acknowledged that this was not the only time minutes had been edited and rewritten before they were sent out. He acknowledged that, just about the time he left his position at E3, Dow formally objected to the process and started to take its own minutes.

[530] Mr. Wade acknowledged that, long before the litigation commenced in June 2006, there was an attempt to keep the commercial issues between Dow and Nova away from the manufacturing people, to preserve a working relationship among the technical people.

[531] Shortly after the litigation commenced, Nova elected to run E3 at some fairly high rates. Most of the coil changeout had been completed, but this was before the first burner change.

[532] Mr. Wade was cross-examined about certain mechanical issues at E3.

[533] He confirmed that the work done in the September 2001 turnaround fixed the depropanizer tower issue to the ■■■ – ■■■% rate. He confirmed that the acetylene reactor issue was resolved after 2001, and some additional precautionary work was done in 2003 "as we were changing the nameplate of the Plant".

[534] He confirmed that there were no material issues with the E-565 C2 splitter and E-568 ethane recycle vaporizer until 2006 when he left, that some work was done on them after the 2003 turnaround, and that he could not recall there being an issue after that.

[535] He described some issues with the TD405 steam rack, but could not describe the specific problems.

[536] With respect to the fouling in the E-560 ethane superheater, Mr. Wade described it as a concern when operating at high rates and when operating at very high rates with six furnaces. He said it was manageable with seven furnaces, but running six furnaces at ■■ Mg/hr required changes to the venturis. He acknowledged that this would resolve the problem, but “it was not a minor cost” and at the time “there wasn’t a feeling that we should spend that kind of capital”.

[537] He confirmed that, although the venturis had been identified as a problem in 2002, and although they could have been replaced when the coils were changed out, they still had not been changed when he left in 2006, and he thought they had not been changed yet.

[538] He described the debris in the cooling water system as not significant, but commented that it could have impacted production by a few percent.

[539] He acknowledged that the E-502 de-ethanizer exchanger was not an issue after the COP in 2003.

[540] He confirmed that problems with variable frequency drives had been resolved.

[541] Mr. Wade was a credible and candid plant witness. Although he made it clear where his allegiance lay, he did not try to avoid or deny uncomfortable facts. His testimony was illuminating with respect to the degree of severity of mechanical issues, the capacity of E3 even before the coil and burner changeouts, and the credibility of the E3 Management Committee minutes. It also confirmed that key decisions with respect to how E3 was actually run rested with the EBT.

j) John Dennehy

[542] John Dennehy was a manufacturing team leader in human resources when E3 commenced operations. He managed the 2002 turnaround. Shortly after that, he was assigned to other duties, but in 2008 he became a night shift manager to help manage the 2008 turnaround. From 2008 to 2009, he was the Maintenance Team Leader. From 2009 to 2014, he was operations team leader at E3, and presently, he is the E3 Asset Manager.

[543] Mr. Dennehy had assembled three binders of numerous documents, with information on plant operations from 2008 to 2012. From these documents, he had prepared notes for his testimony of “different issues on conditions that were restricting the Plant’s production over that period of time” which he had reviewed with counsel.

[544] As Dow counsel pointed out, many of the documents refer to matters that Mr. Dennehy was not personally involved in. Dow objected to having a lay witness come to the stand with prepared notes such as these. I allowed it on the basis that Mr. Dennehy identify with respect to each document whether he had personal knowledge of it, and noted that issues of credibility could be raised later.

[545] Mr. Dennehy testified about actual Plant performance. He testified about identifying “what the plant constraint was going to be”. He identified problems with the E-S66 seal potst in 2008, and in 2012, both due to fouling, and he described Nova’s experience with respect to the fouling.

[546] He described the need to replace certain debutanizer bottoms pumps after the turnaround in 2008, which led to reduced rates at the plant for nine days. He described issues that led to Plant shut down, which Mr. Mikulka would have accounted for in his damages calculation. He described five-furnace operation when one furnace was undergoing regular turnaround work and

the other was down for unplanned maintenance. He also described five-furnace operation when two furnaces were scheduled for decoking at the same time, because one had been laid up for the winter due to running at low rates as directed by the commercial people, leading to two days of five furnace operation. Mr. Dennehy also described five-furnace operations in April 2009 because one was being decoked, and two others had TMT issues, and other periods of time when burner replacements overlapped on two furnaces. It became apparent that five-furnace operation was often a result of conducting regular maintenance at the same time as unplanned repairs. Mr. Dennehy described how Nova had managed to produce “against” some constraint.

[547] Mr. Dennehy reviewed many of the constraints that had already been identified between 2008 and 2012, with cross-references to particular incident reports, the JPPT, and sometimes Manufacturing West reports.

[548] Most of these issues had already been described by previous witnesses, and he conceded that others would have had primary responsibility for the issue. He conceded that the averages of maximum capability of operations at E3 that he had testified to for various periods of time were averages that he had recently calculated, and not assessments that he had made at the time.

[549] He was cross-examined about his methodology of selecting periods of time for the averages, and the impact that would have on his numbers, which illustrated that his subjective choice of days made a difference to many of his opinions about maximum capability during these periods of time.

[550] This illustrated the difficulty of accepting testimony from a lay witness that is essentially opinion evidence that should be subject to a report produced in advance and open to rebuttal. It also affected the credibility of Mr. Dennehy’s analysis.

[551] Mr. Dennehy acknowledged that by August 2008, three of the seven furnaces had received new Callidus burners, and E3 was coming off its best production year ever, although 2007 was four years from the last turnaround. He agreed that it was reasonable that by 2007, some fouling had built up, and that it would be dealt with in the 2008 turnaround. He conceded that, by August, 2005, his group was dealing with a clean Plant

[552] Mr. Dennehy also acknowledged that the problem with the seals that he had testified about, identified in March 2009, was not repaired until the 2014 turnaround.

[553] Mr. Dennehy admitted that, on a day-to-day basis, he did not conduct assessments as to what internal or external constraints, if any, there were in E3’s ability to produce ethylene. While there would be discussions in daily meetings, nothing was produced at the time that looked like the notes he produced for his testimony. Personally, he made no notes of alleged constraints in the operlog entries that he was testifying about. He agreed that the real story of what was going on was in the records he had assembled. In particular, any E3 information or data that Nova felt was significant enough to be reported to Dow was set out in the Manufacturing West reports.

[554] Mr. Dennehy acknowledged that E3 provided what the commercial people at Nova directed it to produce, and that, for some of the constraints he had identified, Plant rates were actually reduced because of ethane allocation.

[555] Mr. Dennehy was questioned about the furnace that had been shut down in December, 2008. He described that it had been shut down because they were directed to run at low rates, and it was not needed. He was also referred to JPPT minutes for June 18, 2009, when the operations people were advised that, since PEI’s reactor outage was going on longer than anticipated, there

was no issue in allowing one furnace to remain down for a longer period of time. The Plant was directed to be held to █████% of design capability.

[556] Mr. Dennehy acknowledged that none of the “nomination business plan” or “ethane shortage” reasons for running at lower rates appeared in his notes, and he acknowledged that what was often driving E3’s production was the availability of feedstock.

[557] Mr. Dennehy conceded that Nova would sometimes change rates at E3 depending on what was happening at E1.

[558] He also acknowledged that, once the litigation commenced in 2006, several changes were made in the way constraints were recorded in the Manufacturing West reports. He conceded that from March 2009 until the end of 2012, there were very few operating days when Nova fed more than 53 mg/hr of the E3 furnaces, unless it was at low conversion, despite the new furnace coils and burners. This was the case whether six or five furnaces were operating. He confirmed that the new burners did not represent a constraint against production, but, despite this, the pre-burner exchange period of 2004 – 2007 remains the highest period of production of E3.

[559] For all these reasons. I give little weight to Mr. Dennehy’s testimony.

5. Conclusions on Mechanical Constraints

[560] My conclusions on the specific mechanical constraints described by Nova on which it seeks to rely to support its submission that it ran E3 to its maximum capacity are as follows:

a) Furnace Burners and Coils

[561] Nova alleges problems with plugged burner tips. However, both Mr. Holloway and Mr. MacPherson, Nova’s E3 Maintenance Supervisor, confirmed that plugged burner tips could be quickly and easily repaired without taking a furnace offline. Nova also alleges flame rollover issues but Mr. Dennehy, Nova’s E3 Operations Team Leader, confirmed that no such issues arose after the September 2001 mini-turnaround.

[562] I am satisfied from the evidence that between August 2000 and September 2001, changes were made to the burners, and the replacement of all the furnace burner tips and air-flow reducers was completed by September 2001. Nova acknowledges that the changes enabled the furnaces to operate at design conditions and to achieve the minimum specified design run length, 53 Mgs/hr, while operating at six-furnace operation, at design conversion of 65% and for run lengths of 38 to 42 days. In fact, Mr. Gent and Mr. Woods were of the opinion that furnace availability could significantly exceed design, in Mr. Gent’s view, in the range of █████ BPY. As noted later, in July 2002, Mr. Gent identified the need for a furnace retrofit program. In February 2003, when the E3 Management Committee approved funding for the COP, it recognized that additional expenditures might be required for modifications to the furnace burner tips. The E3 design engineering firm Stone & Webster was retained to investigate observed burner issues, such as tip pluggage and uneven coil heating, and to recommend any modifications needed to reach such objectives.

[563] In September 2003, after completion of the COP, Stone & Webster reported to Nova that there was no evidence of continuing flame impingement. It concluded that furnace performance with the existing burners was already at or very close to the COP objective of █████ Mgs/hr. It recommended changes to the burner tips.

[564] Nova did not immediately share Stone & Webster's report with Dow, but reported that success had been achieved in the later high rate furnace trials without burner limitations. All of the E3 furnace burner tips were replaced with new, low profile tips.

[565] In 2003, a non-urgent safety concern was identified that arose during furnace start-up and cool-down that had no impact on the ability of the furnaces to run. In 2005, Nova suggested to the E3 Management Committee that the burners be replaced with new Callidus burners.

[566] In February 2006, new Callidus burners were successfully modeled in simulations up to the ethane feed equivalent of ■ Mgs/hr. They were installed between 2006 and 2009. The new burners fully addressed the safety concerns, they were stable, and they significantly improved heat flux profile. Burners were no longer a constraint on running the furnaces at the COP rate of ■ Mgs/hr. Mr. Dennehy, Nova's E3 Operations Team Leader, and Mr. Wallsgrove acknowledged that the furnaces were capable of higher rates than 53 Mgs/hr, and, in 2008, Nova assessed the maximum feed rate for the new furnaces as being between ■ and ■ Mgs/hr.

[567] As Dow notes, this was seven years after Mr. Gent first identified the need for furnace modification.

[568] While Nova relies on testimony of Mr. Just to the effect that, from September 2001 to June 2003, Nova was not prepared to operate any furnace at a feed rate above the design rate of 53 Mgs/hr outside of rate trials and that E3 was constrained to a total furnace feed rate of no more than 318 Mg/hr during six furnace operation, or ■% of nameplate capacity, I agree with Mr. Holloway that furnace issues were overstated. The time taken to resolve them was far too long.

[569] Nova's claim that operating at rates higher than 53 Mgs/hr caused high TMTs relied on tests conducted in preparation for the COP turnaround. Nova conducted a two-phase furnace high rate trial in May 2004. During the first phase, a furnace was run at a feed rate of ■ Mgs/hr, "successfully demonstrat[ing] that the individual components ... throughout the furnace, were capable of processing ■ Mgs/hr". Nova ended the rate trial after 17 days due to reported high TMTs that were below the furnace design maximums, and due to suspected burner flame impingement on the coils.

[570] In the second phase of the high rate trial, Nova tested four furnaces at ethane feed rates of up to ■ Mgs/hr. One furnace, already online for 17 days, was run at ■ Mgs/hr at design conversion for 44.5 days. Another, already online for 18 days, was run for 41.7 days. The first furnace was run again for 43.5 days. Nova reported to Dow that it had exceeded its targets in support of the COP.

[571] These tests were conducted before the original furnace coils, which Dow concedes were likely damaged, were replaced.

[572] Dow points out that the approved TMT limits for the improved coils, installed between July 2004 and April 2006, ranged from 1122° to 1133° C, yet the data table assembled by Nova reflects no TMT higher than 1022° C. Similarly, the tube failures raised by Nova were experienced only with the original coils. I agree that there is no reason to suggest the furnaces were ever a constraint on E3's production once the coils were replaced. It is noteworthy that the E3 Management Committee minutes of July 14 2004 indicate in response to a question about whether the coil replacement schedule could be improved upon, that Nova advised that, given the

availability of feedstock and the continued application of ethane allocation, there “would be no benefit to accelerate the furnace turnaround schedule”.

[573] Dow notes that E3’s original design basis assumed a four-year coil life, which was consistent with Mr. Holloway’s opinion of typical industry experience. However, the evidence is clear that Nova tried to extend furnace run lengths, which Mr. Just conceded resulted in higher TMTs.

[574] Rather than using the furnace designer’s TMT limits, Nova set its own maximum operating temperature levels for the furnace coils that were significantly lower. When Nova detected a “high temperature” using these maximums, it did not decoke the furnaces. Instead, it curtailed product production by either reducing conversion or reducing the ethane feed rate in an effort to extend run length. In this way Nova tried to extend coil lives to six or seven years, delaying replacements long past their four-year design life. Five of the seven furnaces were left with original coils for nearly six years.

[575] After all the coils had been replaced by April 2006, Nova did not register the new TMT limits with the Alberta pressure equipment safety authority until 2007, and even thereafter, continued to use its own lower limits.

[576] As also noted by Dow, the burners in the E3 furnace were replaced over almost a three-year period. As a result, several furnaces operated for some time with new coils but old burners. In furnace H260, for example, the coils were replaced in 2004, but new burners were not installed until September 2008. However, Nova ran E3 at high rates for the first half of 2004. During that period, the furnace did not experience a single leak, blister or bulge in its coils.

[577] I am satisfied by the evidence that, once new coils and burners were installed, the furnaces were not constrained to 53 Mg/hr or to any other identified rate below ■ Mg/hr. Starting in November 2006, Nova ran one furnace at ■ or ■ Mgs/hr of ethane feed for 42 days, and starting in October 2007, Nova ran another furnace at an average of ■ Mg/hr for 43 days. However, after this litigation was commenced, Nova did not conduct any furnace trials to test the ■ Mg/hr COP design rate, or any rate between the 53 Mg/hr or less that it ran E3 at most of the time.

b) Venturis

[578] Ethane enters each furnace through the venturis, which equalize the flow of ethane into the coils. To regulate the flow effectively, the venturis require a different pressure on each side.

[579] After the early 2002 high rate trials, Mr. Just recommended replacing the venturis in E3 with larger ones as part of the COP program, given a concern with high header pressure in the ethane vaporization system of the plant upstream of the venturis. No work was performed on new venturis at that time.

[580] In 2004, Mr. Gent noted internally that venturis could be changed inexpensively during upcoming coil replacement work. However, Mr. Gent noted that “we may come close to (or slightly below) COP rates without making this change.”

[581] Nova technical personnel repeated their recommendations in succeeding years, but because of Nova’s internal financial constraints, their recommendations went unheeded.

[582] In 2008, as part of the MAC Project, Mr. Wilke brought forward the venturis replacement program to the E3 Management Committee, at an estimated cost of \$300,000 to \$350,000.

However, the MAC Project was not approved by Nova and the venturis have still not been replaced.

[583] There is insufficient evidence that venturis replacement was necessary in order to run E3 at more than 53 Mgs/hr. However, had they been changed, there appears to be a consensus that E3's furnaces could be run at a feed rate of [REDACTED] Mgs/hr.

[584] Mr. Wallsgrove suggested that some related operational modifications might need to be addressed, but he said that all of them could be run at that feed. Mr. Holloway agreed.

[585] In any event, when all seven of E3's furnaces are available, Mr. Gent acknowledged that the COP feed rate of [REDACTED] Mgs/hr, based on a conservative assumption as to how often seven furnaces would be available, is not required to achieve COP production rates. Mr. Holloway calculated that a feed rate of [REDACTED] Mgs/hr would have been sufficient to run E3 at full COP productive capability, taking into account E3's actual furnace availability. Nova's own expectation was that the MAC Project would have increased E3's base capacity to [REDACTED] or [REDACTED]% of its old 2.81 BPY design capacity – a capacity of [REDACTED] to [REDACTED] BPY.

[586] Mr. Kapur expressed the opinion that venturis replacement would provide incremental capacity above COP rates. Thus, I am satisfied that the venturis issue was only a constraint on production to the extent that Nova failed to fix a relatively inexpensive maintenance issue after recommendations to replace the venturis had been made as early as 2002. The excuse for failing to changeout the venturis in 2005 was the feedstock supply.

c) E-502 Exchanger

[587] Based on the evidence of Mr. Just and Mr. Wilke, Nova submits that, because of vibration in E3's E-502 de-ethanizer cross-exchanger, the plant operators would not operate E3 at total furnace feed rates above the design rate of 318 Mg/hr (six furnaces times 53 Mg/hr each) from the September 2001 turnaround until August 2002. However, while the exchanger was replaced at the time of the 2003 COP work, Mr. Gent, clarified that the replacement was not really a capacity-related item and that capacity was adequate. He testified that, prior to the replacement, his assessment of E3's productive capability was in the range of [REDACTED] TPY. Mr. Holloway confirmed that the E-502 vibration did not constrain production below E3's productive capability.

[588] From August 1, 2002 to May 27, 2003, "feedstock" and "nomination business plan" were the reason for 96.5% of E3's constraints in Mgs and 91% in hours. The exchanger is only referred once in an August 2002 "plant highlight" report.

[589] At any rate, Nova replaced the exchanger during the June 2003 COP turnaround, and no further vibration problems were encountered.

d) C2 Splitter – Hydrate Formation

[590] Nova submits that from late August 2002 until June 2003, a hydrate or contaminant problem in the C2 Splitter System constrained E3's capacity to [REDACTED] of its hourly nameplate capacity or [REDACTED] Mg/hr, although no Nova expert witness mentioned any problem. The problem remained unresolved for ten months, but Nova attributed to it a total production restriction of only 402.9 Mgs. Dow points out that, over the same period, Nova reported "feedstock" and "business plan" restrictions of 46,933.7 Mgs and 11,105.2 Mgs respectively, which puts the constraint into perspective.

e) E-568 Exchanger

[591] Nova submits that polymer fouling in the E-568 heat exchanger reduced E3's capability from █% in March 2009, to less than █% in the summer of 2010, and then to approximately 95% from August to October 2010. However, as Mr. Gent and Mr. Holloway noted, fouling is a fact of life in an ethylene cracker, and it is something that a prudent operator identifies and does his best to control.

[592] Nova attempted to remove the fouling through washes when it was observed in the C2 Splitter system during the 2008 turnaround. These attempts were unsuccessful. By June 2010, E-568's condensing duty was down to 72% of original design, which limited plant rates to between █ and █% of HNC. Another attempt to clean the fouling was made in June 2010, but the result was a further reduction in E-568's capacity. Finally, a new exchanger was ordered.

[593] Nova estimated that a replacement exchanger could be built in 12 weeks and installed in 48 hours, but according to the report, controlling the E-568 fouling was not scheduled as a 2010 priority. Apparently, this was because at the reduced rates Nova proposed to continue to run E3, it did not expect "the E-568 fouling *will become a plant constraint*" until sometime "prior to 2014, by which time Nova presumed it would need the ethylene. The matter was not a priority for Nova, since it could "displace" its own ethylene production from E3 to E1 and E2 to meet any production restriction.

[594] Nova concedes that it had begun to observe a decline in performance of E-568 in 2007, indicating fouling, and it knew then that if E-568 was fouling, E-565 would too.

[595] Mr. Holloway testified that Nova's decision not to fix the fouling immediately was "unprecedented".

[596] Both Messrs. Holloway and Kapur testified that installing a spare exchanger would have been a reasonable option. As Mr. Holloway explained, tie-ins could have been installed in the 2008 turnaround and a second exchanger installed a few months later. I cannot accept the E-568 Exchanger issue as a true constraint on production, given the length of time it took Nova to address it.

f) E-565 Reboiler

[597] Nova submits that fouling in the E-565 C2 Splitter tower reboiler constrained E3's productive capability from March 2009 until mid 2012. However, Mr. Dennehy testified that E-565 was not a constraint at rates of up to █% of design nameplate capacity. Nova did not attempt to run E3 above that level. However, Dow notes that Nova estimated that the E-565 fouling of 1% per year restricted E3 to █% of design nameplate at the end of 2013, suggesting a capability of █% through 2012 and █% through 2011, even fully taking into account the fouling that Nova continued to permit to linger. Mr. Kluthe's modeling put the capability figures even higher, suggesting a limitation at █% of design nameplate in mid-2013.

[598] Once again, it is evident that Nova decided not to address the E-565 fouling because it could meet its own ethylene needs without running E3 at higher rates. In an internal October 2012 presentation, Nova noted that it would not need "full site rates" until "post 2015", and that "Nova production can be made up by E1/E2"

[599] When Nova's business forecast changed and it developed a "desire to reach maximum rates in Q4 2014", it expedited delivery of a replacement reboiler.

g) E-650

[600] Nova submits that fouling in the E-650 superheater and resulting pressure drop issues have periodically affected E3's productive capability from 2006 through 2008. Toluene washes have been applied. While Mr. Gent testified about other ways of addressing the issue, those were never brought forward within Nova.

[601] Despite Nova's submissions that "[f]ouling in E-650 constrained E3's ... capacity from April 2006 ... until the turnaround in August of 2008", Mr. Kieboom testified that the toluene washes addressed the issue. Mr. Holloway found no evidence that fouling limited E3's production. Dow notes that some of the periods of highest production that Nova chose ever to achieve at E3 occurred during periods when it claims E-650 to have been a constraint: August and September 2006, and much of the 2007 year, E3's highest production year ever. Thus, although the fouling was an unusual problem, I cannot find that it affected E3's productive capability in a material way.

h) TD-405 Steam Rack

[602] Nova submits that lift rod wear in the TD-405 steam rack caused a "significant mechanical constraint" in 2009 and 2010. However, Nova's records, supported by Mr. Craig's testimony, indicate that the lift rod issue could have been avoided had E3 been run at higher rates, which would have achieved the "win-win" result of maximizing production and minimizing the wear on the valves.

[603] This was confirmed by Mr. Holloway, and Mr. Ferrigno agreed that "the lift rod issue ... wasn't impacting the productive capability" of E3, and he declined to treat it as a constraint.

[604] Nova submits that another "significant mechanical constraint occurred on TD-405" for a brief period in late 2011. Nova's estimate in the JPPT at that time was that the steam rack would limit E3 plant rate to █% of nameplate ethylene production. However, Nova did not run E3 at rates anywhere near █%, with Mr. Craig noting the cost of Nova's handling of the issue was "most significant to the JV partner as Nova is able to do some production management via E1 and E2". Mr. Craig conceded that work on this issue could have been done much earlier.

i) Crossover Piping

[605] Nova submits that crossover piping repairs and replacements caused by the failure and resulting fire created a significant increase in furnace maintenance and reduced furnace availability. E3 first experienced crossover piping corrosion issues in October 2006, after Nova decided to reduce the amount of sulphur injected into the furnaces. Between 2006 and 2010, six failures were recorded, each resulting in about a week of downtime for the affected furnace. In late 2010, Nova began replacing the piping but it took longer than planned. Mr. Eisenhower testified that the replacement piping installed to date has not presented any issues. In any event, as Mr. Holloway explained, the crossover piping replacement has not correlated with any lower furnace availability.

j) Furnace Availability Issues – Miscellaneous

[606] Nova submits that a variety of further "furnace mechanical issues, including the Variable Frequency Drive (VFD) fan bearing and USX failures," also caused a significant reduction in furnace availability.

[607] After experiencing four VFD failures between September 2005 and August 2006, Nova eventually completed a Root Cause Failure Analysis and began implementing a solution in 2010. Recognizing that its reliance on an outside service provider for repair and its maintenance of an inadequate supply of spares was keeping furnaces offline for longer than necessary. Nova decided by June 2012 to train its own technicians and to keep spares handy. As noted by Dow, this was a “leisurely approach” to resolving the problem. Despite this, as Mr. Ferrigno noted, Nova maintained an average availability of 6.316 furnaces over the claim period. Mr. Holloway confirmed that the VFD failures had no impact on productivity.

[608] An induced fan bearing failure occurred in November 2010. Nova kept the affected furnace offline for three weeks. Mr. Craig recommended changes to avoid any recurrence, but Nova had not instituted them by the time that a second failure occurred about five months later. Nova remedied the second failure in about half the time it took to remedy the first one. In any event, Nova attributed no production loss to furnaces on either occasion.

[609] Nova mentions an inducted draft fan coupling “failure” in July 2011, but no mention of this was made at trial by Mr. Craig, the author of the related incident report, or by any Nova expert. Dow submits that this was not a material problem. As Mr. Holloway explained, fan bearing and coupling failures are common repair and maintenance issues at ethylene plants, and it is regular practice to keep spare parts on hand for repairs.

[610] Mr. Holloway also explained that USX nozzle replacements are also part of the standard maintenance of an ethylene plant, able to be made during planned coil changes with no impact on furnace availability or ethylene production. Mr. Eisenhower, a Senior Nova Mechanical Engineer, confirmed that Nova ultimately replaced E3’s USX nozzles as a “proactive approach to ensure integrity and safety”. Nova seems to submit that the nozzles impacted E3 production, but there is no persuasive evidence of this.

k) Cooling Water System Debris

[611] Nova submits that there was an adverse effect on E3’s productive capability from debris in the cooling water system between July and October 2011. Nova knew of flow restrictions resulting from the debris in July, but decided to wait until October to address them. Dow submits, and Mr. Wade concedes, that Nova could have installed better filters when debris was observed previously, but it did not. Mr. Ferrigno declined to assess any supposed impact for this brief episode, observing that attempting to do so would require “some kind of fancy model”.

l) T-301 Pressure Relief Devices

[612] Nova claims that T-301 Pressure Relief Devices limited E3 to █████% of its design nameplate capacity during “6 plus 1” operation, the very brief period during which a furnace is transitioned into or out of a decoke cycle. Mr. Just testified that this limitation, if it existed, affected E3 only “prior to any COP changes”. Mr. Holloway confirmed this, and pointed out that E3 was run at █████%. Nova never reported any associated production loss, and no Nova expert mentioned any such limitation in his report or testimony.

m) K-570 Pressure Safety Valves

[613] Nova submits that K-570 pressure safety valves (PSVs) limited E3 to █████% of design capacity during Plant high rate trials in February and March of 2002, prior to the COP. The claim springs from Mr. Ferrigno’s interpretation of a rate trial report. When Mr. Gent reviewed the same data in 2002, he calculated E3’s “likely annualized capacity” to be █████%.

[614] Mr. Ferrigno thought that all three PSVs needed to be in service to achieve rates above ██████%, and that having all three in service was a safety issue. But Nova apparently considered after the rate trial that two might be sufficient to support COP rates, and in any event, it was prepared to operate with all three “if required to support the COP capacity”, mitigating any associated risk in various satisfactory ways.

n) K-400 Compressor

[615] Nova submits that fouling in the K-400 compressor caused an unquantified yield reduction at E3. Mr. Wilke purported to estimate an impact on production in 2007 and 2008, but 2007 was E3’s record year. Nova attributed no ethylene production loss at all to K-400 in 2007 or between January and July 2008, despite having a line item for K-400 production losses in its E3 monthly reports. Once Nova performed a wash-oil injection in July 2008, Mr. Wilke agreed that there was no further fouling concern. Mr. Craig conceded that Nova was operating the K-400 compressor for many hours in excess of the 30 – 40 hour design limit.

[616] Nova also consistently spent less than it had budgeted for E3 maintenance. Nova witnesses indicated that, initially, its maintenance budget numbers were too high because of lack of experience with the Plant, but even after 2002, Nova underspent on maintenance to a large degree.

[617] Dow submits that, by not performing maintenance, or deferring it, or extending run cycles well beyond design lengths, short term savings can be accomplished, but at the cost of productivity. The evidence establishes that Nova had no business reasons to run E3 at full rates, and recognized internally that to do so would benefit Dow.

[618] Specific incidents confirm this prioritization of Nova’s needs and requirements over its Co-owners.

[619] In summary, I find that the mechanical issues that Nova submits were uncommon and a reason it was not able to run to its productive capacity were overstated, or, while perhaps a plant issue that needed to be addressed in timely manner, did not constrain production. I accept the opinions of Mr. Kapur and Mr. Holloway that Nova failed to address these issues expeditiously, and the only reasonable explanation is that Nova did not require the additional ethane that timely resolution of the mechanical issues would produce. This lack of prompt resolution is corroborated by the evidence of Nova’s lay witnesses.

[620] I also note the late appearance of the issue of mechanical constraints during the pre-trial process, the late production of thousands of low-level plant records, the fact that mechanical issues had not been pled, and that when Dow asked Nova during the discovery process to identify any constraints that it alleged had limited plant production, Nova’s response was that the question was “not relevant”.

[621] I also note the ambiguity about the “constraint” tables in the monthly reports, confirmed even by Nova lay witnesses, the manner in which “restraints in production” were recorded in several ways, and the testimony of some witnesses that the hours restriction tables were designed to show some constraint for every hour of every month, whether the Plant was being run at full rates or less, whether it was hitting a constraint or whether the restraint was merely the next anticipated constraint.

[622] For all these reasons, I decline to make adjustments to the opinions of Mr. Kapur and Mr. Holloway, which I accept as valid and reasonable. I accept that some of the fouling issues may

have been out-of-the-ordinary, but given the length of time Nova took to resolve the issue, and given that Mr. Mikulka's opinion fairly backs out actual down-time from his calculations, this approach compensates for any minor more-than-normal constraint on production. The same is true with respect to the furnace issues, given the extraordinary length of time taken to resolve the issues, and the continued failure to resolve the relatively minor venturis issue.

[623] Nova is critical of Dow for failing to call lay witnesses from its own organization who Nova submits have a familiarity with the actual capacity of E3 and the impact of any operational issues on its productive capability. However, these lay witnesses would have run into the same constraints as the Nova lay witnesses with respect to their scope of admissible opinion evidence. Their limited evidence further limited by what had been disclosed to Dow by Nova at the time these mechanical issues arose, would have been of little assistance in addressing the issues.

D. Breach of the Joint Venture Agreements

[624] Dow submits that Nova is in breach of sections 4.3(b), 4.4(a) and 7.3 of the OSA, section 3.2(c) of the OSA and section 3.11 of the COA.

1. Breach of Section 4.3(b) of the OSA

[625] Section 4.3(b) of the OSA under the title "Duties of the Operator" requires Nova as Operator to "conduct the Operations with the objective that the Plant, subject to the direction of the Management Committee, will optimize Product production and achieve first decile performance when compared to other ethylene plants in North America". This duty of the Operator is subject to the terms of the OSA, including, specifically, actions requiring the approval of the E3 Management Committee.

[626] There are two parts to this duty: optimizing product production is the first, and achieving first decile performance is the second. Mr. Wilke, Mr. Kluthe and Mr. Kilbourn, Nova witnesses, recognized that optimizing production means making as many pounds of ethylene as possible.

[627] As noted, the evidence establishes that E3 was rarely run to capacity. Nova's stated goal, as set in the objective of the JPPT, was to optimize production and profit to Nova from the three crackers at the Joffre Site as a group, rather than E3 as a stand-alone plant.

[628] Nova submits that Dow misinterprets the word "optimize" in section 4.3(b) to mean "maximize", with the result that Dow is implying a production guarantee that does not exist in the OSA. However, Dow responds that it has never alleged that there were guarantees, either with respect to ethane supply or ethylene production.

[629] What Dow submits is that there are contractual commitments that obligate Nova to supply the ethane that was required for Nova to conduct operations at E3 as the OSA provided.

[630] Nova refers to the testimony of its expert, Scott Ferrigno, who indicated that optimizing is not as simple as "maximizing everything;" that optimization involves balancing different things to find a point that produces the maximum profit. Mr. Ferrigno testified that it is true that sometimes optimizing production of product could be maximizing, but "[w]e don't assume it is until we do the calculations and the math. We optimize".

[631] In a scenario in which there was always enough ethane to fill E3 to capacity, optimizing product production is not complex, and, as Dow submits, means producing as much product as possible at E3. It is clear that Nova instead conducted operations to optimize Nova's profit from the Joffre Site as a whole.

[632] Although it described ethane allocation differently, Nova filled E3 with ethane first, with the intention of maximizing production from the most efficient and cost-effective plant. However, it did not allocate 50% of the E3 ethane thus produced to Dow. Dow also complains that, beyond that, Nova failed to maximize E3 product production because it did not need the production itself.

[633] Dow submits that this is evident from the way Nova chose to run E3, including trying to extend the run lengths of the E3 furnaces beyond design run lengths and running at low conversion on the pretext of ethane shortage, failing to deal in a timely and effective way with fouling and other maintenance issues, and spending less than budgeted and deferring on maintenance.

[634] Even Nova's expert, Mr. Wallsgrove, was of the opinion that E3 could have consistently been run at a rate of [REDACTED] or [REDACTED] BPY, but the evidence discloses that Nova did not run E3 even to that level. Dow submits that Nova knew that, if it could leave Dow short of ethylene at E3, where the cost was lower, and induce Dow to use more fully the E1 Toll, where the cost was higher, that would not just be more costly to Dow but also financially rewarding to Nova.

[635] Nova appears to submit that, given the word "objective" in section 4.3(b), it cannot be in breach of the section since the duty of the Operator is a lesser duty, not an obligation but an objective. This may be persuasive if the evidence indicated that Nova as Operator had tried but failed to comply with this duty due to circumstances beyond its control, or circumstances that would constrain production for reasons that were verifiable and reasonable. Nova is correct that this objective does not amount to a production guarantee. However, it is clear from the evidence that Nova did not attempt to run E3 with the objective of optimizing Product production. I accept that Nova ran E3 with the objective of satisfying its own demands and the objective of optimizing production at the Joffre Site as a whole thereby maximizing Nova's profit over that of its Co-owner. Plant personnel and Nova management knew E3 could produce more ethylene. Nova management knew that Dow needed more ethylene. After the COP, Nova rarely chose to run E3 at or even near its productive capability. The duty of the Operator set out in section 4.3(b) is not merely aspirational, although it may be limited by the factual context. Nova as Operator thus was in breach of its duty to operate with the objective clearly set out in the agreement.

[636] The second part of section 4.3(b) refers to achieving first decile performance when compared to other ethylene plants in North America.

[637] The Solomon survey reports its survey results in quartiles, not deciles. Section 4.3(b) does not refer to the Solomon survey.

[638] However, reference was made at trial to Schedule "C" of the Project Management Agreement, which described the Co-owners' project objectives at E3's design and construction stage. Those objectives were to create a "facility ... capable of 'first decile' industry performance and ranking in the following areas, based on the Solomon survey: Return on Capital, Cash operating expenses (Fixed Costs at Joffre) [and] Mechanical availability (%)." Once design and construction were completed, though, and the operations began, the OSA replaced the Project Management Agreement as the parties' governing contract. Thereafter section 4.3 of the OSA set out the Co-owners' operational objective for E3 as being to "optimize Product production and achieve first decile performance when compared to other ethylene plants in North America". Nova submits that, as an antecedent agreement, the Project Management Agreement properly forms part of the factual matrix that the Court must consider in interpreting the OSA.

[639] While that may be, the specific language of an antecedent agreement, if inconsistent with the specific language of the later agreement, cannot override the specific language of that later agreement. The antecedent agreement emphasized first decile performance on return on capital, operating expenses and mechanical availability. The later agreement emphasized product production and first decile performance as compared to other ethylene plants in North America, referenced against product production. The previous metrics cannot be read-in to replace product production.

[640] Dow submits that the objective function that section 4.3(b) requires to be optimized is the production of ethylene and by-products, not cost or profit. The trial evidence was clear that the Solomon survey category that measures product production, being a plant's actual production as a percentage of its reported capacity, is Capacity Utilization. It is also clear in the three Solomon surveys that took place in the period between 2001 and 2011 that E3 scored below the first quartile in Capacity Utilization and thus below the first decile.

[641] Nova did score close to the top in the Solomon category for keeping maintenance costs low, but, as several witnesses conceded, that is not necessarily a good thing in terms of productivity. Thus, on the best evidence before me of E3's ranking against other North American plants, the Solomon survey, I am satisfied that Nova as Operator has breached the second part of its duty set out under section 4.3(b) by allowing Nova to prioritize Nova's interests over first decile performance in optimizing Product production.

[642] Nova submits that there is no obligation to continually rebuild E3 in order to achieve first decile performance. Whether or not that is true, it is clear that E3's productive capability has become higher during the eleven years of operation that are the subject of the damages claim, and whether the Plant will be able to continue to achieve first decile performance in the future will be subject to the circumstances at the time, and the directions of the Co-owners.

2. Breach of Section 4.4(a) of the OSA

[643] Section 4.4(a) of the OSA provides that, notwithstanding section 4.3, the Operator will not cease or curtail production at E3 except in certain circumstances that are not in issue. Dow submits that this is what Nova did in running E3 at less than its full capacity despite the nominations of the Co-owners.

[644] Nova responds in two ways:

- i) constraints on production were communicated to Dow; and
- ii) approval of E3's budgets were an approval of the way that Nova chose to operate E3.

a) Constraints were reported to Dow

[645] Nova points out that constraints impacting E3's production rates were communicated to Dow through E3 monthly reports, E3 daily, and weekly status reports and E3 Management Committee meetings, presentations and teleconferences. It also submits that a number of Dow's employees had either been involved in the design and operation of E3 or were sufficiently knowledgeable about its operation to maintain a daily model of the Plant.

[646] While it is true that the production rates and constraints were reported to Dow, it cannot be argued that Dow accepted such under-production. From Mr. Fergusson's early complaints

through the rest of the years at issue, Dow continually complained about the rate of production and asked for more ethylene.

b) Budgets as Approval of Operations

[647] Nova submits that, when the E3 Management Committee approved the yearly budget, it was in effect an approval of the extent of E3's operations. It notes that from 2001 through 2012, Dow approved, or otherwise did not object to, the budget and production forecast. The only exception to this was Dow's objection to the Operator's manufacturing budget in 2011 and 2012.

[648] Mr. Wade and Mr. Wilke confirmed on cross-examination that they did not consider or treat E3 Management Committee approval of an expense budget based on a production forecast to be any direction or authority to produce ethylene only up to forecast volume, or as E3 Management Committee consent to the curtailment of production to such volume. They confirmed that no one from Nova ever suggested such a thing.

[649] Mr. Flint testified that, after Mr. Ramachandran's questions had "brought matters to a head between Dow and Nova," any matter that was contentious was "taken offline" rather than dealt with at the committee meetings. He conceded that he understood "from late 2004, if not earlier ... that Dow had a serious issue with Nova running E3 at less than full rates". He stated that, to his knowledge, the E3 Management Committee never gave any direction ... "to run E3 at reduced rates, or any direction purporting to override any of Dow and Nova's monthly co-owner nominations."

[650] Mr. Van Hemmen, while initially disagreeing, ultimately conceded that Nova had never suggested that budget approval was a direction to produce at lower rates, and that he knew Dow wanted more ethylene than E3 was producing.

[651] Dow notes that the "Budget" is a defined term in the OSA, meaning "the amount of capital or operating expenditures, or both, to the extent approved by the Management Committee for the conduct of Operations during a specified year, or for such other period of time as the Management Committee may determine". While a forecast of production is a necessary input to the calculation of such expenditures, the defined term "Budget" does not include an amount of production. I agree that it is an authority to spend money, not to curtail production rates.

[652] While Nova as Operator has authority under section 4.3(e) to prepare and present annual Budgets for approval, it has a separate duty under section 4.3(b) to conduct operations with the objective that E3 will optimize production.

[653] If Nova as Operator sought to limit production, it could have sought approval directly from the E3 Management Committee, pursuant to section 4.4(a). It is illogical to interpret the duty to present a budget as an indirect method of allowing the curtailment of production, particularly given the testimony of Mr. Wade, Mr. Wilke and particularly, Mr. Flint.

[654] Thus, I find that Nova as Operator was in breach of section 4.4(c) of the OSA.

3. Breach of Section 7.3 of the OSA

[655] Section 7.3 of the OSA states that "it is the intent and objective of the Co-owners" that E3 "continually operate" at not less than the Ethylene Nameplate Capacity of E3 and that "each Co-owner continually take 100% of its "Ethylene Production Proportion of Product produced at the plant." The balance of the section deals with the possible scenario of a Co-owner nominating less than its full EPP amount of product, in which case, the other Co-owner will assist the under-

nominating Co-owner in fulfilling the objective of taking 100% of its EPP. Whether a breach of this section exists is dependent on what the Ethylene Nameplate Capacity (ENP) of E3 can be said to be.

[656] The evidence establishes that Dow attempted three times to have E3's ENC adjusted to take into account its expanded capacity. The first request was from Mr. Fergusson following the completion of the 2003 turnaround. Mr. Foy and Mr. Wade made a presentation to the E3 Management Committee in February 2004 reviewing the criteria under Schedule E of the OSA to be followed by the Operator in developing a proposed revised ENC for approval by the E3 Management Committee.

[657] The minutes of the February 11, 2004 E3 Management Committee indicate that Mr. Wade and Mr. Foy advised that "any change to the nameplate would have no material impact on the rights of the two Co-owners of feedstock rights under the agreement". The minutes also indicated that "since the initial feedstock fraction has already been determined, there is no link between the ethylene nameplate and the co-owners' respective feedstock fractions".

[658] The presentation indicated that "[c]urrently, the Feedstock Fraction of either co-owner does not increase until such time as that additional feedstock is secured", and that once the Co-owners requested a revision, "the operator shall use reasonable efforts to adjust its ethane contracts to satisfy each co-owner's request."

[659] Mr. Fergusson indicated that he would review the presentation internally and get back to Nova in due course.

[660] Mr. Wade conceded that there existed a diversity of opinion within Nova as to whether a revision to E3's ENC would necessarily entail a change to the Feedstock Fractions.

[661] At the next E3 Management Committee meeting of July 14, 2004, Dow again requested a nameplate adjustment, as the COP project was essentially complete. The matter was delegated to Mr. Miller of Dow and Mr. Wade of Nova to review the Schedule E procedure and bring the matter forward.

[662] At the November 23, 2004 meeting, the minutes indicate that Dow wanted to revise E3's nameplate based on post-COP capability, but that it was "a low priority for Nova", that "Nova sees no benefit because the plant is not routinely using the capacity above nameplate" and that the item was "tied into other commercial items currently being discussed". It was conceded that the feeling within Nova was that the parties were in litigation mode.

[663] The possibility of changing E3's nameplate capacity was next revisited by the E3 Management Committee at its meeting held on May 24, 2007.

[664] Mr. Humble, a Dow employee and Mr. Wade developed differing models with respect to E3's potential productive capacity and made a joint presentation at the July 27, 2007 meeting of the E3 Management Committee. At the November 6, 2007 E3 Management Committee Meeting, there was a presentation of an "E3 Nameplate Re-Determination Proposal", setting out two possible scenarios. The range of nameplate capacity under these scenarios was from [REDACTED] BPY, or [REDACTED]% of design capacity, to [REDACTED] BPY, or [REDACTED]% of design capacity, if certain modifications were not addressed during the 2008 turnaround.

[665] Mr. Johnston of Dow asked Mr. Flint at the meeting whether Nova would support revising E3's nameplate to [REDACTED] BPY. Mr. Flint refused. He testified at trial that, since there was

inadequate feedstock to operate E3 to capacity, Nova did not see the sense in restating E3's nameplate capacity.

[666] Nova submits that, because section 7.3 of the OSA refers to the "intent and objective of the Co-owners", and does not reference the Operator, operating E3 at not less than the ENC is an objective of the Co-owners and not a duty of the Operator. Nova seeks to restrict the Operator's duties to those set out in section 4.3. As noted previously, section 4.3 is not the only provision of the OSA that assigns duties to the Operator. However, it is not necessary to decide this issue, as it is clear that E3's ENC was not restated from its design ENC, and therefore, there is insufficient evidence to establish a breach of section 7.3.

4. Breach of Section 3.2(c) of OSA and Section 3.11 of the COA

[667] Dow submits that Nova has breached section 3.2 of the OSA, in which the Co-owners and the Operator covenant "not to do any act ... which could cause it or the other Parties to be in breach of ... this Agreement". Section 3.11 of the COA provides that each Co-owner agrees to act honestly and in good faith, and in accordance with the provisions of the agreement and the other Project Agreements with respect to the ownership and use of the Plant. By imposing "ethane allocation" and taking for itself part of Dow's E3 ethylene, and by directing that E3 be run to suit Nova's commercial needs instead of according to the joint venture agreements and the Co-owner nominations, Nova as both Co-owner breached section 3.2 by causing the Operator to be in breach of its contractual obligations, and breached the honesty and good faith provisions of section 3.11. To the extent that Nova claims that any of the maligned conduct was as operator, it breached section 3.2.

[668] Dow points out that, by using ethane allocation, Nova recovered more ethylene than its EPP entitlement under ethane allocation. By failing to optimize production, it deprived Dow of the additional ethylene that E3 was capable of producing.

E. Conclusion on Optimization Claim

[669] As noted previously, I accept the evidence of Mr. Kapur with respect to the productive capacity of E3. I also accept the evidence of Mr. Holloway that there were no uncommon mechanical constraints that ought to have restricted E3 from reaching its full capability, other than some of the fouling. But, with respect to the fouling and the burner replacement issues, Nova's approach to repairing the issues was slow, a lower priority given that it did not need the extra ethylene that could have been produced.

[670] My review of the evidence of the Plant lay witnesses does not change my view of Mr. Holloway's opinion. Mr. Gent's comments in particular did not make Mr. Holloway's opinion less valid. Some of the lay witnesses were overly partisan and allowed their loyalty to their employer to colour their testimony, but it was clear from all of them that the operations people were not pressed to repair mechanical issues with any speed and that they were under the direction of the Nova commercial people on how to run E3.

[671] I must conclude that Nova as Operator failed to comply with its contractual obligations to run E3 with the objective of optimizing Plan Production and achieving first decile performance.

[672] I am satisfied by the evidence that, although E3 had a design nameplate rating of 2.81 BPY, almost immediately, Nova recognized internally that E3's productive capability was higher than that and that from September, 2001 until the completion of the COP, E3's productive capacity was [REDACTED] BPY.

[673] This evidence includes:

- a) internal Nova documentation, such as the April 23, 2001 presentation to the May 14, 2001 E3 Management Committee providing a status update, the high rate trials in February and March 2002, the December 2002 internal analysis, the January 22, 2003 presentation, the comments in the February 2003 Owners' Project Objections for the COP, and the December 9, 2003 presentation;
- b) Mr. Gent's testimony that he assessed E3's capacity as █████ BPY after the 2001 mini-turnaround, and that during the August 2002 COP Process Design phase, while E3 had "not yet achieved its annual nameplate production of 1,274 kilotonnes of ethylene", this was primarily due to "business-driven operating constraints".

[674] I am also satisfied from the evidence that, after the COP was completed in 2003, E3's productive capability was increased to over █████ BPY. The evidence indicates that Nova used capability numbers between █████ to █████ BPY internally for budgeting, planning and forecasting purposes, and sometimes communicated these numbers to Dow.

[675] Again, internal documentation reflects this, including the December 9, 2003 presentation to Nova's leadership team, the 2004 performance test, the rate at which E3 was run in 2004, some of the material in Mr. Broenink's April 20, 2004 presentation in Pittsburgh, the December 9, 2004 presentation to the PEBT, the April 2005 presentation, the November 2006 presentation, the December 2006 presentation and the November 2007 presentation.

[676] Following the COP work, Nova conducted a performance test in January 2004 that validated the COP target of █████% of design nameplate capacity. Mr. Wilke reported within Nova that "[i]t is clear that we can operate at COP rates if required for business reasons." He confirmed in his testimony at trial that he has "known, from a manufacturing perspective, that there were many periods of time when E3 has had capacity that wasn't being used". Referring to some April 2004 JPPT minutes, Mr. Wade testified that "█████ percent ...was typically what we would use as a target level" for "full rates" when Nova's production plan so mandated.

[677] Mr. Gent testified that he assessed E3's at █████ BPY soon after the COP.

[678] Nova submits that it used lower forecast capacity figures in the 2004 E3 expense budget, but that only establishes that, while it was using higher capacity figures internally, it communicated a lower figure to Dow.

[679] Nova reported such productive capacity numbers as part of the Soloman survey, at least until 2011, when Mr. Van Hemmen instructed the capacity number to be lowered.

[680] For years, until a member of Nova's litigation team intervened, Nova personnel reported E3's capacity as █████ BPY when they conducted plant tours. Mr. Mathieson, who issued regular reports to the natural gas liquids industry and who testified at trial, reported such numbers to the industry and to Alberta Environment.

[681] Mr. Saunders confirmed that, in 2008, Nova reported to Alberta Environment that E3's annual capacity was █████ BPY. Converted to an annual number that incorporates a 40-day plant turnaround every five years, █████ BPY is approximately █████ BPY, again a number that closely matches Mr. Kapur's calculation.

[682] The evidence discloses that there were periods after the COP when E3 was run at higher rates between █████ and █████ BPY, when a Nova plant was on turnaround, or when ethane

storage was limited. Examples of such periods are May 2004, March 2007, May-June 2007, and June-July 2012.

[683] On cross-examination, Mr. Flint testified that Nova's best information as to the maximum amount of ethylene that E3 has been capable of producing over a twelve-month period is the verified COP capacity, confirmed at █████ BPY.

[684] In 2005 and 2006, when Nova was investigating whether to build another polyethylene plant at the Joffre Site, Nova reported internally that E3 would produce █████ to █████ BPY.

[685] These reports included the April 2005 presentation to OPOL and December 1, 2006 draft report to Nova's executive leadership team.

[686] Although Nova only conducted one rate trial after 2004, that trial in March 2009 revealed a sustainable achievable production rate of █████% of █████, or █████ BPY.

[687] Therefore, I am satisfied from the evidence that Nova ran E3, not to optimize production of Product, but to optimize Nova's profit and to optimize the entire Joffre Site. The JPPT's objective was optimization, not of E3, but of Nova's profit from the three Joffre plants as a whole. Such Nova witnesses as Mr. Broenink, Mr. Just, Mr. Wade and Mr. Dennehy testified that E3's production rates were set based on the rates Nova chose to run E1 and E2. Mr. Wade commented that Nova ran Joffre as "one plant, well spaced".

[688] The evidence also discloses that, before IPIC acquired Nova in 2009, Nova ran E3 for the purpose of reducing "Cash Flow Cycle Time", a performance measure used within Nova to improve the appearance of its financial reporting. Nova's standing practice was to reduce inventory as much as it could at quarter- and year-end. At such times, Nova would minimize ethane consumption and curtail E3 so that Nova's ethylene inventories and working capital performance could appear to be improved, irrespective of the nominations of the Co-owners.

[689] Since I have found that Nova had enough ethane to run E3 at its maximum rate, the issue is whether there are other reasons to justify Nova's rate of production.

[690] Nova alleges that to have filled E3 to "its productive capability would have necessitated operating E1 and E2 at rates which were consistently uneconomic, frequently operationally unsafe and which would have at times required placing E1 in block operations." The evidence does not sustain this.

[691] Alleged safety of the other crackers on the Joffre Site does not justify a failure to run E3 at maximum rates. The evidence discloses that, as well as having enough ethane to fill E3, Nova could run E3 to its productive capability and run E1 and E2 in a stable fashion.

[692] If Nova had run E1 and E2 only at the low, "false load" levels required to make up the balance of its ethylene needs, the costs of production at E1 and E2 would sometimes have increased, thereby reducing for Nova the economic benefit of complying with its contractual obligations to fill E3. E1 and E2 could certainly be run safely in their "false load" ranges, but operating them in such a fashion would have increased their production costs slightly.

[693] Finally, while I accept Mr. Holloway's opinion that there were no uncommon mechanical constraints that would limit E3's productive capability. Dow's damages expert uses a more conservative basis to calculate damages.

VIII. Damages

A. Introduction

[694] Dow's theory of damages is that, if Nova had properly operated E3 to its productive capability, and had provided the Dow plaintiffs with Dow's EPP of the resulting products, the Dow plaintiffs would have received hundreds of millions of pounds of cost-advantaged ethylene.

[695] The Dow plaintiffs sell most of their polyethylene production to their ultimate parent, TDCC, which re-sells it in the United States and elsewhere. They claim only damages that have been lost in sales to their parent, as TDCC is neither a party to the joint venture agreements, nor a party to this litigation. Dow notes that its sales to TDCC are made at a discount to market value, and since the lost profits that TDCC would have earned are not included, the damages claimed are less than they would be if calculated against market.

[696] I have referred to the Dow plaintiffs collectively as Dow from time to time in this part of the decision, unless the context makes the distinction important.

[697] The parties agreed to a cut off date of December 31, 2012 for the purposes of their experts' calculations of damages. Thus, provision for a post-trial "top up" will be needed to account for the period January 1, 2013 through the date of judgment in a fashion consistent with the terms of this decision.

B. Dow Lay Witnesses

[698] Dow called as lay witness David Kyle and Mariano Gutierrez, whose evidence is reviewed in the following sections.

1. David Kyle

[699] David Kyle was product director for low-density polyethylene for Dow in 2007, and product director for gas phase polyethylene in mid-2008, and later global business director with the responsibility of overseeing profit and losses for the Dow in North American region.

[700] He described Dow's assets in Louisiana and Texas and the LP7 facility in Prentiss, Alberta. He testified that there are two large reactors at LP7, Dow's biggest and newest facility, referred to as R71 and R72. Mr. Kyle described the reactors as the "crown jewels" of the polyethylene business, as they were competitively advantaged from a conversion-cost perspective and had access in Alberta to a very cheap source of ethylene, according to an external benchmarking study.

[701] Mr. Kyle also described Dow's three-solution polyethylene reactors at Fort Saskatchewan, which were served by LHC-1, a Dow Cracker. He noted that there was interconnectivity and flexibility in the system, but, generally speaking, it was intended that E3 would connect up with the Prentiss facilities and LHC-1.

[702] As Mr. Kyle noted, ethylene is 80% of the cost of a pound of polyethylene, and therefore, cost competitiveness is a key factor, together with reliability of supply.

[703] He described E3 and LHC-1 as some of the most competitive crackers that Dow has globally.

[704] Mr. Kyle testified that Dow Canada owns the reactors and "the steel on the ground" and that Dow Europe owns the raw materials, the feedstocks that are supplied to the Prentiss reactors,

and, ultimately, the product produced by those reactors. This product is polyethylene produced from ethylene by Dow Canada in the Prentiss reactors. Dow Europe gives Dow Canada the ethylene and Dow Canada produces polyethylene to give back to Dow Europe. Dow Europe sells the polyethylene to its customers, Dow Canada, TDCC or the Dow Chemical Company. The products are then sold to third parties in Canada by Dow Canada and in the United States by TDCC. Roughly 15 to 20% of the volume remains in Canada, and the rest is sold in the US. Periodically, Dow exports product to other regions of the world, but that involves smaller amounts.

[705] Mr. Kyle testified that, generally, he did not concern himself about which legal entity was selling Alberta polyethylene, as his job was to maximize profits for the broader Dow Chemical Company. He did not have any regard to whether profit would be realized in Dow Canada, Dow Europe, or elsewhere.

[706] He confirmed that he did not always get as much ethylene as he wanted for the Alberta polyethylene assets. He was referred to an August 12, 2009 email from the then-president of Dow Canada, copied to Dow's ethylene planner and Mariano Gutierrez, Dow's planner for gas-phase polyethylene. The group had been advised that Dow was on ethane allocation [REDACTED]

[707] Mr. Kyle referred to the cost advantage of the manufacture of ethylene in Alberta as the "Alberta advantage", being a combination of an abundance of ethane feedstock from natural gas and the lower conversion costs associated with state-of-the-art reactors. He noted that the extent of that advantage varied with the cost of ethylene. The extent and alleged variability of the Alberta advantage is an issue between the parties with respect to whether demand for ethylene existed at all times.

[708] Mr. Kyle also commented on an internal Dow presentation dated February 21, 2008, which compared Dow and Nova's assessment of the Alberta advantage for the four quarters of 2007. Dow regularly tracked its view of the Alberta advantage, as well as those of Nova from its reports to the media.

[709] He acknowledged that distance was a disadvantage to Alberta product, and had to be taken into account in assessing the advantage. He also acknowledged that the Alberta advantage has narrowed with the increase in production of shale gas, but noted that, even if American Gulf Coast product becomes more competitive, that does not deteriorate the competitiveness of Canada product *vis-à-vis* the rest of the world, where cost to produce polyethylene is largely based on naphtha as a fuel. He stated that Dow would still want to run its Canadian assets as hard as it could to exploit the competitive advantage globally.

[710] Mr. Kyle testified that, to his knowledge, Dow had never chosen to reduce polyethylene production at LP7 in order to produce polyethylene outside Alberta.

[711] He described the difference between "gas phase", a method of producing polyethylene in which ethylene is injected into a vessel with gas, and "solution phase", in which ethylene is injected into a solvent system.

[712] Mr. Kyle also testified that, during his tenure as the product director for gas-phase polyethylene, he had been involved in assessments about whether Dow should invest capital to

expand its poly-ethylene assets in Alberta, but it needed a secure source of ethane before it undertook expansion of its capacity.

[713] He spoke about the project to debottleneck LP7, which allowed the North American gas-phase business to expand Dow's lowest cost asset while utilizing stranded ethylene available in Alberta.

[714] In an email exchange in April 2009, Mr. Gutierrez, Mr. Kyle and others at Dow discussed

[REDACTED]

[715] In another email chain dated in early June 2009, Mr. Gutierrez

[REDACTED]

[716] Mr. Kyle described that production planning would be done annually, attempting to balance sales with production, taking into account anticipated hydro-carbon and feedstock supply. Planning was then done monthly, or more frequently, as issues of supply and demand arose.

[717] In February 2009, Mr. Kyle, Mr. Gutierrez and others at Dow were again part of an email exchange

[REDACTED]

[718] Mr. Kyle testified about an internal Dow presentation he and Jose Obregon, who ran the solution business, made to the hydrocarbons business leadership on March 2, 2010. The presentation indicated a downward trend in Canadian ethylene supplies. Mr. Kyle tried to estimate the impact of the lack of ethylene. He noted that:

... in a low-case scenario, we're falling short in [Canada] by 300 million pounds. In the high case, could have been as high as 500 million pounds. These aren't

precise numbers. This is just a ballpark estimate so people could understand the order of magnitude of the situation, the gravity of the situation. And putting together a rough [EBITDA] margin against those volume scenarios, you come up with a range of \$60 million to \$125 million in [2010] that we were potentially foregoing by not being able to run those assets.

[719] Mr. Kyle also commented in the presentation on the non-financial impact of the ethylene shortage, including the complexity of moving products, the ill-will created by cutting customer demand, and the resource drain to the company of having to work with customers to make adjustments to their manufacturing processes.

[720] He stated that, although he was aware of the litigation, he did not keep any records of third-party sales that he regarded as lost as a result of the under-delivery of E3 ethylene, commenting:

... we were in the business of recording actual sales, not recording sales we weren't going to deliver upon ... I don't get paid to overpromise and underdeliver. So we never would keep records like that. I mean, our job was to sell all that we could sell, not track what we weren't going to sell ... we adjusted our planning process.

2. Mariano Gutierrez

[721] Mariano Gutierrez, Dow's Latin America Product Director, testified that it was Dow's strategy to run its Canadian facilities first, as they were cost advantaged, and then run facilities in the rest of North America. He said that North American operations are primarily ethane-based, and have a cost advantage over naptha-based ethylene as it is produced in Europe or the Pacific area.

[722] Mr. Gutierrez was located in Houston from January 2007 until April 2012. During that time, he held various positions relating to Dow's global business supply chain, being the Global Gas Phase PE Supply Chain Manager from June 2007 until March 2010, the Global Solution PE Supply Chain Manager for solution polyethylene operations until September 2011, the Global Co-Monomers Manager from June 2007 until April 2012, and the Solution PE Asset Manager from September 2011 until April 2012. In his role as Co-Monomers, or raw material Manager, he was in charge of supply chain planning globally for ethylene, keeping a balance between market requests and what Dow could produce.

[723] Mr. Gutierrez indicated that he was always being pressed to produce more polyethylene to meet customer demand, but he was faced with the capacity he had. He referred to it as being "sold out".

[724] He testified that there was never a time when there was not a demand for polyethylene made at LP7, Dow's Alberta plant, other than perhaps during the November/December global financial crisis, but this was only a matter of two or three months. Dow never reduced production at LP7 in favour of producing polyethylene at the US Gulf Coast.

[725] Mr. Gutierrez referred to the ethylene shortage in Canada as a "chronic shortage". In that situation, he would have to advise the Dow commercial people that he would not be able to supply what they were demanding, and they would have to adjust customer demand accordingly.

[726] Mr. Gutierrez was referred to [REDACTED]

[727] Jose Obregon, a product director, made the same comments as Mr. Kyle with respect to not being able to move any solution business to the Gulf Coast.

[728] Mr. Gutierrez indicated that the message he received was that there was the capacity to use the ethylene, the demand for it, and it was all a matter of a limitation of ethane.

[729] Mr. Gutierrez testified that [REDACTED]

[730] He noted [REDACTED]

[731] He testified that his recollection was that, [REDACTED]

[732] Mr. Gutierrez indicated [REDACTED]

C. Expert Witnesses

1. Charles Mikulka

[733] Charles Mikulka was called by Dow as an expert to give opinion evidence concerning the petrochemical industry, including the assessment and quantification of damages.

[734] Mr. Mikulka is Senior Managing Director with FTI Consulting, Inc. in the Petroleum and Chemicals Practice. He has more than 40 years of diversified experience in the chemical and related industries. He has provided litigation support in various matters, and has performed major consulting projects in a variety of industries, including the energy and chemical industries. He has testified as an expert witness in a number of US and international decisions and arbitrations.

[735] Mr. Mikulka was asked to provide a broad overview of the structure and operations of the chemical industry, with a focus on the ethylene and derivatives sector. He was also asked to assess whether or not the Dow plaintiffs experienced any damages in this case and, if so, to quantify those damages.

[736] Mr. Mikulka worked with a core team of five people at FTI to produce his reports, principally engineers and analysts with economic and financial training.

[737] He prepared an initial report dated January 20, 2014. He then produced an updated rebuttal report dated June 14, 2014 in response to a report prepared by Mr. Williams of KPMG, and also because he became aware of additional information provided through questioning and interrogatories. Mr. Mikulka also then prepared two reports dated September 24, 2014 in response to the KPMG and the ESI rebuttal reports. Mr. Mikulka noted that a few days before he testified, he had received a further report from Mr. Williams, and that he had reviewed the ten-page summary of the report but had not had time to review the 3,400 pages of supporting documentation.

[738] Arising from Mr. Mikulka's testimony, the damages claimed by Dow through to December 21, 2012, other than for co-products, ethane purity and other adjustments, are as follows:

| | Dow Europe | Dow Canada |
|---|----------------------|-----------------------|
| Lost Profits on Incremental Polyethylene Sales | | |
| Lost sales at LP7 | \$436,019,645 | \$9,684,730 |
| Lost sales at the Fort Saskatchewan unit | | 9,288,812 |
| Lost sales of ethylene to Dow Canada for Fort Saskatchewan unit | 23,552,257 | |
| Lost Margin Due to Use of Higher Cost Ethylene | | |
| Lost margin due to spot ethylene purchases from Nova | 18,547,505 | (2,891,381) |
| Lost margin due to streamed ethylene purchases from Nova | 7,494,656 | (2,109,827) |
| Lost margin due to use of E1 Toll | 159,119,994 | (69,627,833) |
| Lost Profits on Merchant Market Sales | | |
| Dow Europe lost profits on sales to Dow Canada | 124,513,038 | |
| Dow Canada lost profits on merchant market sales | | (32,209,437) |
| Total | \$769,247,095 | (\$87,864,935) |

[739] Dow's main damage claim is calculated on the basis of the variable contribution margin of volumes of ethylene not received. The contribution margin is the delta between the incremental costs of making a pound of ethylene compared to the incremental revenue.

[740] In his calculations, Mr. Mikulka first applied lost ethylene volumes to polyethylene raw materials losses suffered by the Dow plaintiffs. The first category of damages, “Lost Profits on Incremental Polyethylene Sales,” refers to losses that the Dow plaintiffs incurred because they were unable to produce and sell polyethylene made from lost E3 production. These damages total approximately \$478 million.

[741] Mr. Mikulka next applied the remaining lost volumes to higher-cost ethylene purchases Dow made in any period in which they were able to fill their Alberta polyethylene facilities despite the E3 shortfalls, or in which they would have been able to fill them with something less than all of the incremental lost ethylene volumes.

[742] This claim, described as “Lost Margin Due to Use of Higher Cost Ethylene”, totals approximately \$111 million on a net basis for both Dow Europe and Dow Canada.

[743] The final category of damages calculated by Mr. Mikulka assumed that any remaining lost volumes would have been directed to the merchant ethylene market, which he used as a proxy for derivative sales that would have resulted from the earlier expansion of derivative capacity, had Dow been able to count on a reliable supply of the volumes of E3 ethylene to which they were entitled. These damages total approximately \$92 million on a net basis.

[744] Dow submits that, consistent with its recognized strategy of making ethylene into more profitable derivative products rather than selling merchant ethylene, had the Dow plaintiffs been able to count on a reliable supply of those lost ethylene volumes, they would have increased their derivative-making capability to match. The evidence of Dow’s lay witnesses support this, and Mr. Mikulka indicated that “the whole industry” recognized that Dow is not in the business of making ethylene to sell in the merchant market: it is a consumer of ethylene. Despite this, Mr. Mikulka calculated damages on a more conservative basis that assumed no expansion of derivative capacity. His suggested damages total is thus \$118 million less than an estimate that assumed reasonable derivative expansion.

[745] Mr. Mikulka used documents prepared in the normal course of business for both Dow and Nova to calculate damages. He took account data drawn from Dow’s *Asset Utilization Database (AUIDB)* in determining how much more ethylene Dow could have consumed at their assets and infrastructure. Wherever the AUIDB data for the Dow Alberta polyethylene facilities reflected a lack of demand for ethylene, Mr. Mikulka did not calculate derivative losses, but applied the lost ethylene volumes instead either in substitution for higher cost ethylene mitigation volumes or as sales into the ethylene merchant market.

[746] Mr. Mikulka made the following assumptions in preparing his opinion:

- a) that E3’s production of ethylene and co-products was supposed to be optimized to the full extent of E3’s productive capability;
- b) that LP7’s cost efficiency, coupled with the availability of low-cost ethylene from E3, means that its output has a comparative cost advantage over other North American plants. Because of this integrated cost advantage in conjunction with LP7’s capacity to produce polyethylene, and because the Dow plaintiffs could also use E3 ethylene in their Fort Saskatchewan facility, the plaintiffs’ demand for ethylene from E3 would generally be the maximum volume of ethylene obtainable from E3 in any month; and

- c) that during most months beginning in July 2001 and continuing to the date of the report, Nova had not run E3 at its productive capability, even though Nova always obtained enough ethane to do so.

[747] On cross-examination, Mr. Mikulka agreed that he was instructed to look at damages to Dow Canada and to Dow Europe, and to assume Mr. Kapur's productive capability analysis.

[748] Mr. Mikulka indicated that the existence of demand for incremental low-cost E3 ethylene and derivatives manufactured from the ethylene is demonstrated not only by LHC-1's high operating rate, but also from the following conduct of Dow and Nova;

- a) Dow's E3 nominations;
- b) Nova's recognition that LP7 would compete for derivative market share;
- c) the COP;
- d) the bottleneck of LP7;
- e) Dow Canada's purchases of ethylene from Nova;
- f) Nova's conversion of ethylene to which Dow Europe was properly entitled through actual sales;
- g) Nova's expansion of its derivative units; and
- h) the recent expansion of US derivative facilities.

[749] With respect to his assumption that E3 did not run to its productive capability, Mr. Mikulka reviewed E3's operational data, and also the Solomon studies for 2003, 2007 and 2011. He noted that, in each of those years, E3 was arguably rated as one of the lowest-cost ethane-based ethylene crackers in the world, if not the lowest, always in the first or top quartile in terms of low-cost, efficient operation. It was rated much differently when it came to capacity utilization. It was in the third or fourth quartile, toward the end of the curve. He commented that E3 was big, efficient and low-cost, but with respect to productive capability, there was "low production out of the asset, so E3 was underperforming in that area."

[750] Mr. Mikulka reviewed Mr. Kapur's analysis and concurred with his approach and methodology, and his ultimate assessment of productive capability of E3.

[751] Mr. Mikulka explained that, in reaching his opinion, he started with Mr. Kapur's analysis of productive capability, but because he calculated damages on a monthly basis, he could not use an average annual downtime that was spread over a number of years, or put into a specific year over 12 months. He had to know when the actual plant outages occurred.

[752] He took Mr. Kapur's analysis, and stripped out the periods when Mr. Kapur anticipated a turnaround would occur and its duration and his estimated downtime. This way, he came up with what he termed "effective capacity," or what E3 could produce if it ran at its productive capacity without any outages. Then, using Nova's records of the operations of he factored back into his analysis the actual days and months E3 was not operating for whatever reason.

[753] Mr. Mikulka's calculation of damages thus makes no claim for periods when E3 was not operating, which in my view accounts fairly for the downtime whatever uncommon mechanical constraints may have caused had they been addressed diligently. Mr. Mikulka then assessed the

period when E3 was operating. He noted that in his analysis, he tried to represent the reality of when E3 was operating to come up with the ability to produce ethylene in the marketplace.

[754] Nova criticize Mr. Mikulka's opinion on the following five bases:

- a) entitlement to damages;
- b) unlimited demand;
- c) reliance on the AADB;
- d) lack of experience; and
- e) the Empress *force Majeure* period.

a) Entitlement to damages

[755] Nova submits that, since Dow Canada has no contractual entitlement to any inputs or outputs at E3, Dow Canada has no claim for loss of ethylene from E3. This submission is analyzed later in these Reasons.

b) Unlimited demand

[756] Nova submits that Dow's damages claim is based on unlimited demand for ethylene. Dow responds that the question is not whether there was unlimited demand, but whether Dow had the demand for the additional ethylene above the volumes it actually received that it would have received as its full EPP of E3's optimized product production. Dow states that this amount is specific and finite. Between July 2001 and December 2012, Dow received [REDACTED] pounds of ethylene from E3. As a result of Nova's failure to provide Dow with its full entitlement, Mr. Mikulka has determined that Dow was deprived of an additional [REDACTED] pounds of ethylene over the same period – roughly a 20% increment above what it actually received. Thus, demand for that additional 20% increment is what is in issue.

[757] Dow submits that there was abundant evidence at trial of full demand for all the E3 ethylene Dow could obtain. Contrary to Nova's submission that there is no direct evidence of month-by-month demand, Dow cites the evidence of monthly nominations of Dow's full share of E3 production. Of the 138 months in the damages period, there were only three months when Dow under-nominated.

[758] Many Dow witnesses confirmed Dow's demand for additional evidence from a fully-optimized E3. As Dow notes, Mr. Kyle testified that obtaining full production from the Alberta polyethylene assets was always the goal: "To make the most money, we had to run those assets flat out because of their competitive advantage".

[759] Mr. Gutierrez testified that Dow commercial directors were constantly pushing him to produce more ethylene. He indicated that his customers were always willing to buy more, but that he was always sold out.

[760] Mr. Fergusson indicated that Dow's refusal to agree to propane cracking was not because Dow did not have the demand, but because the lack of sufficient ethane was a Nova problem, Dow considered that it should bear the additional cost of propane.

[761] Mr. Ramachandran testified that Dow nominated its absolute maximum entitlement from E3, and that instructions were to run the crackers as hard as they could, especially at LHC-1 and E3 because that was the lowest cost ethylene in Dow's portfolio.

[762] Dow points out that Nova's expert Mr. Woods candidly acknowledged that the plaintiffs likely could have produced and sold more polyethylene derived from E3 ethylene. Mr. Woods testified that he had "no doubt" that Dow would have been able to sell every pound of polyethylene manufactured from Dow's share of a fully optimized E3 because "[t]he demand was there".

[763] Mr. Woods acknowledged that the cash cost advantage of low-cost Alberta polyethylene made it attractive in comparison with product from other sources, and that polyethylene produced from the Dow E3 lost volumes would have been among the most cost-advantaged in North America for much of the damages period. He noted that when LP7 started up, even though demand in the US was falling, LP7 was able to displace more marginal (higher cost) sources of ethylene. Further, he acknowledged that "the most marginal pound" would be displaced into the export market, and that LP7's pounds were not that most marginal pound.

[764] As previously noted, Mr. Mikulka listed a number of the factors that demonstrated the existence of demand for incremental E3 ethylene and derivatives manufactured from the ethylene, drawn from conduct of both Dow and Nova. He also looked at the AUSB to understand why the assets did not run as hard as possible.

c) Reliance on the AUSB

[765] Both Mr. Mikulka and Nova's damages expert witness, Mr. Williams, referred to the AUSB to calculate damages, although Mr. Williams expressed reservations about doing so. Nova submits that the Dow plaintiffs and Mr. Mikulka are "blindly relying" on the AUSB to represent demand. That characterization cannot be sustained. Mr. Mikulka used the AUSB, not to quantify Dow's demand or to establish damages, but as a cap or restriction on damages. As he indicated, absent such a restriction, more of the Dow plaintiffs' damages would be in the high margin category of polyethylene losses. By limiting "demand" to the "Raw Material Loss" category of the AUSB, such damages have been limited to the Dow plaintiffs' existing capacity to produce polyethylene.

[766] Mr. Mikulka testified that he used the AUSB to look at the ability of LP7 and the Fort Saskatchewan facility to consume what the demand was for ethylene supply from LP7 through E3. He noted:

The assumption I said [that] every pound would have been spoken for was based on other assumptions. I limited myself to what the raw material loss that was identified in the asset utilization database depicted.

Q So the raw material losses coupled with your overall view that production from LP7 with E3 ethylene is always in demand?

A Yes. Based upon what was going on the marketplace, you know, debottlenecks, construction, the Alberta advantage, the North American advantage, other facilities being built in North America, both ethylene and polyethylene, you know, this R3 reactor expansion that's going on as we speak ... all of those elements factored into the opinion that E3 ethylene converted into polyethylene would have found a home.

Q I think, as you said in your rebuttal report, sir, that those were all things that you looked at to confirm your assumption?

A Correct.

[767] Dow submits, and I agree, that calculating polyethylene losses on the basis of the restrictions implicit in the AUSB understates the Dow plaintiffs' damages. As Mr. Kyle testified, Dow's philosophy in the operation of its Alberta derivative assets has been to invest capital to expand capacity whenever possible, a philosophy limited only by the availability of a reliable, consistent supply of feedstock. Mr. Mikulka observed that, consistent with this philosophy,

He concluded that

[768] Nova submits that the AUSB measurement of non-production against Dow's optimization tool, Maximum Asset Capability or MAC, somehow overstates losses, but I am persuaded by Mr. Mikulka's explanation that it does not. Mr. Mikulka, who has experience both with Dow's AUSB and with other similar databases, testified that the MAC measurement is eminently achievable, as did Mr. Gutierrez and Mr. Holloway. Dow notes that, since it received less than its EPP of ethylene for LP7, if anything, LP7's calculation of MAC has been unduly limited. The evidence indicates that Nova has recently developed its own AUSB-type database, also using a standard which is essentially a MAC.

[769] Nova submitted in its written argument after the trial that the AUSB was not in evidence for the truth of its contents. Dow argues that this submission is a late and improper attempt to resile from the usual practice, followed through the trial, for the introduction and acceptance of records into evidence.

[770] Nova attached to its written argument a January 2015 email exchange between counsel before the trial started, which indicates that Nova was not prepared to admit the AUSB for the *prima facie* truth of its contents. It also attached a letter sent by Nova counsel to this effect in September 2015, when the trial was almost over.

[771] The January 2015 email exchange addressed the potential admission of exhibits under the parties' Agreed Exhibit Protocol. As the trial unfolded, very few exhibits were admitted into evidence by that Protocol. The vast majority were admitted in the conventional way.

[772] The September 2015 letter came approximately seven weeks after Dow had completed the main part of its case, and had called all of its lay witnesses. It referred back to the Protocol, which Dow submits had never suggested would limit in any way the parties' ability to offer proposed exhibits at trial in the usual fashion.

[773] Nova also states that it mentioned during its opening statement that the AUSB could not be relied upon to prove alleged demand and lost sales.

[774] However, despite the earlier email and whatever was said in Nova's opening statement, the AUSB was introduced into evidence on multiple occasions during the trial without objection until the September 2015 letter. On no such occasion did Nova challenge the admission of the AUSB into evidence, or suggest that it was to be treated as less than a full exhibit, including as a

truthful record of its contents. Nova often itself offered it as an exhibit, relying on the presumed truth of its contents, in cross-examining a witness.

[775] As noted in *Foley v Alberta (Administrator, Motor Vehicle Accident Claims Act)*, 2002 ABCA 297 at paras 57, 63-65, counsel at trial may make strategic choices, including deciding not to object to inadmissible evidence. Where counsel refrains at trial from objecting to the admissibility of what might otherwise be inadmissible evidence, and even acts upon the evidence, any right to object to the reception of the evidence is effectively waived for reasons of trial fairness. Given the apparent acceptance of the AUIDB at trial, despite Nova's earlier comments and Nova's own use of the AUIDB, I find that Nova must be taken to have waived its earlier objections.

[776] At any rate, I am satisfied that the AUIDB satisfies the business records exception to the hearsay rule for records made in the usual and ordinary course of business. While it was not proved as a business record in the usual way, a number of witnesses described the history and rules of the AUIDB, speaking to its importance and accuracy as a reliable, ordinary course, business record. Mr. Mikulka testified about his extensive previous experience with the AUIDB and similar databases, referred to variously as "production gap files", "variance files", "lost production files" and "asset utilization databases". Mr. Ferrigno testified that he was familiar with the inherent reliability of such databases from past practice; he agreed that they are the "most reliable place to find information about things that were limiting a plant." Mr. Kyle explained that the AUIDB data "underpins" Dow's entire \$12 billion per year polyethylene portfolio, and thus is required to be credible and reliable. He described Dow's rigorous "procedures and processes in place that oversee how this data is input, how it's managed, how it's aggregated." While admitting that he had nothing to do with its creation, Mr. Gutierrez testified that he, too, uses the AUIDB in his supply chain roles and considers it to be "a powerful tool that we have within the business that allow us or allows the people that are running the business to really understand your production losses, to really understand what the key metrics are from manufacturing". He testified that he had a high level of confidence and trust in the AUIDB because of the extensive rules and procedures in place to govern its use.

[777] The extensive rules, procedures and processes described by Messrs. Kyle and Gutierrez with respect to the AUIDB are outlined in the "Global Asset Utilization Resources (GAUR) Definition Details Documentation". That document provides detailed explanations of seventeen categories of production losses, offers guidance as to when each category is to be used, and details the multi-level data review process employed to ensure the accuracy and effectiveness of the data. The evidence discloses that all data is reviewed twice or three times for accuracy: once at the plant level, once at the Tech Center level and, if necessary, once at the Site Integration level. The GAUR discloses that all employees charged with entering data into the AUIDB at the plant level, and all employees charged with conducting first-level reviews of the data, must complete training certification prior to assuming their responsibilities.

[778] I find that the AUIDB is admissible evidence for the truth of its contents.

[779] There is one remaining issue arising from the use of the AUIDB. It appears that the way in which information was recorded in the AUIDB changed at least once in 2007/2008, based on a verbal direction. This direction resulted in the recording of raw material shortages in place of what had previously been recorded as LP7 Lack of Demand. However, the reason for this change was explained by Mr. Gutierrez.

[780] Nova submits, from cross-examination of Mr. Ramachandran, that the creators of the AUSB had a motive to mispresent information in it in a way that would assign blame to a lack of feedstock, rather than to mechanical constraints. However, while Mr. Ramachandran candidly agreed to a human tendency to try to look good, he also noted that Dow had “a pretty good audit mechanism ... where we go in and make sure that nobody is playing games with these things.”

[781] Mr. Mikulka disagreed with Nova’s characterization of a motive to misrepresent, and I find that there is no evidence to sustain it.

d) Lack of experience

[782] Nova submits that Mr. Mikulka’s “inexperience” as a damages expert was evidenced by his response to Nova expert Mr. Williams’ argument that Dow should have further mitigated its damages by using the E1 Toll. Mr. Mikulka’s comments on that issue were that any excess in the E1 Toll that Dow had available to it was principally sold to Nova. When taken to a specific month in which it appeared that there may have been capacity to use more of the E1 Toll, he commented that it was necessary to investigate whether Dow had the ethane to run the E1 Toll. He noted that, if ethane was put into the E1 Toll instead of being sold to Nova for use in the Pool, there would be economic consequences that would have to be considered before anyone would be able to determine whether or not it made economic sense to Dow or Nova to do that. Further comment on this issue is found in the analysis of Mr. Williams’ evidence. After considering both submissions on the issue, I accept Mr. Mikulka’s reasoning on this issue, and do not find that his view reflects any inexperience as a damages expert.

[783] Nova also submits that Mr. Mikulka’s inexperience was highlighted because, in Nova’s view, he sought to characterize what he called “sales” in his initial report as “inventory transfers” in rebuttal. Mr. Mikulka adequately explained the point he was attempting to make. The conflict between Mr. Mikulka and Mr. Williams on this issue revealed what is a different philosophy of categorization that does not affect either opinion in any material way. In my view, this is not a sign of inexperience, but of differing views of expressing the same set of facts.

e) The Empress *force majeure* period

[784] A tornado significantly reduced ethane supply from the Empress straddle plants that supplied ethane to Joffre in the summer of 2005. Nova shut down E3 for a full month, and declared *force majeure*. Nova submits that the Dow plaintiffs claim damages for undelivered E3 ethylene during the *force majeure* period, even though E3 was not operating for part of that time.

[785] However, even though Nova did not formally release its reliance on *force majeure* until September 2, 2005, E3 resumed operations by July 20, 2005, and produced ethylene for the rest of July and all of August 2005.

[786] Mr. Mikulka appropriately calculated damages for the Dow plaintiffs in the parts of July and August when E3 was up and running and producing ethylene.

[787] Additional testimony and evaluation of Mr. Mikulka’s opinion is included in the analysis of Mr. Williams’ opinion later in these Reasons.

f) Liquid Co-Products

[788] Dow Europe claims damages for:

- a) the failure to receive the correct mix of co-product from E3. Dow submits that, since Nova was providing Dow a Joffre Site average mix of ethylene co-products such as propylene, butadiene and pyrolysis gasoline, as opposed to the specific mix and volume of co-products produced by E3, it suffered damages. This is one of the co-product components of the main claims of allocation and optimization;
- b) the failure to receive its EPP of co-products, which is the other co-product component of the main claims; and
- c) the failure to receive correct volumes of co-products due to E3 not running at design conversion.

[789] Damages calculated by Mr. Mikulka for these three categories of claims are as follows:

| | |
|--|---|
| Failure to receive correct mix of co-products | \$ 1,174,618 |
| Failure to receive EPP of co-products | \$12,597,100 |
| Failure to receive correct volume of co-products due to E3 not running at design conversion | \$26,005,370 |
| | <hr style="width: 100%; border: 0.5px solid black;"/> |
| | \$39,777,088 |

[790] Dow notes that, in 2009, in the course of working with Nova on other co-product issues that have since been resolved, Lorrie Deutscher discovered that Nova had not been accounting to Dow for Dow's EPP of each liquid co-product as such co-product was produced at E3. Instead, Nova had been calculating a revenue share for Dow based on the aggregate of all co-products produced at the Joffre Site. However, the mix of co-products produced at each plant is different and the value of each co-product is different.

[791] Ms. Deutscher testified that she raised the issue with Kerry Hargreaves of Nova. Mr. Hargreaves indicated in an internal document that "[w]hen I read [the OSA] I read that [Dow] should get 50% of each. It doesn't say "each" but I also don't read that they get 50% of the sum of all products. If I were a third party reviewing this then I interpret 13.2 as they get their EPP of each co-product". Mr. Hargreaves concluded that Nova was misinterpreting the OSA. Despite this internal advice, Nova has not changed its methodology on a going forward basis.

[792] With respect to the third category of co-product damages, Mr. Mikulka explained that when E3 is run at lower than design conversion, the Plant produces fewer co-products, but consumes less ethylene. He calculated the difference between the co-products that should have been produced against the value of ethane that was saved.

[793] Mr. Woods submitted that the additional ethylene produced more than makes up for the redirected co-products produced, but Mr. Mikulka emphasized that he calculated the difference between the greater amount of ethylene and the lower amount of co-products based on a wider, more appropriate, range of conversion factors than the narrow range used by Mr. Woods. He verified his calculations from data obtained from COP.

[794] In answer to a comment from Mr. Woods about validity of the data with respect to receiving the correct mix of co-products, Mr. Mikulka confirmed that he made his calculation on the difference in the mix of co-product from data in the Nova historian about E1, E2 and E3.

[795] In response, Nova notes that the liquid co-products from the three plants were physically commingled and stored together before they were transported off site. It submits that Dow's Mr. Miller knew this and that he had been aware since 2002 that that was the way that Nova's infrastructure was set up. However, Dow points out that such commingling has no bearing on ownership and accounting. Given that the amount of each individual co-product produced at E3 is measured and there is no physical commingling across co-products, it submits that there is no reason why each co-product cannot be accounted for by the EPPs.

[796] Nova appears to justify its treatment of co-products by reference to a marketing agreement between the parties that was finally terminated in 2007. However, this agreement did not change Dow's right to its EPP of co-products.

[797] With respect to whether liability for these claims is excluded under section 14.1 of the OSA, Nova submits that the only damages for liquid co-products not subsumed within the allocation and optimization claims are those relating to the failure to receive correct volumes of co-products, and that damages claimed by the Dow plaintiffs under this heading are for loss of products or loss of production, a claim that is barred by section 14.1.

[798] Dow submits, and I agree, that the definition of loss of products or loss of production is not so broad as to cover Nova's conversion of Dow's products. Further analysis of the scope of section 14.1 is found later in this decision.

[799] With respect to whether the other two categories of claim are subsumed within the main claims, Dow notes that it claim its share of the missing co-products based on the actual ethylene production, so that there is no overlap with the E3 Production Shortfall Claim.

[800] Mr. Williams testified that, although he did not deal with this head of damage in his report, he checked Mr. Mikulka's calculations, and confirmed that Mr. Mikulka calculated damages under this category for the same credit that he accounted for in his other heads of damage. Thus, he was of the opinion that Mr. Mikulka double-counted on this issue. However, he gave no specifics. I am satisfied from my review of Mr. Mikulka's opinion that there was no double-counting.

g) Ethane Purity Claim

[801] Dow claims damages as a result of E3 receiving ethane with a higher CO₂ content than the blended site average. In effect, it says that E3, and thus the Co-owners, were paying for less ethane and more CO₂ than based on the blended site average cost that it was charged.

[802] Dow submits that there is nothing in the OSA that entitles Nova to divert purer ethane from the Pool to its own plants, E1 and E2, and to deliver higher CO₂ ethane to E3. Inherent in the definition of "Pool" in the OSA, which uses the word "aggregate", is a mixing of all sources of ethane.

[803] Dow submits that diversion of the lower CO₂ ethane to E1 and E2 for Nova's benefit (or for the benefit of its affiliate which ultimately came to own E1 and E2), without any disclosure to Dow, is a breach of Nova's obligations both as a Co-owner and as the Operator.

[804] Damages calculated by Mr. Mikulka for this category of Claim are \$19,238,330. They measure only what was paid for ethylene that was not obtained by E3 due to higher stripping of CO₂, not for any margin on sales of additional ethane that may have been received.

[805] Mr. Mikulka noted that, from start-up of E3 to sometime in 2002, the three plants were getting different concentrations of ethane. From 2002 to sometime in 2004, the ethane stream was blended. Then, in 2004 and continuing to 2008, because the CO₂ content of ethane coming into Joffre Site was increasing, ethane with a higher content of CO₂ was again fed to E3 as it had the capability of handling higher CO₂ content streams.

[806] Although E2 had been upgraded and could handle the same higher levels of CO₂, ethane with a lower level of CO₂ was directed to both E1 and E2. E1 was not upgraded, and costs for a full upgrade of E1 would be as high as \$40 million, according to Mr. Wilke.

[807] In 2009, Nova began to price ethane to E3 based on the energy content of the ethane that was being fed to the Plant so that E3 was only paying for actual ethane. The claim is for the period before this change was made.

[808] Dow submits that:

- a) Nova purposely took steps in setting up the ethane delivery infrastructure at Joffre after 1995 and in blending/not blending to ensure that cleaner ethane was preferentially streamed to E1 and E2;
- b) Nova did so for its own gain, so that it or its affiliate received more pure ethane per barrel at E1 and E2 than was in the average Pool barrel E3 paid for, and to save itself up to \$40 million in otherwise necessary upgrades at E1;
- c) Nova did not disclose to Dow what it was doing, and did not seek the approval of Dow or the E3 Management Committee; and
- d) Nova failed to establish any system to ensure that any Nova employee would even turn his or her mind to the impact that this conduct would have on Dow as a Co-owner of E3.

[809] Nova's written argument corroborates Dow's first submission: it is clear that Nova set up the ethane delivery infrastructure at the Joffre Site after 1995 to ensure that ethane with higher CO₂ was preferentially streamed to E3, while ethane with lower CO₂ was streamed to E1 and E2. It also appears clear that this was to avoid the necessity of upgrading E1.

[810] From documentation and testimony, Nova recognized that the installation of a second ethane feed line at the Joffre Site would provide an opportunity to "preferentially stream cleaner ethane to E1/E2". When there was only one line, all plants feeding from that line by necessity received the same ethane. However, the second line could be set up so that the lower CO₂ ethane went to E1 and E2 and the higher CO₂ ethane went to E3. Nova management recommended that the second feed line be installed "bearing this in mind".

[811] Mr. Wade testified that:

The place where we landed was that E3 would be designed for the new AEGS spec of 6% CO₂. There was an evaluation of what needed to be done and/or did we need to spend capital in E1 and E2 to be able to process that material. My recollection was that E2 was modified, the Amine system was modified to be able to handle 6% CO₂, and the Amine system in E1 was not modified and a process to stream Cochrane leg ethane or southwestern leg AEGS into E1 and Empress leg material into E3 and then a combined stream with the two feeds going to E2 was

put in place so that a capital expenditure didn't need to occur in E1. [emphasis added]

[812] I also agree that Nova's submissions do not support its position that Dow knew what was occurring before 2007, other than Dow knowing the CO₂ content of what was delivered to E3. In 2006, Dow was merely informed that E1 and E2 feedstock composition "could be the same or different", that "there are two lines coming into the facility that are blended. The composition will not always be the same in E3 due to the blending", although at that time there had been no blending since 2004. This advice from Mr. Wilke as "Operator", I agree with Dow, was opaque.

[813] Nova submits that the Pool Users are not entitled to ethane of a specific composition, as long as the ethane they receive meets AEGS specifications. However, Nova itself concedes that "though comprised of multiple Ethane supply contracts, the Pool constitutes a single source of supply". Nova acknowledges that the Pool is not to be divided into its component supply contracts, but is instead an aggregated whole intended by the parties for use as ethane feedstock at all three ethylene crackers at the Joffre Site. Further Nova acknowledges that this is the basis for the invoicing of both Ethane Fixed Costs and the Ethane Variable Costs on a pooled basis.

[814] While Nova as Operator has discretion under section 5.2 of the OSA, this discretion must be exercised honestly and in good faith and not to favour one Co-owner's interests over the others. Nova as agent had the obligation to account fairly to its principal.

[815] Nova submits that this conduct does not constitute Gross Negligence or Wilful Misconduct under section 14.1 of the OSA, which would render the Operator liable. It submits that this was at worst an error of judgment or an honest mistake. Given that Nova as Operator failed to disclose or be candid about what was actually occurring, I cannot accept that characterization. This was Wilful Misconduct, or at the least Gross Negligence, as there was no system in place to determine the differential in impact this decision was having on the Co-owners.

[816] Mr. Wilkes testified that he knew that blending was "potentially possible" before E3 ever commenced operations. When asked by Dow at the E3 Management Committee in May 2007 whether E3 was receiving higher CO₂ ethane, he responded that blending was possible but not typical, and did not disclose that blending had occurred for more than two years. This was not "openness and responsiveness" as alleged by Nova.

[817] In addition, it is not clear from the evidence that this was an Operator decision. Nova as Co-owner created the operational concerns it submits led to the preference, such as the capability of E1's amine unit and the way ethane flowed to the plants. Thus, Nova as Co-owner is in breach of its duty of good faith under the COA, and for causing the Operator to be in breach of section the OSA. The rationale of Operator's discretion does not explain why, even though E2 had the same CO₂ capability as E3, Nova elected to direct the higher CO₂ ethane to E3. Mr. Mikulka's evidence indicates that Nova did not have to stream cleaner ethane to E1 and E2; there were times when it blended the stream. It is also apparent from what Nova's commenced doing in 2009 that it could have adjusted the billing to E3 to address the difference.

[818] Therefore, I allow Dow's ethane purity damages in the amount of \$19,238,330.

h) Adjustment Claims

i) Life-to-date accounting reconciliation

[819] As Mr. Mikulka described this, Nova prices E3 on the basis of a cumulative, or life-to-date, accounting basis. In other words, it takes the total volume consumed from inception to date against total dollars paid. Nova divides that into that month and uses that value as the price, as opposed to the actual ethane purchased and consumed in a specific month.

[820] As this is cumulative, there is no adjustment or reconciliation at a period of time to zero it out. According to Mr. Mikulka, effectively E3 was overpaying for ethane it was receiving over the damages period, and the claim he calculated under this head of damage, \$15,507,355, is Dow's portion of this overpayment.

[821] However, Mr. Tulk testified that the Operator's use of the life-to-date method was explained to the Dow plaintiffs at a meeting with Chris Foy of Nova in May 2001 and, as a result of this meeting, Mr. Tulk believed that they understood the life-to-date method and had agreed to its use.

[822] The Dow plaintiffs' corporate officer confirmed that the Dow plaintiffs met with Mr. Foy in 2001, and that they:

- a) were aware of the Operator's use of the life-to-date method by September 24, 2002, as a result of the 2001/2002 audit;
- b) were aware of the Operator's continued use of the life-to-date method through subsequent audits for the 2001, 2008, 2009, 2010 and 2011 fiscal years;
- c) paid the Ethane Variable Costs knowing that these costs were calculated using the life-to-date method; and
- d) did not object to the Operator's use of the life-to-date method at any time prior to March 23, 2012.

[823] Thus, Dow knew or could have reasonably discovered as early as September 24, 2002, that the Operator was calculating Ethane Variable Costs using the life-to-date method. Since the claim was first raised in Mr. Mikulka's report in 2014, damages prior to January 2012 are barred pursuant to the *Limitations Act*, RSA 2000, c L-12. An analysis of this is found under the heading "Limitations of Actions."

[824] However, although Nova points out that the Fifth Amended Statement of Claim does not raise or seek this relief, I note that Nova has been aware of Dow's disagreement with the practice since 2012. Thus, there is no prejudice or surprise to Nova. Given the decision I have made on Nova's application to amend its pleadings on the last day of trial, I extend the same opportunity to Dow pursuant to Rule 3.65 of the Rules of Court with respect to future breaches, such amendment to be filed and served within 90 days of the date of this decision.

[825] In the circumstances, Dow has failed to establish that it is entitled to damages under this heading prior to 2012.

ii) Ethane Fixed Cost Adjustment

[826] This claim relates to the interpretation of the definition of “Feedstock Fraction” in the OSA. According to section 5.9(a) of the OSA, the Feedstock Fraction means at any particular time in respect of:

- a) Nova, the fraction that results when the Total Nova Pool Ethane (which means on the facts that existed in the damage period, the quantity of ethane that Nova uses at E1, E2 and E3) is divided by that quantity plus Dow ethane for use at E3; and
- b) Dow, the fraction that results when Nova’s Feedstock Fraction is subtracted from 1.00000.

However, section 5.9(b) states that the “initial” Feedstock Fractions of the Co-owners shall be determined such that:

- a) the “initial Nova Joffre Ethane quantity shall be equal to that quantity of Ethane required to produce a quantity of Ethylene in a year equal to the sum of the [ENC] of [E1, E2 and Nova’s [EPP] of the [ENC] of the Plant as of the commencement of Initial Operations, less the quantity of Ethane, if any, processed pursuant to any Tolling Agreements”; and
- b) The “initial [Dow] Joffre Ethane quantity shall be equal to that quantity of Ethane required to produce a quantity of Ethylene in a year equal to [Dow’s EPP of the ENC] of the Plant as of the commencement of Initial Operations”. [emphasis added]

[827] At the time the initial Feedstock Fractions were established, Nova used the total amount of the E1 Toll, 600 million pounds, to establish the fractions.

[828] Nova did not adjust the initial Feedstock Fractions in accordance with the actual usage of the E1 Toll, which terminated in 2008, and in fact still uses the initial Feedstock Fractions despite that termination.

[829] Dow submits that the initial Feedstock Fractions should have been adjusted to take into account actual usage of the Toll, in accordance with section 5.9(b).

[830] Mr. Mikulka calculated the amount of this claim as \$42,214,429.

[831] Nova submits that this claim must fail because the OSA provides for how and when the Feedstock Fractions will change, either increasing or decreasing, in sections 5.9(c) and (d), and requires written notice to the Operator in either case. However, section 5.9(c) sets out that the Feedstock Fraction of a Co-owner will be increased if either Co-owner requests an increase in its entitlement to Joffre ethane, in which case written notice to the Operator must be provided, and the Operator must use reasonable efforts to accommodate that increase. Certain conditions apply to that request to increase ethane entitlements. Section 5.9(d) applies to a request to decrease a Co-owner’s feedstock fraction if a material event occurs that would result in a decrease in its ethane requirements. However, Dow’s claim does not relate to either a request for an increase or decrease of entitlement to Joffre ethane, but merely the adjustment of the initial Feedstock Fraction on a continuing basis to take into account the quantity of the E1 Toll actually processed, with both parties remaining entitled to the same quantity of ethane as before.

[832] The inclusion of the words “at any particular time” in section 5.9(a), and “the quantity of Ethane, if any, processed pursuant to any Tolling Agreements” in section 5.9(b) implies an

adjustment to the Feedstock Fractions as circumstances change. Nova submits that this interpretation is commercially absurd, since it would require Dow and Nova to constantly buy or sell portions of their ethane as set out in section 5.6(g) of the OSA in inventory to give effect to variations caused by the varied use of the E1 Toll.

[833] However, this section does not require actual sales, but deemed acquisitions or dispositions, an accounting exercise, and at any rate, the requirement to vary Feedstock Fractions in this way ceased when the E1 Toll was terminated in 2008.

[834] However, the Dow plaintiffs' corporate officer confirmed that Dow was aware that Nova was calculating Feedstock Fractions in this way since 2001, and the claim was only raised in the Mikula report. I find that the claim for damages under this heading is barred under the limitations statute during the damages period.

[835] With respect to future damages, however, I find that Mr. Mikulka's interpretation of section 59(b) is correct, and that this is a continuing breach. Given that I have allowed Nova's application to amend its pleadings on the last day of trial, I will extend the same courtesy to Nova, pursuant to *Rule* 3.65 and direct that Nova shall file and save such amendment if it wishes to pursue this claim within 90 days of this decision.

iii) Plant cost recovery

[836] This category is a credit to Nova for the amount Dow would owe to Nova based upon Dow taking Nova's under-nomination of ethylene, as calculated in the OSA. It applies to the five months when Nova actually under-nominated, and amounts to \$2,627,659. Nova accepts this.

2. John Williams

[837] John Williams was called by Nova as an expert to give opinion evidence concerning the assessment and quantification of damages in this case.

[838] Mr. Williams is a Chartered Accountant, Chartered Business Valuator and has been recognized as a specialist in Forensic and Investigative accounting by the Canadian Institute of Chartered Accountants. He is a Managing Director with Alvarez & Marsal Canada – Global Forensic and Dispute Services in Calgary, Alberta. Prior to that, he was with KPMG for approximately 29 years.

[839] Mr. Williams has been qualified in other superior courts in Canada as a forensic accountant and as an expert in damage quantification and business valuation issues. Some representative examples of matters in which he has provided expert evidence include contractual disputes, a patent infringement dispute, an assessment of economic losses, and lost profits as a result of the termination of a contract.

[840] Mr. Williams was retained to provide an expert rebuttal report in response to the Mikulka report and to prepare his own assessment of the Dow plaintiffs' damages. He was instructed not to address Mr. Mikulka's final three heads of damage, being liquid co-product damages, ethane priority and the three adjustments made by Mr. Mikulka.

[841] He was instructed to make the following assumptions in estimating the Dow plaintiffs' damages:

- a) that the Court finds that Nova was required to provide Dow Europe with 44.484% of the ethylene produced at E3 until June 30, 2004 and 50% thereafter, regardless of the application of the allocation procedures (the allocation claim);
- b) that the Court finds that Nova was required to produce ethylene as set out in Dow's expert reports by directing ethane to E3 in preference to E2 and E1 at all times (the optimization claim);
- c) that the two Dow plaintiff components of Dow Europe's claim to E3 ethylene, the allocation claim and the optimization claim, are separate claims and are to each be assessed separately, first dealing with the allocation claim and then the optimisation claim;
- d) that the two Dow plaintiff companies are separate legal entities and that damages flow to each based on their contractual entitlements, including that:
- e) Dow Europe is the party entitled to ethylene from E3 and to all polyethylene produced at LP7;
- f) apart from E3, Dow Canada is the exclusive purchaser of ethane for Dow Canada and Dow Europe's ethane requirements, including E3 streaming, the E1 Toll, any and all spot ethane sales to Nova or third parties, and for use as buffer on the Cochin Pipeline; and
- g) Nova is the exclusive purchaser of the ethane feedstock required for E3 operations except during periods covered by streaming agreements;
- h) alternatively, assume that the Court finds that the Dow plaintiffs are jointly entitled to damages despite being separate legal entities;
- i) that E3's productive capability is as set out in ESI's updated capacity spreadsheet, provided to KMPG on June 30, 2014. Mr. Williams did not attempt to validate the ESI calculations;
- j) that during the period of the *force majeure* in effect between June 22 and September 1, 2005, Nova had no obligation to produce ethylene for Dow Europe; and,
- k) that Dow has no optimization or allocation claim for the following periods:
 - (i) prior to June 29, 2004; and
 - (viii) from May 1, 2005 to October 31, 2006.

[842] Mr. Williams testified that these assumptions addressed matters not within his expertise, and he conceded that he had not assessed whether they were reasonable.

[843] In addition to the foregoing assumptions, Mr. Williams also made the following assumptions:

- a) the conversion rates from ethylene to polyethylene for LP7 and Fort Saskatchewan as set out in the Mikulka report are appropriate for the purposes of estimating incremental polyethylene production;
- b) any incremental polyethylene sales made by the Dow plaintiffs would be based on the selling price of the lowest margin products sold by Dow Europe or Dow Canada in a given month;

p) the calculation of the Lost Margin Due to Use of Higher Cost Ethylene is based on the cheapest source of ethylene available at the time.

[844] For purposes of his calculations, Mr. Williams was instructed to rely on the E3 Availability Capacity Scenarios provided by ESI. These scenarios changed from Mr. Williams' written report to the date of his testimony.

[845] Mr. Williams made an adjustment to the ESI E3 Availability Capacity Scenarios calculated by ESI for the period from June 22, 2005 to September 1, 2005 to reflect the impact of a tornado that caused a *force majeure* to be declared at E3 by Nova. He was instructed by counsel to use the following ESI Capacity Table, which he referred to as a "*force majeure* assumption". The following table summarizes the "available capacity" he used for his calculations:

| E3 Available Capacity (Million Ethylene Lbs.) | ESI Scenario A | | ESI Scenario B | |
|--|----------------|--------------|----------------|--------------|
| | ESI | Adjusted ESI | ESI | Adjusted ESI |
| June 2005 | 179.37 | 179.37 | [REDACTED] | [REDACTED] |
| July 2005 | 86.60 | 0 | [REDACTED] | 0 |
| August 2005 | 246.01 | 0 | [REDACTED] | 0 |
| Total | 511.98 | 179.37 | [REDACTED] | [REDACTED] |

[846] I have eliminated the ESI Scenario A calculated by Mr. Williams, as it was clear from Mr. Ferrigno's testimony and cross-examination that it is not a useful scenario. However, it is noteworthy that Mr. Williams calculated ESI Scenario A damages, despite being aware, as he conceded on cross-examination, that in reality E3 produced more ethylene than he was being asked to assume that it was capable of. He conceded that he did not challenge this scenario with his client, and chose to accept it as an assumption. Mr. Williams testified that he was entitled to make the assumption he was directed to make, despite its obvious flaws, because it was a matter outside of his expertise.

[847] With respect to ESI Scenario B, Mr. Williams conceded that, although he had no reason to doubt Mr. Mikulka's statement that E3 produced more ethylene in 22 of the 138 months set out in ESI's capacity calculation, he did not question that calculation, again because it was outside his area of expertise. He also conceded that he did not know whether the actual production data for E3 would represent whether the Nova employees at E3 were trying to run E3 hard or whether they were running it at reduced rates on instructions from the Nova business people.

[848] In his June 6, 2014 report, Mr. Williams performed two separate sets of calculations.

[849] One set of calculations dealt with Dow Europe on a stand-alone basis, so the damages in that scenario relate only to Dow Europe. In a separate calculation, he prepared a combined damages assessment for Dow Europe and Dow Canada. Within each of those assessments, he prepared separate calculations for the allocation claim and for the optimization claim. The allocation claim is based on the allocation volumes, on which he and Mr. Mikulka agreed. The optimization claim is based on the ESI Capacity Scenarios.

[850] Within each of those calculations, Mr. Williams ordered damages in the following manner:

- a) he dealt with mitigation volumes and mitigation damages;
- b) he dealt with lost polyethylene sales; and
- c) he dealt with lost merchant ethylene sales.

[851] In all of the calculations, he used the contribution margin approach, except mitigation, on which he used a cost differential approach. In preparing his calculations, he used the AUBD because it was the only information that he had available to get to some understanding of what lost sales may have been in each of the months in question.

[852] Mr. Williams then received Mr. Mikulka's surrebuttal report in September 2014. Mr. Mikulka agreed with some of Mr. Williams' comments and made some changes accordingly. Mr. Mikulka agreed with Mr. Williams with respect to excluding lost polyethylene sales from LHC-1 when lack of demand was recorded, but continued to calculate lost merchant ethylene sales during those months. Mr. Mikulka's surrebuttal report contained revised calculations.

[853] Mr. Williams prepared an update to his report dated February 17, 2015, re-doing the calculations he had done previously so they were responsive to Mr. Mikulka's new numbers. In the meantime, he had received additional documentation.

[854] Mr. Williams updated and changed his initial report in response to certain of Mr. Mikulka's comments. He then issued a report dated March 16, 2015 when he discovered that he had made an error in accounting for royalty expenses in his February report. Mr. Williams prepared a second amendment update dated June 16, 2015 related to some updated capacity numbers provided to ESI.

[855] Mr. Williams' calculation of damages for Dow Europe and Dow Canada on a combined basis are as follows:

| Dow Europe / Dow Canada Combined Basis | | ALLOCATION CLAIM |
|--|-----------------------|-------------------------|
| Base Case | (A) | \$68,272,347 |
| Reduction for no damage to June 29, 2004 | (B) | 4,313,830 |
| Reduction for no damage between May 1, 2005 to October 6, 2006 | (C) | 3,937,469 |
| Total Allocation Damages net of no damage claim scenarios | (D) = (A) – (B) – (C) | \$60,021,048 |

| Dow Europe / Dow Canada Combined Basis | | OPTIMIZATION CLAIM ESI – Case B |
|---|-----|--|
| Base Case | (A) | \$153,847,421 |
| Reduction for No Damage to | (B) | 3,389,675 |

| | | |
|---|-----------------------|---------------|
| June 29, 2004 | | |
| Reduction for No Damage between May 1, 2005 and October 6, 2006 | (C) | 29,410,222 |
| Total Optimization Damages Net of No Damage Claim Scenarios | (D) = (A) – (B) – (C) | \$121,047,524 |

[856] Within those categories of damages, first with respect to the allocation claim, the first head of damages that Mr. Williams addressed was mitigation damages, followed by polyethylene and, lastly, merchant ethylene. Allocation damages were calculated on the entire allocation volume, on which he and Mr. Mikulka are in agreement, so there are no volumes in that category that do not result in one form of damage or another.

[857] With respect to the optimization claim, Mr. Williams followed the same ordering. He attempted to identify those months where the Dow plaintiffs did not appear to have any further demand for polyethylene and/or merchant ethylene and made adjustments to his previous calculations.

[858] Mr. Williams agreed on cross-examination that the most significant difference between his calculation of damages and Mr. Mikulka's arises from the different assumptions each made about capacity, since Mr. Williams used ESI capacity numbers and Mr. Mikulka used Mr. Kapur's numbers. He agreed that accounting adjustments between him and Mr. Mikulka are a fraction of the effect of the capacity assumptions.

[859] Mr. Williams criticized Mr. Mikulka for his approach, which he characterized as being based on an assumption of unlimited demand for polyethylene, and based on Mr. Kapur's capacity estimate for E3. Mr. Mikulka calculated the Dow plaintiffs' lost profit damages by taking the expected selling price of polyethylene, deducting from that the cost to manufacture such polyethylene and then multiplying that by the notional capacity of the plants in question to produce incremental polyethylene, which became the final lost profits sales figure, by Mr. Mikulka's calculation.

[860] Mr. Williams noted that Mr. Mikulka separately calculated mitigation damages. In that regard, the calculation involved the cost differential between the various sources of mitigation volumes that were purchased and the cost that would have otherwise been paid for E3 ethylene. Mr. Williams testified that, in his view, this does not properly account for what would have occurred in the "but-for world," and failed to satisfy the objective of placing the plaintiffs in the position that they otherwise would have been, absent the alleged harm. In Mr. Williams' view, this requires a month-by-month assessment.

[861] Mr. Williams criticized Mr. Mikulka for failing to take an approach consistent with the standards of the Canadian Institute of Chartered Business Valuators, although Mr. Mikulka is not a member of that association. He also questioned whether Mr. Mikulka supported many of his assumptions. He questioned what he called the assumption of unlimited demand, and he questioned the use of the AUSB.

[862] Mr. Williams identified seven key assumptions in Mr. Mikulka's report with which he took issue. They are as follows:

a) Both Dow plaintiffs are entitled to damages

[863] Mr. Williams characterized this as an “unstated assumption” In that, in his view, Mr. Mikulka treated Dow Europe and Dow Canada as a single economic entity with commonly-owned assets and a common set of rights and obligations. Thus, he noted, if the Court were to award damages to just one of the plaintiffs, Mr. Mikulka’s calculations would not be helpful. As I have found that both the Dow plaintiffs are entitled to damages, that issue disappears.

[864] Mr. Williams also faulted Mr. Mikulka for failing to analyze what each Dow plaintiff may have done had they been acting in their own rational economic self-interest.

[865] Although Mr. Williams acknowledged that the assumption he had made that the Dow plaintiffs were separate legal entities and that damage should flow to each was an assumption directed by counsel and not within his expertise, he became an advocate for that position, refusing to acknowledge until late in his testimony that Dow Europe and Dow Canada are affiliates bound by intercompany transfer policies, and refusing to acknowledge their relationship and contractual arrangements with respect to his theory of rational self-interest.

b) Allocation and optimization claims are calculated on a combined basis

[866] The major issue Mr. Williams identified with this is that, if the Court were to award only one type of damages, Mr. Mikulka’s method would not be useful. As I am prepared to award both types of damages, this issue also disappears.

[867] Mr. Williams also alleged concerns about double counting in the way that Mr. Mikulka calculated damages.

[868] However, Mr. Mikulka’s model includes a section entitled “Optimization Claim v. Conversion Claim”, enabling the user to toggle back and forth among the allocation claim, the optimization claim, and the combined claims. Thus, the model permits the calculation of damages either under separate heads or on a combined basis, alleviating the concern of double counting.

[869] As noted in Mr. Mikulka’s reports, seven categories of damages totaling \$116,740,202 are based on existing production, as opposed to on the E3 shortfall. Therefore, the inclusion of these categories in each claim needs to be accounted for only once if the allocation and optimization claims are calculated separately and added together. When this \$116.7 million in non-shortfall damages is added to the two claims separated by the toggle, the total is \$4,253,836, which is greater than the final combined net damage figure of \$795,494,704. This small difference is due to a second kind of overlap that Mr. Williams did not consider, but which Mr. Mikulka’s model also avoids.

[870] Dow submits that commercial decisions to be made by Dow Europe in the but-for world under the allocation and optimization claims would be different because the volume of available ethylene would be different in each instance, and different again from a scenario in which they are considered together. Dow cites the example that the combined ethylene available from both claims would be more than the existing unused polyethylene capacity, resulting in the damages treatment of a portion of the ethylene as a merchant market sale. On a standalone basis, however, the ethylene available in each claim might be less than the existing unused polyethylene capacity, so the consideration of either claim without the other would result in no assumed

merchant market sale. Failing to consider the claims together, and instead merely calculating them independently and then adding them together, would incorrectly increase damages by the said additional \$4.2 million. I am satisfied by this explanation that Mr. Mikulka's model recognizes and accounts for the potential duplication.

c) E3 should have produced up to its productive capacity

[871] Mr. Williams merely advised that Mr. Mikulka used Mr. Kapur's report, and he used the ESI report. As noted previously, I find Mr. Kapur's opinion of productive capacity to be preferable to that of ESI.

d) Unlimited demand for E3 ethylene

[872] Mr. Williams submits that Mr. Mikulka provides no analysis or evidence with respect to two interlinked assumptions:

- a) There was demand up to the maximum amount of ethylene obtainable from E3 in any month; and
- b) E3 was the only source of Alberta ethylene that was cost-advantaged in comparison to US Gulf ethylene.

[873] Mr. Williams acknowledged that what he really meant by "unlimited demand" was Mr. Mikulka's assumption that demand for Alberta cost-advantaged ethylene and ethylene-derived products is equal to the maximum volume of ethylene obtainable from E3.

[874] Mr. Williams asserted that Mr. Mikulka provided no analysis with respect to this. This ignores Mr. Mikulka's analysis in his surrebuttal report. Mr. Williams dismissed this as a "macro analysis" of the ethylene and polyethylene market.

[875] He conceded that Nova's efforts to obtain further production along the lines of what he would have liked to see to perform his analysis were unsuccessful, both at the case management and the Court of Appeal level. He acknowledged the real-life nominations made by the parties, the fact that Nova had a market for the ethylene it obtained through ethane allocation and that it produced at E1 and E2, and Nova's plans for the R3 expansion project. He was aware of the testimony of Mr. Kyle, Mr. Gutierrez, Mr. Ramachandran and Mr. Woods, although he said that he was not aware of Mr. Woods' opinion that there would virtually always have been a demand for LP7 polyethylene and that, during the period of 2009 to 2012 in particular, he had no doubt that any such polyethylene could have been sold.

[876] However, Mr. Williams was stubborn in his opinion that from certain factors he took into account indicated that the Dow plaintiffs did not experience a loss of ethylene sales between 2001 and 2008, taking into account certain factors he identified.

[877] He testified that he tested the assumption that there was demand up to the maximum amount of ethylene obtainable from E3 from the records he was able to access, with the following results:

- a) LHC-1 (owned by Dow) had approximately

[REDACTED]

- b) Dow Canada sold approximately [REDACTED] pounds of ethylene already in its possession to third parties in Alberta on a spot basis, notwithstanding the fact that the Dow plaintiffs assert that they would have processed all incremental ethylene from E3 into polyethylene in any given month;
- c) Dow Europe sold approximately [REDACTED] pounds of ethylene to Dow Canada during the period in question, although according to the Mikulka opinion, there was a significant “E3 Production Shortfall” between 2001 and 2012;
- d) ethylene purchased under the E1 Toll also benefited from the Alberta advantage, and throughout much of that period for which comparative data from TDCC on the cost to manufacture ethylene in its various ethylene crackers is available, [REDACTED] [REDACTED] according to the TDCC Global Cracker Reports;
- e) for every month between July 2001 and December 2008 (except for six months), Dow Europe could have generated a positive contribution margin by converting E1 ethylene purchased from Dow Canada (at the intercompany transfer price) into polyethylene; and
- f) for every month between July 2001 and December 2008, Dow Canada could have generated a positive contribution margin by converting E1 ethylene purchased from Nova into polyethylene.

[878] Mr. Williams testified that all of this demonstrated to him that there was not, at all times, unlimited demand, and there was no evidence on the limited facts available to determine what the demand was on a month-by-month basis.

[879] Mr. Williams conceded that he had not verified with anyone who had expertise in the petrochemical industry whether these tests for demand were appropriate. He knew that several witnesses had testified about Dow’s demand for low-cost Alberta ethylene and for derivative products produced from it, including Mr. Woods, a Nova expert witness, and he acknowledged that the industry experience and expertise of each of those witnesses exceeded his own. However, he did not communicate with Mr. Woods or more knowledgeable KMPG colleagues about his tests or his assumption of restricted industry demand.

[880] He acknowledged that, when he had identified any month to which one of these tests related, he removed all damages for that month.

[881] With respect to the first factor, lack of demand at LHC-1, Mr. Williams acknowledged that this totalled only [REDACTED] pounds spread across nine months, over a nine-year period during which LHC-1 produced over [REDACTED]. This factor is thus of limited validity in assessing demand.

[882] With respect to the second factor, Dow’s spot sales, Mr. Mikulka noted that Dow Canada spot ethylene sales rarely overlapped with periods of damages related to lost polyethylene sales due to raw material losses. The evidence discloses that only [REDACTED] pounds of the [REDACTED] [REDACTED] pounds of spot ethylene pointed to by Mr. Williams were sold in months in which Mr. Mikulka calculated damages related to polyethylene losses, a relatively tiny amount.

[883] With respect to those [REDACTED] pounds, Mr. Williams conceded that he had not considered the timing of the sale agreements versus the dates of delivery.

[884] He also had not considered whether Dow had purchased ethylene in an equal amount or none. This factor is also of limited validity.

[885] With respect to the third factor, Dow Europe's sales of ethylene to Dow Canada, Mr. Williams conceded on cross-examination that sales occurred in both directions in nearly identical volumes. Mr. Mikulka testified that this represented the reality of affiliates working together to move ethylene to where it was most urgently needed or could be most profitably used.

[886] On cross-examination, Mr. Williams acknowledged that sales from Dow Europe to Dow Canada might not have been driven by lack of demand but by a desire to maximize profit in the face of Nova's ongoing failure to deliver the Dow's share of ethylene from a fully optimized E3. He conceded that the purchase of ethylene by either Dow plaintiff was evidence of demand.

[887] Mr. Williams conceded that he knew that there was a powerful demand for low-cost Alberta ethylene and derived products for the years 2009 to 2012, and that he had not advanced a submission that there was an overstatement of Dow's damages for that period, other than a small amount, until his final report issued after the trial began.

[888] In that report, he alleges that a \$36.2 million overstatement on lost profits on incremental polyethylene sales for July 2010, July 2011 and October 2012. Mr. Williams acknowledged that, in effect, he chose to eliminate Mr. Mikulka's over [REDACTED] pounds of LP7 raw material losses from the damage calculation because Dow sold [REDACTED] pounds of ethylene on the spot market. Mr. Williams conceded that he did not take into account that, during the same period, Dow purchased in excess of [REDACTED] pounds of ethylene from Nova, indicating the weakness in his analysis.

[889] Mr. Williams was cross-examined extensively on his suggestion that the fact that Dow did not always fully use the E1 Toll was a sign of lack of demand. He acknowledged that, in his calculations, when Dow did not fully utilize the E1 Toll and he had calculated a profit margin available for polyethylene manufactured from E1 Toll ethylene, he assumed no damages from the incremental polyethylene sales as ethylene sales.

[890] He testified that he was aware that TDCC had the option of purchasing polyethylene from other non-Canadian affiliates, but he resisted the suggestion that TDCC may decide to do that rather than buying polyethylene from more expensive E1Toll ethylene. He suggested that TDCC was a customer, and as a customer, would not care how much it cost a manufacturer to manufacture products. He refused to assume that TDCC wanted the cheapest polyethylene it could buy.

[891] Mr. Williams persisted in ignoring the real-world fact that the TDCC was affiliated with the Dow plaintiffs, complaining about lack of information from the parent company. He finally reluctantly conceded that it was common sense that TDCC would want to buy polyethylene cheaply and would want its Canada affiliates to succeed.

[892] He conceded that, in the real world, TDCC might decide to purchase polyethylene from other sources rather than the comparatively-speaking more expensive E1 ethylene, but insisted that this was an indication of lack of demand. As Dow points out, this only indicates lack of demand for E1 Toll-based polyethylene.

[893] Mr. Williams conceded that his calculations with respect to when E1 Toll ethylene appeared to be cheaper than US Gulf Coast ethylene were limited to a 12-month period from the fall of 2007 to the fall of 2008. He indicated that this was because that was all the information he had. He acknowledged that this was during a period of extremely high Alberta advantage, and also acknowledged that he was not aware that during the 12-month period from August 2006 to July 2007, Nova ran E3 at extremely high rates. He insisted that this just supported his theory of lack of demand. Again, he appeared to be equating lack of demand for E1 Toll-based polyethylene with lack of demand for cheaper E3 ethylene.

[894] Mr. Williams also conceded that his assumption that Dow always had the ethane available to run the E1 Toll at maximum was based on an ambiguous undertaking response. He refused to acknowledge that he knew that Dow only had enough ethane, provided that one took into account volumes that were sold to Nova or used for another purpose, until he was taken to the actual wording of the undertaking.

[895] Mr. Williams acknowledged during his testimony that he had no real understanding of the issue of ethane allocation. He finally conceded that Dow selling ethane to Nova instead of using it for the E1 Toll might have been a rational economic choice. However, he refused to acknowledge that this may not be an indication of lack of demand.

[896] Mr. Williams also conceded that he was not aware that:

- a) periodically, Nova encouraged Dow not to use the E1 Toll, but to sell excess ethane to the Pool; or
- b) that Nova itself was aware that Dow would be better off economically to build ethane inventory to ensure it had enough to run LHC-1 at full rates.

[897] Mr. Williams acknowledged that, from his own research, after mid-2004, Dow sold virtually any remaining excess ethane it had after satisfying its contractual obligation to the Pool. He conceded that the E1 Toll expired at the end of 2008, and that the vast majority of lost sales of LP7 polyethylene occurred after that.

[898] It also appears that Mr. Williams had mistakenly treated all volumes of ethylene manufactured by Dow under the E1 Toll or purchased on the spot market as “mitigation volumes”. He was unaware that the E1 Toll, in existence even before E3 was constructed, was, like spot purchases, a longstanding supply source for Dow Canada’s Fort Saskatchewan derivative facilities, and not merely a potential avenue for mitigation.

[899] Dow’s allocation of its ethane to uses other than the E1 Toll at various times is not persuasive evidence, in the context of what was occurring at the time, that Dow did not want its full share of ethylene from a fully optimized E3. The notion that the E1 Toll use is somehow a proxy for E3 ethylene demand is not persuasive.

e) The Dow plaintiffs were unable to further mitigate damages

[900] Mr. Williams called this an unstated assumption by Mr. Mikulka. He submits that Dow could have mitigated further. Dow’s failure to do so, he opined, is evidence of no further demand for polyethylene, or merely a failure to fully mitigate; in either case he said this affected Dow’s entitlement to damages.

[901] Mr. Williams viewed the mitigation efforts of Dow Canada on the basis that it is a stand-alone economic entity that would always act in its own rational self-interest.

[902] His analysis was as follows: he compared the cost of acquiring ethylene through the E1 Toll to the cost of purchasing ethylene from Dow Europe. He found that in 83 out of 88 months, it was cheaper for Dow Canada to purchase ethylene from the E1 Toll than to buy it from Dow Europe. Thus, he submitted, had Dow Canada wanted to mitigate any shortfall of ethylene, it could have obtained it cheaper from Nova than from Dow Europe. In his opinion, there was no reason to suggest from an economic or a financial standpoint that the only source of ethylene that made sense for Dow Canada was the E3 ethylene sold to it by Dow Europe at transfer price.

[903] Mr. Williams noted that the kind of record he would expect to see and rely on to assess this kind of damage, for example, unfulfilled sales orders, evidence of sales contracts that could not be met, marketing analysis, were not in evidence.

[904] On this issue, Nova submits that Dow has not kept any record of local market prices or the discount rates applicable to the sale made by Dow Europe to its affiliates over the course of this litigation, and that the records used to determine the transfer price for sale to TDCC are not available, have not been produced, and as a consequence are not in evidence.

[905] However, the evidence establishes that Dow maintains its global accounting records in a comprehensive electronic database. Dow's full Canadian polyethylene sales files were in evidence, based on the historical data. A review indicates that each of the Canadian polyethylene sales files includes a tab entitled "Dow Europe Data" containing data points extracted directly for the database. The data includes (a) every invoiced sale of the Canadian gas phase polyethylene sold to Dow entities for sale to a third party customer, (b) the trade name of each type of product sold in each invoiced sale, the intercompany discount applied to each invoiced sale, and (c) the sale price paid by each third party customer pursuant to each invoiced sale. Similarly, each of the Intercompany Transfer Policies charts intercompany product discount rates over the damages period. The policies clarify that the "net FOB Production Plant Price", extracted from the database into the "Dow Europe Data" tab of the Canadian Polyethylene Sales Files, is the Local Market Price as defined by Intercompany Transfer Policies.

[906] Nova alleges that Dow failed to produce documents that would have been relevant to the plaintiff's production of ethylene and polyethylene in Canada, but Dow submits that none of the type of documents described by Nova were shown to exist.

[907] For example, Nova points to records of a type that Mr. Williams presumed would exist, and that he thought could be relevant to an assessment of the Plaintiffs' demand – "evidence of unfulfilled sales orders, evidence of sales contracts that couldn't be met, evidence of unfulfilled purchase orders from customers, evidence of unfulfilled demand". As Mr. Kyle explained, however, there would not be records of unfilled orders or lost sales resulting from Nova's chronic failure to give Dow its share of ethylene from a fully optimized E3. In his words, "we were in the business of recording actual sales, not recording sales we weren't going to deliver upon we would never keep records like that"; because the deprivation was chronic "we adjusted our planning process ... to recalibrate ourselves to that new reality". Mr. Mikulka confirmed that Mr. Williams' assumption of records of lost sale was mistaken, and merely reflected Mr. Williams' unfamiliarity with business practices in the polyethylene industry.

[908] Mr. Mikulka noted as follows:

In evaluating demand, it is important to distinguish between the ethylene-starved environment in which the Plaintiffs found themselves – in other words, being

short the Dow Total Lost Volume – and the “but for” world in which they would have operated had they consistently received those volumes of ethylene. In the actual ethylene-starved environment, the Plaintiffs were constrained from further building their production of and market share for ethylene derivatives. Before orders can be solicited from customers, the Plaintiffs need relative certainty that they will be able to fill those orders. In the actual world, the Plaintiffs had no such certainty. In the “but for” world with E3 operating at its productive capability the Plaintiffs would have had the certainty necessary to solicit additional sales, grow production and build market share. Williams’ suggestion that the Plaintiffs should have “produced evidence of actual lost sales to customers” demonstrates an unfamiliarity with business practices in the polyethylene market. The Plaintiffs will have no “log” of unfilled orders, since it would not have been good business practice to solicit orders without some assurance that Nova would provide reliable delivery of the Dow Total Lost Volume. In an ethylene-starved environment in which the Plaintiffs did not receive the E3 ethylene, the Plaintiffs would then have to breach customer obligations or reduce even further the supply of ethylene to their own derivative units.

[909] Nova points to TDCC’s weekly production plans as another type of supposedly unproduced demand evidence. As Mr. Gutierrez explained, however, while the plans were important to him in his role as supply chain manager, they did not reflect demand for the additional ethylene that Dow should have received from a fully optimized E3. So as not to “overpromise and underdeliver”, Dow’s commercial and supply chain personnel deliberately tailored production to line up with forecast supply, so that the weekly production plans matched the anticipated output from Dow’s assets. As Mr. Gutierrez explained, this “demand” was a “constrained” demand for polyethylene, limited to the amount Dow expected to receive in light of Nova’s chronic deprivation of Dow’s share of ethylene from a fully optimized E3. As a result, the production plans do not reflect Dow’s actual demand for the additional ethylene – and thus polyethylene – that would have been produced from a fully optimized E3. That is why the plans were not relevant in this action, and that is why they were neither produced nor ordered to be produced. As Mr. Gutierrez testified, Dow’s polyethylene business was consistently “sold out” of cost-advantaged Alberta polyethylene, and was constantly seeking more from the low-cost Alberta assets.

[910] Nova submits that evidence of TDCC’s month-by-month demand exists, citing a May 29, 2009 Ernst & Young submission made on behalf of Dow to the CRA and the Swiss Federal Tax Association with respect to Dow Canada and Dow Europe’s tolling arrangement at LP7 (the BAPA submission). The issue is, however, how relevant such documents would be given that Dow submits that it would not show evidence of unfilled orders or reflect demand for additional ethylene that Dow should have received from a fully optimized E3.

[911] Mr. Mikulka was cross-examined on whether he asked to see the forecasts referred to in this document, and he indicated that he asked to see “sales plans and the like” but was told that the information was temporal; overwritten over time, so it is not available. When he was questioned about whether his opinion was thus merely theoretical, he responded negatively, indicating that it was a fair valuation of demand for low-cost polyethylene derived from North America and specifically LP7. He indicated the data would be embedded in the asset utilization database showing what the various sources or the issues affecting the ability of the plant to

produce, and lack of demand is one of those categories, as well as raw materials, and operational issues. The asset utilization database would be the repository for what occurred in a specific month, the general assessments of the market, and what was going on. He concluded that every pound of LP7 polyethylene derived from E3 would have found a home.

[912] The BAPA documents were authored by a third party. No one was called from E&Y to speak to them. A witness who was interviewed in 2008 for the document that was ultimately produced testified that he was never contacted either to verify the notes of his interview or the assertions of fact made in the report that were based on speaking with him.

[913] Nova submits that the BAPA submission indicates that there was no “Alberta Advantage”. I accept the evidence of the other witnesses that there was such an advantage, except for the late 2008 to mid 2009 period and the late 2012 period, confirmed even by Nova witnesses.

[914] The second suggestion, that the BAPA report proves that documents, particularly production plans of TDCC, exist that would be valuable in detailing demand, was contradicted by a number of Dow witnesses.

[915] Nova notes that it tried to compel Dow to answer questions about production at its US Gulf Coast facilities that are part of the conglomerated company. Nova argued that this information was relevant and material under R. 5.2, as it related to the quantum of the plaintiffs’ claimed damages for the value of misappropriated ethylene, and the lost profit from upgrading that ethylene. Since the Dow Value Center Team in Houston might divert production from Canada to the US Gulf Coast, Nova argues that the decisions made by it are relevant to the damages claimed by the plaintiffs.

[916] The case management judge concluded that the plaintiffs did not have to answer questions relating to the operations of other parts of the TDCC conglomerate.

[917] The Court of Appeal at 2014 ABCA 244 noted that the Dow plaintiffs have made extensive production of the records under their control. They resist producing records that are under the control of TDCC; and upheld the case management judge.

[918] What the case management judge correctly held was that records that do not relate to the business and operations of the plaintiffs, but that relate to the business and operations of another corporate member of the Dow group, are not under the control of the plaintiffs. They are not *prima facie* producible, although as the chambers judge recognized they might be producible under R. 5.13 if they were relevant and material.

[919] As the Court of Appeal determined that the documents were not relevant and material to the litigation, they cannot now be stated to be so.

[920] Mr. Williams criticized Mr. Mikulka’s use of negative numbers for Dow Canada in his analysis of damages. He submitted that “it can never be reasonable to expect one company to incur a loss to the benefit of another company if they’re acting in their economic self-interest.”

[921] Mr. Williams’ calculation of the total ethylene that was available to Dow Europe from 2001 to 2008 from various sources indicates that it could have acquired far more additional ethylene than the amount of polyethylene that is claimed by Mr. Mikulka as lost profit sales volume. He also calculated that the Dow plaintiffs, on a combined basis, could have had access to much more ethylene than they claim as lost profits from polyethylene sales. He submitted that

this negates the assumption of unlimited demand during this period, and to the inadequacy of Mr. Mikulka's approach.

[922] However, the real-world evidence is clear that Dow Canada and Dow Europe were conducting their operations in tandem, and that the Dow group operates globally as an integrated business.

f) AUSB is an accurate measure of lost polyethylene sales

[923] Mr. Williams acknowledged that he too used the AUSB to calculate damages, but he said that that was because there was no other information to use. Using references from the reseller agreement between Dow Europe and TDCC, which provides that TDCC would be the reseller of polyethylene produced by Dow Europe, Mr. William submitted that reports on market trends, activities of competitors, possible changes in technology, reports on product market penetration, forecasts of product purchases, etc. would be available to the Dow plaintiffs in proving their damages and that TDCC should have produced these reports.

[924] However, he conceded that the industry's normal procedure with respect to solitary orders relating to polyethylene was not within his area of expertise. Due to its general nature, the kind of report referred to in this agreement would not be less persuasive than the direct evidence that was given by Dow lay witnesses at trial.

[925] Mr. Williams had the following criticisms of Mr. Mikulka's reliance on and use of the AUSB:

- a) There are four categories of raw material losses for LP7 and at Fort Saskatchewan in the AUSB, only one of which (hydrocarbons) relates to shortages of ethylene from E3. The remaining categories related to other types of raw material shortages. Mr. Williams noted that the Mikulka calculations incorporate the shortages from all four categories of raw material losses, thereby overstating the volumes and the commensurate Dow damages. However, Mr. Williams acknowledged that Mr. Mikulka had corrected his analysis in this regard in his most recent opinions.
- b) Mr. Mikulka's calculations included approximately [REDACTED] pounds of LP7 raw material losses when E3 was shut down for planned turnarounds or unplanned outages. This was in reference to a plant shutdown in September 2008. Mr. Mikulka referred to emails among Dow personnel indicating that the reason for the shut-down was that there was not enough ethylene to keep LP7 going, even though they wanted to keep operating. Mr. Mikulka testified that he did not calculate damages for this period.
- c) Mr. Mikulka's calculations include approximately [REDACTED] pounds and [REDACTED] pounds of raw material losses for the LP7 in 2009 and 2010, respectively, apparently without having inquired into the mechanical issues that Nova reported to be limiting the amount of ethylene E3 could produce. As noted previously, I accept Mr. Holloway's opinion that there were no uncommon mechanical issues at this time.

g) Ordering of damages

[926] Mr. Williams disagreed with the way Mr. Mikulka accounted for mitigation in his model, and submitted that his approach of first accounting for mitigation is more correct. He also submitted that Mr. Mikulka's method results in the overstatement of damages because the

margin on a lost polyethylene sale is much greater than the incremental cost of ethylene that Dow purchased to mitigate the shortage.

[927] However, Mr. Williams conceded that, if more E3 ethylene became available to Dow, he would expect Dow first to upgrade that ethylene into more profitable polyethylene, which is consistent with how Mr. Mikulka orders damages.

[928] Mr. Williams testified about other issues he had about Mr. Mikulka's reports, as follows:

i) Average selling price

[929] Mr. Mikulka used an average selling price of all polyethylene grades sold during a given month. Mr. Williams submitted that it is more appropriate to use the lowest selling price and base damages on the lowest margin product.

[930] His reasoning is based on an assumption that, when faced with a curtailment or shortage of E3 ethylene, the only reasonable reaction would be to cut production of Dow's lowest margin products, because not to do so would be to sub-optimize the profitability of the enterprise. He cited testimony by Mr. Kyle and Mr. Gutierrez in that regard. However, Mr. Kyle's testimony was with respect to a specific, planned outage at E3, and Mr. Gutierrez's testimony was also about temporary load-shedding, and not about chronic shortages.

[931] Mr. Mikulka pointed out that the lowest priced products do not necessarily have the lowest margins. Mr. Williams submitted that, from certain answers to interrogations, he concluded that every product and grade produced in a Dow plant has the same cost associated with it, and thus, the only variable it is necessary to identify is the lowest selling price. This mischaracterizes Dow's responses, which indicated accounting treatment, and not a margin calculation. I accept Mr. Mikulka's view that:

- a) the average monthly price is appropriate because, had Nova regularly supplied the lost volumes of ethylene, it is reasonable to assume that in the "but for" world, the Dow plaintiffs would have been able to negotiate contracts and subsequently sell the incremental cost-advantaged, E3 ethylene-based polyethylene production to fill the spectrum of customers' needs as reflected by their current product profile;
- b) with the category of high-density polyethylene produced by LP7, there are different grades that are purchased for their physical properties and are not interchangeable. They sell for different prices and have different manufacturing costs. In the "but for" world, Dow would have hundreds of millions of pounds of additional ethylene to sell to new and existing customers across the whole spectrum of product lines and profit margins;
- c) although Mr. Williams criticizes the use of an average price, his analysis also uses average prices. In any given month, there are multiple sales of various products at various net unit revenue (NUR) to any one country. Mr. Williams has calculated the average NUR for each country in a given month and then chosen the lowest country-average NUR. Mr. Williams has assumed that all of the Dow plaintiffs incremental sales would be to the country with the lowest average NUR. However, within that average NUR there is a range of prices for a range of products.

i) Under-nomination by Nova

[932] Mr. Williams commented that “this is another example where what was done in the real world might not make sense when you look at the economic facts in the but-for world.”

[933] His opinion is that, as a result of Dow obtaining the ethylene it should have obtained, Nova will receive less. Therefore, it is not logical to conclude that Nova would continue to under-nominate.

[934] Mr. Williams was concerned about a four-month period when this was an issue, but did not realize that, in these months, Nova did not impose ethane allocation and ran E1 and E2 at rates well below their nameplate capacities. This weakened his assumption that Nova would have nominated in full.

ii) Merchant market in Alberta

[935] Mr. Williams disagreed with Mr. Mikulka’s assumption that there would be a market for Dow Europe’s ethylene in Alberta. He submitted that the lack of data with respect to merchant ethylene sales that makes it difficult to establish an intercompany transfer price suggests a lack of market. He submitted that Mr. Mikulka’s calculation “forces” the sale of ethylene (surplus to Dow Europe’s needs) to Dow Canada at a price above which Dow Canada can resell it into the Alberta market. This has the effect of creating a loss in Dow Canada of approximately \$32.6 million. Mr. Williams submitted that the manner in which these transactions are accounted for by Mr. Mikulka assumes that Dow Canada will act in an economically irrational manner, and has the effect of transferring \$32.6 million of profit from Dow Canada to Dow Europe.

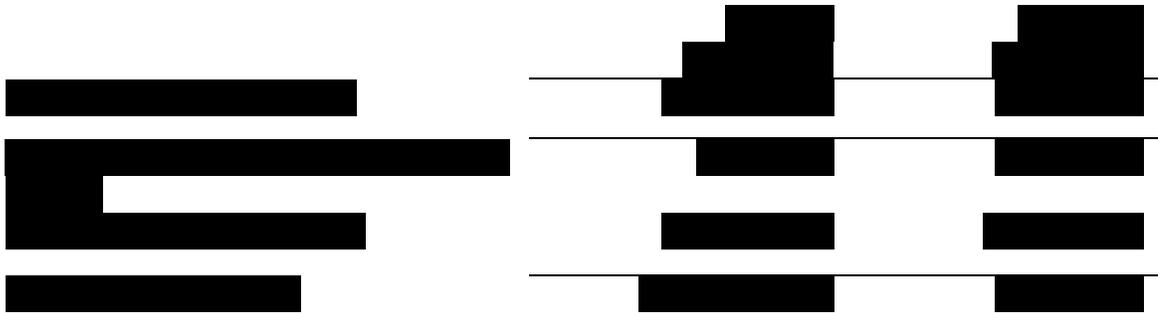
[936] In his calculations, Mr. Williams based lost profits on merchant sales and the [REDACTED] prices used in Mr. Mikulka’s calculations. Mr. Mikulka criticized this, and commented that Mr. Williams should have used the intercompany transfer pricing.

[937] Mr. Williams responded that he used the [REDACTED] price because it put Dow Canada in a position where it would record a loss, although he conceded that Mr. Mikulka’s own calculations showed a loss to Dow Canada. Mr. Mikulka noted that, while the [REDACTED] contract price is a reasonable proxy for a merchant market price, it is not appropriate to use the lowest NUR, nor to apply a transfer pricing discount to it.

[938] Mr. Williams responded to Mr. Mikulka’s comments on the Williams rebuttal report.

[939] Mr. Williams disagreed with the assumption of unlimited demand that he suggested was the basis for this assumption, and with respect to his previous concern about Mr. Mikulka’s ordering of damages. He submitted that Mr. Mikulka in this regard was taking a theoretical approach to mitigation, rather than a factual one. However, Mr. Williams conceded he was not qualified to give an opinion about whether it would be reasonable for Dow to have expanded LP7 sooner, given a more reliable source of E3 ethylene, and I find from the evidence of Dow witnesses, particularly Mr. Kyle, about how Dow operated, and would operate if it had been able to obtain a secure source of additional ethylene, that Mr. Mikulka’s assumption is reasonable.

[940] With respect to Nova’s spot sales being evidence of ethylene demand, Mr. Williams disagreed with the fact that Mr. Mikulka continued to calculate merchant ethylene damages



[944] Mr. Williams continued to disagree with Mr. Mikulka’s comment that ethylene transfers between the plaintiffs are inventory transfers and not sales, but as indicated previously, this is not a material issue that affects the validity of either opinion.

[945] Mr. Williams testified that he failed to take into account the cost of the E1 Toll in identifying what he suggests is an overstatement of damages by Mr. Mikulka because, since mitigation by use of the E1 Toll did not occur, it was not relevant. That may be so, but the lack of quantification of the alleged overstatement does not help me in evaluating Mr. Mikulka’s calculations.

[946] Mr. Williams testified that he took into account the conditions of the use of the E1 Toll when he performed his month-by-month analysis on whether the E1 Toll could have been used, and whether it could have been used at a profit. Mr. Williams pointed out that, despite Mr. Mikulka’s criticism that Mr. Williams failed to identify the source of ethane for the E1 Toll, Mr. Mikulka did not say that Mr. Williams was wrong, and did not arrive at any conclusions in that regard. However, the burden is on Nova to show a failure of mitigation.

[947] Mr. Williams was overly stubborn in his responses in cross-examination, argumentative and persistent in his opinion even when faced with common-sense propositions, and evasive in answering questions. Mr. Williams conceded he had no special knowledge or expertise about the ethylene or polyethylene industries, their cost structures, or “of how customers are obtained, sales are made, or prices [are] negotiated” in such industries. It was evident from his answers that he was unfamiliar with the business aspects of the petrochemical industry, which affected the strength and validity of his opinions. While criticizing Mr. Mikulka on his assumptions, Mr. Williams accepted ESI scenarios that lacked common sense in a basic economic way.

[948] Having said this, the most significant difference between Mr. Mikulka’s opinion and Mr. Williams’ opinion relate to their assumptions about capacity. Differences with respect to methodology and accounting adjustments are a fraction of the effect of the capacity assumptions.

3. ESI

a) Mark Woods

[949] Mark Woods of ESI was called by Nova to give opinion evidence as an expert with respect to ethylene, ethylene market analysis, ethylene feedstocks and derivatives, and those aspects of the petrochemical industry that form part of that analysis.

[950] Mr. Woods has a Bachelor of Science in Chemistry with honours, with a minor in Mathematics from the University of Central Arkansas, starting his career more than 30 years ago as a research chemist. Subsequently, he worked as a quality assurance manager, implementing

statistical process controls resulting in quality improvements. Using his analytical and mathematical skills, Mr. Woods later modeled commercial and economics aspects of supply and demand in the ethylene business, and was responsible for \$2 billion in annual sales as the Ethylene Director at Chevron Phillips Chemical Company, including selling significant amounts of ethylene to both Dow and Nova. He moved on to business development and strategic roles with other companies.

[951] He is currently the owner and President of Ethylene Strategies International, LP, (ESI) where he provides consulting and advisory services to help companies evaluate, design and implement ethylene business strategies. He analyzes ethylene, ethylene feedstocks, polyethylene markets, and oil and gas activities to identify trends to provide both short-term and long-term advice relating to strategy and trading on these products.

[952] Mr. Woods is not a financial analyst, economist or accountant, but performs valuations based on his years of experience.

[953] Mr. Woods testified about ethylene chemistry generally, and how it is produced, including its co-products. He testified with respect to two questions that ESI was asked to address in the June 9, 2014 rebuttal to the expert report of Charles Mikulka:

- (a) Mr. Mikulka assumes that TDCC would always have purchased the Dow plaintiffs' ethylene derivative products manufactured with E3 ethylene. Mr. Woods was asked to assess TDCC's ethylene derivative demand to determine the reasonableness of this assumption.
2. If the Dow plaintiffs had received the additional ethylene from E3 set out in the Mikulka report, would the resulting ethylene derivatives have realized the prices used in the Mikulka report?

[954] Mr. Woods confirmed that his experience with Dow was that, in the normal course, it would not sell ethylene: Dow would use it to make derivatives.

[955] Mr. Woods was clear that, in his opinion, every pound of ethylene Dow could have made with the lost volumes calculated by Mr. Mikulka could have been sold by Dow. Initially, it was his opinion that they would have been sold on the export market, and, due to the complexities of that market, he could not give an opinion with respect to price. On cross-examination, however, he agreed that polyethylene made with E3 ethylene could displace higher-priced product in the domestic market, contrary to any "last pounds" theory. He suggested that, in that case, other producers would be forced into the export market, which could lead to a drop in polyethylene prices. However, that was based on the assumption that the market affected would be the export market. If, as Dow submits, the polyethylene was used in North America, he conceded that the volume of additional production in that market would be a very small percentage, less than 1% of the whole market. He admitted that he had not performed an analysis of whether such a small amount of additional product could have any impact on ethylene prices.

[956] Mr. Woods acknowledged that he could not speak on many issues with respect to the Alberta market, which he described as not being a "real" market, but more of a utility.

[957] As noted in his analysis of Mr. Mikulka's report, Mr. Woods acknowledged that the cash cost advantage of low-cost Alberta polyethylene made it attractive in comparison with product from other sources, and that polyethylene produced from the Dow's lost E3 volumes would have been among the most cost-advantaged in North American for much of the damages period. ■■■

b) Scott Ferrigno

[958] As noted previously Mr. Ferrigno was asked to comment on the ENC values calculated on a monthly basis in the Mikulka report, and whether there were any mitigation strategies that the plaintiffs could have pursued to limit or reduce the lost volumes of ethylene set out in the Mikulka report.

[959] His opinion was that, while the Mikulka report takes into account times when the entire plant was down, “[i]n our view it is more appropriate to assess downtime on a furnace availability basis when individual furnaces are down and to account for other operational constraints actually experienced.”

[960] His report then focuses on only two scenarios, rather than the five he considered in the Kapur rebuttal report. These two scenarios are referred to as “Case A” and “Case B”.

[961] The basis of Case A is that E3 has an ENC of 2.81 BPY from its May 2001 performance test to present. The basis of Case B is that E3’s ENC is as calculated from three formal rate trials (the 2001 Performance Test, the 2002 Rate Trial and the 2004 Rate Trial) and the two periods of high production rates (April 2004 and May 2009, which he conceded were actually May 2004 and March 2009).

[962] Mr. Ferrigno testified with respect to Case A that he was asked to do the calculation, but that he did not think he knew enough about the case to say whether it was a reasonable scenario. He agreed that he did not regard his function as determining what the real capacity of the Plant was: he was given two cases on which to focus. He conceded that it was clear that E3 actually produced more ethylene than Case A asked him to assume, and that there was thus a serious problem with its assumptions.

[963] He was instructed to focus on Case B. He conceded that, even though the production data was obtainable, he could not know from that data whether Nova was attempting to run E3 to its real capacity or running E3 at reduced rates on instructions from its commercial people. He knew that this had actually happened from time to time.

[964] Mr. Ferrigno was questioned about his calculations with respect to Case B. It was noted that, for the May 7 to 10, 2001 performance test run, he did not use the actual performance test results for measured plant capacity. Instead, he used an ENC number of 2.785, although the Co-owners agreed that the test was intended to validate, and did in fact validate, 2.81. He agreed that using the actual test data would change his numbers.

[965] Mr. Ferrigno admitted that the figures he used in his calculation for maximum furnace capacity in 2001 were not from the performance trial, but from Schedule E, which was intended to be a sample calculation and pre-dated the performance tests. He used 53 Mg/hr for the other periods of time.

[966] Mr. Ferrigno attempted to explain why he had used lower numbers for Plant ultimate yield or maximum rate when he used 53 Mg/hr from the same source, but his reasoning was impenetrable.

[967] Mr. Ferrigno also attempted to explain why he did not take data from rate trials as mandated by Schedule E, but instead used data from monthly reports. Again, the explanation was not persuasive.

[968] With respect to the 2002 Rate Trial, Mr. Ferrigno conceded that he used a different range of days for data from what he had used in his April report. Even so, Mr. Ferrigno came to a measured plant capacity number of [REDACTED].

[969] Mr. Ferrigno could not identify the source of that number. He explained that he manipulated the number on the basis of his view of safety issues, and then rounded it up to comply with his expectations.

[970] With respect to the 2004 Rate Trial, Mr. Ferrigno again changed the period over which he had calculated the rate from what he had used in his April report. He could not explain why the spreadsheet and the parameters did not match up. Mr. Ferrigno conceded that he again had manipulated the measured plant capacity number on the basis of inferences he drew from the test results.

[971] With respect to the May 2004 “Peak Rates” columns on his calculations spread sheet, he reduced the [REDACTED]% actual results to [REDACTED]% on the basis that he felt that [REDACTED]% was “not how we would want to safely operate the Plant for normal production”.

[972] With respect to the final period, post-2008, Mr. Ferrigno accepted that E3 could achieve [REDACTED]% without bypasses open.

[973] Mr. Ferrigno was cross-examined on his capacity spreadsheet calculations, and his evidence discloses the following problematic issues, among others:

- a) he took figures from various Nova documents inconsistently, making his calculations opaque and subjective;
- b) he arrived at figures for furnace turnaround time and furnace offline days by back-engineering from the number he wanted to achieve;
- c) he took exception to the Schedule E methodology that he says he followed in certain places, and instead, “plugged in” figures that he thought were appropriate;
- d) he used a fouling rate based on his own experience, and not one derived from E3’s operations; and
- e) he based his false load calculations on a number that was higher than actual experience at E1 and E2, despite acknowledging that each plant is different, and that there were a number of references in Nova documentation to a lower false load experience.

[974] The result of Mr. Ferrigno’s capacity model for E3 compared to Mr. Mikulka’s report is as follows:

| | E3 Actual Production billion pounds | E3 Available Capacity billion pounds | E3 Ethylene Production Shortfall billion pounds |
|--------|--|---|--|
| Case B | [REDACTED] | [REDACTED] | [REDACTED] |

Mikulka [REDACTED] [REDACTED] [REDACTED]

[975] Mr. Ferrigno was restrained by Nova in giving his opinion, both in terms of the assumptions he was instructed to make and the scenarios he was asked to address. With respect to Mr. Kapur's report, Mr. Ferrigno started with three closely defined scenarios, expanded them to five, and was then directed to pursue only two in his June report. It is noteworthy that the first of Mr. Ferrigno's two later scenarios is clearly inappropriate, as even at the reduced production rates adopted by Nova, E3 had repeatedly produced more ethylene than Nova had directed Mr. Ferrigno to assume it was capable of producing.

[976] Mr. Ferrigno was left with a single directed capacity scenario based on four rate trials and two higher production periods. He modelled this data on a capacity spread sheet and made certain calculations from it. It became apparent on cross-examination that Mr. Ferrigno chose his data selectively and inconsistently, and not always as represented in his written report.

[977] He described his work as undertaking some analysis, taking some figures and inputting them into the Schedule E methodology. He admitted during the qualification stage that it was not intended that at trial he would testify as to any other independent calculation of the productive capability of E3.

[978] As is clear from his testimony, he relied on the evidence of actual production to give his opinion, rather than what E3 was capable of producing. For all these reasons, I do not accept Mr. Ferrigno's opinion.

c) Mitigation

[979] In ESI's opinion, Dow had the following mitigation strategies at its disposal that it did not use:

- a) using ethane sold to others and increasing ethane extraction at straddle plants (as defined in Nova's counterclaim) to maximize the E1 Toll and selling additional ethane production over and above the E1 Toll requirement to the Pool;
- b) allowing Nova to mix propane into the ethane feed at E3;
- c) operating its LHC-1 facility at lower than maximum conversion to increase ethylene production; and
- d) shifting polyethylene production across North American to Gulf Coast assets owned by TDCC.

[980] Mr. Mikulka reported that he had seen no evidence that the Dow plaintiffs had not explored reasonably available mitigation methods. He criticizes ESI for making no detailed cost-benefit analysis of each of the suggested additional mitigation strategies.

[981] With respect to the first suggestion, using surplus ethane to maximize the E1 Toll, Mr. Mikulka explains that [REDACTED]

[REDACTED] Some of the ethane characterized by ESI as surplus ethane was used to fulfill existing contractual commitments. Other "surplus ethane" was used, as pipeline buffer for ethylene shipments and in balancing transactions. A small amount was used in contracts with "flooders", although not after 2006.

[982] With respect to allowing Nova to mix propane into the ethane feed at E3, Mr. Mikulka noted that ESI failed to consider the fact that Shell also initially decline to participate in propane cracking at Joffre, and that, since 2009, Nova has not cracked propane for its own polyethylene production. Nova could not confirm whether it always earned a positive margin after it cracked propane to make ethylene.

[983] The suggestion that Dow should run its LHC-1 facility at lower than maximum conversion fails to take into account that Dow Canada ran LHC-1 at maximum rates. Thus, lower conversion would result in less ethylene being produced. [REDACTED]

[984] With respect to shifting polyethylene production across North America assets, the Dow lay witnesses were clear that this was not feasible to any extent beyond what had been done.

D. Conclusion on Expert Opinions

[985] For the reasons set out previously, I accept Mr. Kapur's opinion with respect to productive capacity and prefer his conclusions to those of ESI. I accept that Nova's reaction and resolution time with respect to mechanical issues that could lead to constraints was slower than it should have been, given the Operator's duty to conduct operations with the objective of maximizing production. Despite this, I find that the fouling issue and the burner issues were more serious than normal, expected maintenance issues. However, determining how long it should have taken to resolve these issues in a diligent and prioritized way is a speculative exercise. I am persuaded that Mr. Mikulka's conservative method of determining damages by taking into account actual down time of E3 more than compensates for this issue.

[986] I accept Mr. Mikulka's opinion with respect to the calculation of damages in preference to that of Mr. Williams.

E. Nova Defences to Damages Claims

1. Exclusion of Liability under Contract

[987] Section 14.1 of the OSA (the Operator Clause), provides that the Operator shall have no liability for damages incurred or suffered by either of the Co-owners, including:

- a) for breach of contract, "including ... breach of the Operator's obligations pursuant to [the OSA,] which ... includes any breach depriving either of the Co-Owners of all or substantially all of the benefit for which it contracted";
- b) for torts of any nature ... "committed by the Operator ... or any person for whom the Operator may be responsible for any reason whatever relating in any way whatsoever to the Operator's involvement as operator in the Plant ...
- c) except when such damages result or arise from the Operator's "Gross Negligence" or "Wilful Misconduct;" and
- d) even if the Operator has been found to have acted within the definitions of Gross Negligence or Wilful Misconduct, the Operator shall not be liable for Excluded Damages.

[988] Thus, the Operator cannot be liable for any breaches of the OSA or torts unless it has acted with Gross Negligence or Wilful Misconduct, and then only if the damages are not Excluded Damages.

[989] The views of the parties diverge with respect to the meaning of Excluded Damages. “Excluded Damages” are defined in the OSA as (i) “indirect or consequential damages (including without limitation loss of profits and damages arising from loss of production) ... and (ii) “loss of or damage to the Plant or the Products”.

[990] Section 5.01 of the COA (the Co-owner Clause) provides that no Co-owner shall be liable to the other Co-owner for any Excluded Damages as a result of the joint ownership or use of E3. “Excluded Damages” is defined in the same way as in the OSA.

[991] Nova submits that the “plain meaning” of the definition of Excluded Damages is that lost profits and lost production are to be classified as indirect or consequential damages and barred from recovery. This would mean that the Operator would never be liable for lost profits or lost production, even if it has acted with Gross Negligence or Wilful Misconduct.

[992] Nova submits that section 14.1 of the OSA affords the Operator complete immunity from claims for damages from the Co-owners, no matter how those damages arose. This interpretation requires an acceptance that the parties intended to define all and any lost profits or lost production as indirect or consequential damages because the definition of Excluded Damages includes a reference to lost profits or lost production after referring to indirect or consequential damages. The alternate interpretation is that the reference to “loss profits and damages arising from loss of production” is an example of a particular kind of indirect or consequential damage, and loss profits and damages arising from loss of production that are direct damages are not excluded.

[993] There are four parts to Dow’s argument:

- a) the damages suffered by the Dow plaintiffs are direct, not consequential. On any reasonable interpretation, they do not fall into “loss or damage to the Plant or the Products;”
- b) Nova cannot meet the important qualifying language in the Co-owner Clause that the damage was suffered as a result of the joint ownership and usage of E3;
- c) Nova never acted as an independent Operator and cannot rely on the Operator Clause now when it seeks to limit its liability; and
- d) in the alternative, the limitation in the OSA with respect to the Operator does not extend to Gross Negligence or Wilful Misconduct. Dow submits that Nova’s breach of the contracts constitutes Wilful Misconduct, or, at best, Gross Negligence.

a) Direct or Consequential

[994] Exclusion clauses are subject to the key principle of contractual interpretation that the words are not to be read in isolation, but considered in harmony with the rest of the contract and in light of its purpose and commercial context: *Tercon Contractors* at para 64.

[995] Limitation of liability clauses are subject to special rules of construction. The clause must be expressed clearly and it will be “limited in its effect to the narrow meaning of the words employed”. It must cover the exact circumstances that give rise to the claim of exclusion, and it is generally construed against the party claiming the limitation: *Bauer v Bank of Montreal* (1980), 110 DLR (3d) 424 (SCC) at p 428.

[996] As noted in Sidnell, Kenny and Curcio-Lister, “Managing Consequential Damages in Contracts: Drafting an Enforceable Exclusion Clause” (presented at the CBA National Construction Law Conference, Whistler, BC (May 12, 2006) at p 41, “the degree of strictness appropriate to be applied to [the construction of exclusion clauses] may properly depend upon the extent to which they involve departure from the implied obligations”, citing Lord Diplock in *Photo Production v Securicor Ltd*, [1980] 1 All ER 556 (HL) at 850E.

[997] Dow submits that, before it can be determined whether damages claimed fall within a limitation of liability clause, the nature of such damages must be determined. It relies on the seminal case of *Hadley v Baxendale*, [1843-60] All ER Rep 461 (ExCt) as a starting point in the determination of the meaning of consequential damages.

[998] As further noted in Sidnell, *Hadley v Baxendale* sets out two rules:

- a) direct damages, being damages that arise naturally which every plaintiff in a similar situation will suffer, which should “fairly and reasonably be considered as either arising naturally, ie, according to the usual course of things, from such breach of contract itself, or such as may reasonably be supposed to have been in contemplation of both parties at the time they made the contract as the probable result of its breach, are recoverable; and
- b) if special circumstances have been communicated to the party in breach, then the potential of those losses may be reasonably supposed to have been in the contemplation of both parties at the time they made the contract and are therefore available.

[999] *Hadley v Baxendale* deals with the issue of remoteness in relation to a claim for damages. The case was reviewed and modified in *Victoria Laundry (Windsor) Ltd v Newman Industries Ltd*, [1949] 2 KB 528 (CA), making the rules subject to an objective test, and further refined in *The Heron II; C Czarnikow, Ltd v Koufos*, [1966] 2 All ER 593 (CA), aff’d [1967] 3 All ER 686 (HL), where the Court indicated two rules do not exist, but two different instances of the application of a single rule. The Supreme Court endorsed *Hadley v Baxendale* as the proper test by which remoteness of damages should be measured in *BDC Ltd v Hofstrand Farms Ltd*, [1986] 1 SCR 228 at para 25 and in *MJB Enterprises Ltd v Defence Construction (1951) Ltd*, [1999] 1 SCR 619 at para 57.

[1000] As further noted in Sidnell at page 40, more recent UK cases have characterized loss of profit as falling within the first rule of *Hadley v Baxendale* because such loss is characterized as a naturally occurring direct loss. The comments of the Court in *Victoria Laundry* on a review of authorities dealing with damages for loss of profits are helpful:

The authorities on recovery of loss of profits as a head of damage are not easy to reconcile. At one end of the scale stand cases where there has been non-delivery or delayed delivery of what is on the face of it obviously a profit-earning chattel, for instance, a merchant or passenger ship ... or some essential part of such a ship, for instance a propeller ... or engines. In such cases loss of profit has rarely been refused. A second and intermediate class of case in which loss of profit has often been awarded is where ordinary mercantile goods have been sold to a merchant with knowledge by the vendor that the purchaser wanted them for resale, at all events, where there was no market in which the purchaser could buy

similar goods against the contract on the seller's default ... At the other end of the scale are cases where the defendant is not a vendor of the goods, but a carrier: see, for instance *Hadley v Baxendale* ... In such cases the courts have been slow to allow loss of profit as an item of damage. This was not, it would seem, because a different principle applies in such cases, but because the application of the same principle leads to different results. A carrier commonly knows less than a seller about the purposes for which the buyer or consignee needs the goods or about other "special circumstances" which may cause exceptional loss if due delivery is withheld. (pages 1000H to 1001B) [emphasis added].

[1001] The UK courts have subsequently considered the meaning of consequential damages in a series of decisions dealing with exclusion clauses in contracts.

[1002] In *Croudace Construction Ltd v Cawoods Concrete Products Ltd*, [1978] 2 Lloyd's Rep 55 (CA), the trial Court commented that the word "consequential" may have different meanings according to the context in which it is used, and an exclusion clause that referred to consequential damages did not exclude damages that were essentially loss of profit. The Court of Appeal agreed.

[1003] In *British Sugar Plc v NEI Power Projects Ltd*, [1997] EWJ No 1127, the contract included a clause limiting liability for consequential loss to the value of the contracts. The appellants argued that "any reasonable businessman would understand that, for example, loss of profits would be "consequential", at para 9. They relied on comments made in MacGregor on Damages (15th Edition) at paras 25 to 27 as follows:

In a contract the normal loss can generally be stated as the market value of the property, money or services that the Plaintiff should have received under the contract less either the market value of what he does receive or the market value of what he would have transferred but for the breach. Consequential losses are anything beyond this normal measure, such as profits lost or expenses incurred through the breach, and recoverable if not too remote.

[1004] The trial Judge rejected this submission, and the Court of Appeal agreed that he was correct in doing so, because "on the true construction of this contract, the parties simply agreed to limit the defendant's liability for loss and damage not directly and naturally resulting from the defendants' breach of contract."

[1005] In *Hotel Services Ltd v Hilton International Hotels (UK) Ltd*, [2000] 1 All ER 750 (Comm) (CA), the Court again addressed the comments made in MacGegor on Damages, as follows:

As an instance of normal damages [McGregor] gives a net market value of a benefit lost by the breach. Then ... "Consequential losses are anything beyond this normal measure, such as profits lost or expenses incurred through the breach, and are recoverable if not too remote." The distinction is not the same as that between the first and second rules in *Hadley v Baxendale*: a consequential loss may well be within the first rule.

If consequential losses include profits lost or expenses incurred through breach, it is unsurprising that such loss may come within the first rule in *Hadley Baxendale*. What we find more problematical than the conclusion is the premise that such

losses cannot be normal losses in the author's own sense of losses which every plaintiff in a like situation will suffer. Whether they do, it seems to us, must depend on the facts and to this extent [counsel for Hotel Services] is right to submit that the question is fact-sensitive (paras 9 -10).

[1006] The Court then referred to a note added by Mr. McGregor in a supplement to his text that indicates that the courts may be justified in construing the term "consequential" more narrowly where exclusion clauses are concerned, and that "ideally" consequential loss should be constructed narrowly where exclusion clauses are concerned, and widely in all other cases.

[1007] The Court noted:

We may perhaps add that we are not convinced by the passage in which Mr. McGregor goes on to argue that those authorities which appear to confine the meaning of consequential loss to the second limb of *Hadley v Baxendale* lack logic. Not only do we have some difficulty in accepting the reasoning (namely that it is contradictory first to communicate special circumstances and then to accept an exclusion of liability for damage arising out of them: all worthwhile exclusions are contradictory); we find difficulty in allowing a substituted meaning of "consequential", even if it is analytically more satisfactory, to colour decisions based on a different and usage-based meaning.

It may be thought, however, that the source of the difficulty is not the need to find a differential rule for the ascertainment of liability and the construction of exclusion clauses respectively but the underlying distribution of losses between the normal and the consequential. One would like to say simply that all consequential losses are recoverable provided they were either objectively or subjectively foreseeable by the parties; but to do this is to restore to the word "consequential" the natural meaning of which commercial and legal usage in exclusion clauses has long since robbed it. Instead one has to go back to the language of the clause in its documentary and factual context and try to see what it means at paras 10 – 11 [emphasis added].

[1008] The Court then commented that the *Hadley v Baxendale* rule is not "dichotomous but a continuous classification, bringing into the region of recoverability all loss which the parties must in the nature of things or for known reasons have anticipated":

It is the framing of exclusion clauses which has made it necessary to divide up its elements in order to keep the contractual effects within acceptable bounds. Thus in *Millar's Machinery Co Ltd v David Way and Son* (1935) 40 Com. Cas. 204 a clause excluding "responsibility for consequential damages" was read down by this court so as not to exclude liability for damage occurring naturally or directly. In an inadequately reported decision upholding *Branson J*, *Maugham LJ* is recorded in indirect speech as having held that "the word 'consequential' had come to mean 'not direct'," and *Roche LJ* as having applied this reading to the contract.

[1009] The Court addressed the argument that consequential loss would include loss of profits to a reasonable businessman by quoting *Waller LJ* in *Croudace Construction* as follows:

... once a phrase has been authoritatively construed by a court in a very similar context to that which exists in the case in point, it seems to me that a reasonable businessman must more naturally be taken to be having the intention that the phrase should bear the same meaning as in the case in point: at para 17.

[1010] In conclusion, the Court found that an exclusion clause referring to indirect or consequential loss did not exclude a claim for damages that included loss of profit, “read in its documentary and commercial context.” Leave to appeal *Hotel Services* to the House of Lords was refused.

[1011] In *Ferryways NV v Associated British Ports*, 2008 WL 370997, the exclusion clause was essentially similar to those in this case, excluding liability for damages “of an indirect or consequential nature including without limitation... loss or deferment of profit... loss or deferment of production or increased costs of production.” The Court, relying on the previously noted line of cases, indicated that the question was whether the language of the exclusion clause clearly indicated “that the parties were giving their own definition of indirect or consequential losses so as to include the specified losses even if they are the direct and natural result of the breach in question.” The Court found that the words of the exclusion clause did not provide such clarity, that the parties were “merely identifying the types of losses... which can fall within the exception clause so long as the losses meet the requirement that they are “of an indirect or consequential nature”: at para 84.

[1012] Nova submits that *Hadley v Baxendale* has only been relied upon in Canada for its comments regarding remoteness of damages, and that the line of cases culminating in *Hotel Services* and *Ferryways* is contrary to Canada law. It does so on the basis of three authorities:

- a) the comments previously noted in *McGregor on Damages*;
- b) the Australian case of *Environmental Systems v Peerless Holdings* [2008] VSCA 26; and
- c) the Canadian case of *Agfaphoto Canada Inc v Overwaitea Food Group Ltd*, 2008 BCSC 1287.

[1013] As noted previously, the comments made in *McGregor on Damages* are problematic, particularly as the author now appears to be suggesting that there should be a different interpretation of consequential where an exclusion clause is being interpreted rather than the one that is applied more generally. I agree with the court in *Hotel Services* that the comments made in *McGregor* are unconvincing in their premise and the reasoning that would accept different meanings of consequential depending on usage in a particular contract is an awkward method of resolving a problem that would not, in any event, aid Nova in these circumstances.

[1014] There is no doubt that the Australian Court of Appeal in *Environmental Systems* declined to follow the UK line of cases, relying heavily on *McGregor on Damages*. The case involved a written proposal to supply equipment that referred to “General Contractual Conditions.” These conditions included the reference that “[a]s a matter of policy, Environmental Systems does not accept liquidated damages or consequential loss”. Nettle, JC, in considering claims for the cost of labour incurred in making the equipment functional and the additional costs of gas that would be required in the future as a result of the equipment failing to be functional, commented that, in his view, “reasonable business persons would naturally conceive of “consequential loss” in contract as everything beyond the normal measure of damages, such as profits lost or expenses

incurred through breach.” He found that, in the context of the case, it was more likely that the parties intended the expression “to have its ordinary and natural meaning.”

[1015] Finally, in the British Columbia Supreme Court decision in *Agfaphoto*, Holmes, J considered a limitation of liability clause that provided that a seller of photofinishing equipment would not be liable for “loss of profit, indirect, special, punitive or consequential damages: at para 40.”

[1016] The Court found that the reference to “loss of profit” determined the issue, but in obiter commented that the distinction between direct damages and indirect or consequential damages as described in the *Hotel Services* line of cases departs from the established Canadian law of contract damages and does not appear to have been adopted in any Canadian case authorities. She cites no authority for this other than the ubiquitous comments in *McGregor on Damages* and a quote from John Swan, *Canadian Contract Law*, 1st ed (Toronto: LexisNexis 2006) at 296-297, that merely says that:

In a contract of sale, the seller may agree to be liable for “direct” damages but not for “indirect” or “consequential” damages. It is convenient to adopt a usage that corresponds to that frequently used by solicitors and by the courts... The terms “consequential”, “incidental” and “indirect” damages refer to damages that are in addition to or that arise as a consequence of the direct damages of the promisor’s breach.

[1017] However, contrary to the comment in *Agfaphoto*, the reasoning set out in the *Hotel Services* line of cases has been applied in Canada. The Ontario Court of Appeal in *Cathcart Inspection Services Ltd v Purolator Courier Ltd* (1982), 139 DLR (3d) 371 (Ont CA) affirming (1981), 128 DLR 93d) 227 (Ont HC) followed the reasoning in *Hadley v Baxendale*. *The Heron II* and *Hofstrand Farms* in finding a limitation of liability clause that excluded liability for “special, consequential or other damages” to be ineffective to block liability for damages for non-delivery based on the loss of profit that would have been obtained on an undelivered tender. While this case pre-dated the *Hotel Services* lines of cases, it appears to have followed similar reasoning.

[1018] In *Syncrude Canada Ltd v Babcock & Wilcox Canada Ltd*.1997 ABCA 179, the Court considered a clause limiting liability for “loss of anticipated profits ... or other consequential loss or damage of any nature ...” The claim was for damages incurred in strengthening ineffective boilers and for fuel unnecessarily wasted.

[1019] The appellants argued that “anything beyond the direct cost of strengthening [the boilers] was “consequential” and excluded, but the Court disagreed, stating “a usual measure of direct damages for supply of defective work or materials is the difference in value between what was contracted for and what was delivered. None of that is consequential damages”: para 50.

[1020] While this case also pre-dated *Hotel Services*, and does not deal with the issue of whether loss of profits is consequential damages, as loss of profits was not in issue, the case is authority for the proposition that a clause excluding consequential damages is too narrow to exclude economic losses that are direct damages, “the difference in value between what was contracted for and what was delivered,” consistent with the UK line of cases.

[1021] Nova also submits that the House of Lords in the case of *Caledonia North Sea Limited v British Telecommunications PLC*, [2002] UKHL 4 has cast doubt on whether the *Hotel Services*

line of cases will continue to be followed in the UK. This is an overstatement. *Caledonia North Sea* involved fatal injury claims by the victims of an explosion of an offshore drilling rig. The claims were brought in Scotland and settled by the operator of the rig and its insurer.

[1022] When the operator called upon the contract employers of the victims to reimburse it pursuant to indemnity clauses in the contracts between the employees and the operator, the contractors refused to do so. One issue in the litigation was that the contracts included a limitation of liability clause for indirect or consequential losses, including loss of profits, and the contractors argued that the amount of the settlement that was in excess of Scottish law was excluded by the clause. The House of Lords held that the exclusion clauses did not apply to the death claims. However, Lord Hoffman, one of the five judges, while finding that the *Hotel Services* line of cases had no application to the case, commented that he wished to reserve on the question of whether, in the context of the contracts in the *Hotel Services* and similar cases, the construction adopted by the Court of Appeal was correct: at para 100.

[1023] Nova suggests from this that it is questionable whether the *Hotel Services* line of cases will remain the law in the UK, but I cannot draw that inference from the comment. It is true that the House of Lords has not considered the question, but I note that leave to appeal *Hotel Services* to the House of Lords was refused, and it remains binding law in the UK.

[1024] I agree with the comments of the UK Court of Appeal in *Victoria Laundry, Croudace Construction* and *Hotel Services* that the meaning of consequential losses is dependent upon the words of the exclusion clause, the facts of the case and the language of the exclusion clause in its “documentary and factual context.” As noted in *Hotel Services* and in *Victoria Laundry*, the rule in *Hadley v Baxendale* is not dichotomous, but a spectrum or scale. In some contexts, such as a contract for the construction of a project, loss of profits may be consequential. In others involving the provision of a saleable product, a loss of profit is a direct result of a breach of a contractual duty to provide the product.

[1025] Turning first to the language of the exclusion clause, it does not, as submitted by Nova, define loss of profits and loss of production as consequential damages. As has been noted in other authorities, this type of damage can be either direct or consequential. In the plain meaning of this exclusion clause, indirect or consequential damages are excluded, and loss of profits and loss of production are described parenthetically as an example or a subset of this type of damage, not as a definition.

[1026] The provisions do not exclude direct damages of the same nature, interpreted grammatically and in accordance with plain language. As in *Ferryways*, the parties were merely identifying the type of losses that could fall with the exclusion clause as long as they meet the requirement of being indirect or consequential.

[1027] In this case, it must surely have been foreseen by the parties that a failure to provide ethylene would result in a Co-owner suffering loss of profit. Nova, despite arguing otherwise, concedes this in effect when it acknowledges in the context of the purpose of the joint venture that, as a result of an under-delivery of ethylene to UCC, UCC would need to acquire ethylene from higher-cost sources and might suffer lost sales of ethylene. The foreseeability of loss of profits or loss of production is not limited by UCC’s specific circumstances at the time the joint venture was formed. This was a potentially a very long-term arrangement, and a reasonable person would foresee that the under-delivery of a saleable product could result in the loss of

profit related to the amount of under-delivery, and that the amount of lost profit may vary from time to time with the specific Co-owner's circumstances.

[1028] It is also relevant that Nova, being in the same business as UCC and Dow, would be well-aware of the potential damage arising from a failure to deliver or an under-delivery.

[1029] I find that the loss of profit and loss of production damages claimed by Dow with respect to both the allocation claim and the optimization claim arise naturally from Nova's breach of contract, and, in the case of the allocation claim, conversion, and are direct damages. The limitation of liability provisions in the OSA and COA exclude loss of profits and damages arising in the context of indirect or consequential damages and do not clearly and unambiguously preclude liability for any kind of loss of profit. It is only such loss arising from consequential or indirect damage under the *Hadley v Baxendale* rule as it has evolved, claims that would otherwise only be available upon the disclosure of special circumstances. Nova has not satisfied the burden of establishing that any of the damages claimed fall within the exclusion clauses in the joint venture agreements.

[1030] Nova submits that an interpretation that precludes the limitation of liability clause from applying to lost profits and lost production when they are direct damages is commercially unreasonable. Nova points out that the only payment the Operator obtains from each Co-owner is a "nominal" management fee of approximately \$2.7 million per year. It submits that this "negligible" management fee is in no way proportionate to the risks the Operator would be exposed to if liability for lost profits and loss of production was not entirely foreclosed.

[1031] This submission is not persuasive in context. The only risk that the Operator bears for liability for lost profits and loss of production is if it has been found to have engaged in conduct that falls within the definition of Gross Negligence or Willful Misconduct. The carefully drafted limitation of liability clauses exclude liability in any other circumstances. In addition, Nova recovers its administration costs, thus spreading its Joffre administration costs over three plants rather than two.

[1032] As noted by Lord Diplock in *Photo Production*, the degree of strictness of interpretation of such a clause varies directly with the extent to which the clause purports to limit obligations. It does not make commercial sense that the parties would agree to hollow-out the obligations of the Operator entirely, even if the Operator's conduct crosses the line into Gross Negligence or Willful Misconduct.

[1033] It is commercially absurd to interpret the exclusion clauses the way that Nova submits. UCC relinquished control of operations of an extremely valid asset, crucial to many other aspects of its business, to a competitor. That it would then agree to exclude the Operator from liability for loss of profit even if the Operator was guilty of Gross Negligence or Willful Misconduct, while setting out the Operator's duties in great detail, does not make sense commercially. Any attempt to do so must surely be set out in clear language.

[1034] Nova argues that Dow had other remedies if the Operator was guilty of misconduct as alleged, including the portions of its claim that Nova concedes do not fall within Excluded Damages: the ability to remove Nova as Operator if it has been found to have acted with Gross Negligence or Willful Misconduct, and the ability to require Nova to purchase Dow's interest in E3 at an appraised price plus a premium. Such other remedies, however, do not foreclose a claim for damages that does not fall within the exclusion clauses.

[1035] Nova also submits that if Dow's interpretation is accepted and lost profits and damages arising from lost production are considered to be direct damages, the reference to those types of damages under the heading of consequential damages is meaningless. It asks the question "What other lost profits or loss of production could have been contemplated by this provision?" The answer is lost profit or loss of production arising from circumstances that were not objectively or subjectively foreseeable by the parties. Some of those circumstances may be covered by the *force majeure* provision, but that does not make this provision meaningless.

[1036] Nova submits that the reasoning in *Environmental Systems* and in the comments in *McGregor on Damages* are persuasive: that businessmen consider lost profits and loss of production to be "consequential" damages in the broader, more colloquial meaning of the word. There is no evidence that this was a consideration in the formation of this joint venture. These contracts are not simple, "back of the envelope" contracts: they are complex and carefully drafted, clearly with legal assistance. As noted in *Hotel Services*, the term "consequential damages" in the legal sense has long departed from its more colloquial meaning, and sophisticated parties such as UCC and Nova must have had regard to the special meaning of the term arising from years of jurisprudence.

[1037] As Cromwell, J. commented in *Tercon*, sophisticated parties are able to draft clear exclusion and limitation clauses when they are minded to do so: at para 73.

b) Loss or Damage to E3

[1038] With respect to the second category of Excluded Damages, damages arising from "loss of or damage to the Plant or Products", Dow says that its claim does not arise from loss or damage to E3 or its products, but from the manner in which Nova chose to run the Plant. It submits that Nova's conduct was a course of deliberate decisions either not to make ethylene, or to take some of Dow's.

[1039] A common sense reading of the plain language of the second part of the Excluded Damages definition leads to the interpretation that it applies to the destruction of or damage to something tangible. These words are not present in the definition, however, and the literal meaning of loss of products arguably could include the allocation claim. However, in context, a "loss of Products" does not apply to a deliberate conversion of them, such as occurred as a result of the ethane allocation, or failure to produce them is breach of a contractual obligation.

c) Nova as Operator

[1040] Nova may only claim the protection of section 14.1 of the OSA if it was responsible for the loss acting as Operator.

[1041] Dow submits that Nova as Operator cannot take advantage of the clause because there was, in reality, no independent Operator at all. It submits that it is clear from the evidence that Nova put no safeguards in place, took no precautions, and did not appoint anyone to ensure that Dow's interests as principal and Nova's obligations as agent were considered independently of Nova's commercial interests.

[1042] Nova conceded that there was no formally separate, established Operator within Nova and that the EBT determined the amount of ethylene Nova and Dow received under the allocation protocol.

[1043] However, Nova submits that the OSA does not require the establishment of a separate and independent team to act as Operator. It says that the Operator comprises all individuals at the Joffre site and in Calgary who provide the services necessary for E3's operations. Nova submits that during the claim period, Mr. Tulk specifically, followed by Mr. Broenink, were acting in the capacity of the Operator. Mr. Wilke and Mr. Wade also referred to themselves as the Operator from time to time

[1044] Mr. Tulk testified that he considered himself the "Operator" under the OSA from the late 1990's until he left Nova. Thus, he responded to Mr. Flint's letter of May 11, 2009 as "Operator". He testified that he understood that Nova, as Operator, was the agent of both Co-owners of E3, and that the Operator had some obligation to act independently of Nova's commercial interests as a Co-owner. As noted in Appendix A, Mr. Tulk was also the Manager of Nova's Western Feedstock business, reporting to Mr. Flint, from the fall of 1998 until 2003. After that, he became Director, Strategic Development until 2006 when he was promoted to Vice President of National Gas Liquids, responsible for the operational side of feedstock supply to Joffre and to Nova's Ontario asset. He retired from Nova in August, 2009.

[1045] He was a member of the EBT, and conceded that between 1998 and 2009, he had been involved in, if not all, many of the key strategic discussions and negotiations at Nova that involved E3, including not just feedstock issues but ethylene-related discussions.

[1046] As noted by Mr. Tulk, it was the EBT's job to keep abreast of the amounts of ethylene Nova needed, and to serve Nova's commercial interests without regard to those of Dow.

[1047] He also conceded that he was a key member of the team formed within Nova in 2000 to consider the implications of the UCC/Dow merger on Joffre operations, and to come up with a game plan for how Nova could deal with Dow post-merger, including the objectives of minimizing ethylene to Dow and forcing Dow out of E3.

[1048] Mr. Tulk admitted that he was part of the small group within Nova that developed ethane allocation in the last quarter of 2000 and the first part of 2001.

[1049] It is clear from documentation in evidence that Mr. Tulk sought to exert leverage on Dow to support the Casper ethane supply project, devising a strategy" to link production of the greater volumes of E3 ethylene that Dow wanted to its participation in the project on Nova's terms. When Nova formed its litigation team, Mr. Tulk became a member until he left the company in 2009. He was involved in the preparation and issuance of "default notices" by Nova as Co-owner to Dow, to enforce what he regarded as rights of Nova as an E3 Co-owner.

[1050] From 2001 to 2004, Dow sent its ethylene nominations to Mr. Broenink, and from 2005 onwards to Mr. Baker. Nova says that, in these communications, Messrs. Broenink and Baker represented the Operator for the purpose of planning "the production of Ethylene and Other Products" at the Plant.

[1051] However, Mr. Broenink and Mr. Baker represented themselves as the "Business Operations Co-ordinator Ethylene" or "Business Integration Manager/Specialist; Ethylene" of Nova. Thus the Nova employees who Nova says were designated as Operator and who also decided and directed how E3 was to be seen were the same employees whose job it was to run Nova's ethylene business and to generate profits for Nova. It was clear from Mr. Tulk and Mr. Broenink's testimonies that they were not disinterested or impartial between the Co-owners, but promoted Nova's interests first.

[1052] Mr. Broenink, too, was a member of the Nova merger team that strategized in 2000 and 2001 about how to “minimize ethylene to Dow” and “back Dow out of E3”. He was the originator of the “ethane allocation” scheme. In the formulation of that scheme, he considered it to be his responsibility to produce the best commercial result possible for Nova. He was a key member of the EBT and, in that capacity was responsible for assessing Nova’s ethylene needs, and then directing production rates of E3. He was centrally involved in the issuance of Nova’s Co-owner nominations and in deciding when Nova would, in its nominations, notify Dow that it was imposing “ethane allocation”. Like Mr. Tulk, when Nova formed its litigation team, Mr. Broenink became as member.

[1053] Mr. Wade was the E3 plant leader between 1998 and 2006. During part of that time, he acted as chair of the E3 Management Committee. His practice, later adopted by Mr. Wilke and then by Mr. Van Hemmen, was not, as he initially testified in direct evidence, to send draft minutes to the E3 Management Committee members for their comments. Instead, he circulated them among Nova’s personnel for editing before ever sending drafts to the Dow members of the committee. The minutes sometimes contained discussions of contentious issues about which Nova and Dow were on different sides. Mr. Wade, one of the purported independent Operators, considered himself to be on the Nova side.

[1054] Mr. Wilke succeeded in Mr. Wade as chair of the E3 Management Committee in late 2006. He adopted Mr. Wade’s practice of circulating draft minutes among Nova’s commercial personnel before sending them to Dow. He convened Nova-only meetings in advance of the E3 Management Committee meetings. He joined the Nova litigation team.

[1055] Nova submits that Dow was aware that parties that filled the role of Operator were also employees of Nova, “and as such, the scope of their employment encompassed matters not related to E3.” It submits that Dow should have acted through the E3 Management Committee if it was concerned about this. However, the issue is not whether Nova employees could also act as Operator, but how they acted when they assumed that role.

[1056] The context of the attitude of Nova towards Dow at the time was highly competitive. Nova was concerned and distressed about Dow’s involvement in E3. Nova created the JPPT expressly to oversee and manage the operations of the three Joffre plants so as to best optimize Nova profit. Dow was not invited to JPPT meetings, or sent minutes, or even told that JPPT existed. There was no one to speak up for Dow at these meetings.

[1057] When Dow sued Nova in this action in 2006, and Nova formed its “litigation team”, it populated it with employees who continued to be responsible for decisions about how E3 would be run and how much ethylene Nova would deliver to Dow – Ms. Apuzzo, and Messrs. Broenink, Wilke, Tulk, Baker, Flint and Wong.

[1058] Mr. Van Hemmen recognized that the Operator was not entitled to favour one Co-owner over the other, and that Nova as Operator was obligated to give precisely the same information to both Co-owners on whatever it did in discharging Operator functions.

[1059] Conscious of a conflict between the terms of the OSA and the “ethane allocation” scheme, he sought legal advice from internal counsel. Such advice was not shared with Dow nor produced in this action. Knowing that care should be taken to separate Nova’s role as Co-owner from its role as Operator, Mr. Van Hemmen instead met with Nova’s commercial personnel, including at least one member of the litigation team, to devise a strategy for communicating with

Dow. On succeeding to Mr. Wilke's roles of chairing E3 Management Committee meetings and managing the preparation and distribution of minutes, he continued the practice of circulating draft minutes within Nova for input, including to members of Nova's litigation team, before showing them to Dow, and he also continued the further practice of having internal meetings with Nova's E3 Management Committee representatives before the E3 Management Committee meetings. Dow was not informed of this. Mr. Van Hemmen testified at trial that E3 historian data should be available to both Co-owners, but, despite Dow's efforts to obtain this data, it was not shared with Dow. Dow submits, and the evidence supports this submission, that Mr. Van Hemmen introduced a policy of providing less information than before to Dow in the E3 daily reports. Conscious of ongoing litigation, he instructed a Nova employee to adjust E3's capacity figures downward for the 2011 Solomon submission.

[1060] As was clear from the evidence, Nova rarely purported to speak as "Operator".

[1061] The evidence disclosed three letters written by Nova as the Operator; one from Mr. Tulk, the other two from Mr. Broenink after this action was commenced.

[1062] "Operations" is defined as the work and activities performed by the Operator in respect of E3 pursuant to the OSA or in accordance with the direction of the E3 Management Committee. It includes work and activities related to start-up, operation, administration, maintenance, expansion and modification of E3, the production of ethylene and other products, the provision of services through the Infrastructure or otherwise and the windup of the Plant. It does not include the operation of the Infrastructure.

[1063] The "Operator" is defined as the entity appointed as such "in its capacity as operator of E3 and not in any other capacity". The Operator can be an individual, firm, trust, partnership, body corporate, government, government agency or other legal entity.

[1064] Under Section 4.1, Nova was appointed as Operator, with power and authority to act "as [the Co-owner's] sole and exclusive agent" to carry out its duties under the OAS "as the agent of the Co-owner, in accordance with, and subject to, the provisions of the OAS and the direction of the Management Committee."

[1065] Under section 4.3, the Operator has, among other duties.

- a) to conduct the Operations with the objective that E3, subject to the direction of the E3 Management Committee, will optimize product production and achieve first decile performance when compared to other ethylene plants in North America; and
- b) subject to sections 4.5 and 4.6, to provide the Services.

[1066] The Operator is to conduct the operations in accordance with the OSA and to perform its duties under section 4.3 "in a manner as would a prudent operator of a like petrochemical production facility". The Operator will not "cease or curtail production at E3" except in emergencies and subject to *force majeure*: section 4.4

[1067] There are indications in the evidence that Dow knew or should have known that Nova had not set up a truly independent operatorship, from E3 management committee meeting to letters and emails signed by Mr. Broenink. However, Dow does not submit that Nova had to establish a separate group to act as Operator, and the OSA does not require this. Dow does submit that some kind of process should have been set up to ensure that the Operator was able to fulfill its duty as agent of the Co-owners, and that Nova did nothing in that regard. I agree that

the evidence supports this submission, and that it establishes that Dow did, and could not, know how much partiality was being shown to Nova as Co-owner by Nova as Operator, or was aware of the extent of the misrepresentations and failures to be candid by the purported Operator. Therefore its acceptance of how Nova performed as Operator must be considered limited due to misconception.

[1068] The OSA clearly provides that Nova as Operator had contractual duties to the Co-owners. I am satisfied by the evidence that Nova failed to distinguish between the performance of such duties as Operator and its own commercial interests. If I am incorrect in my interpretation of the limitation of liability clauses, I would find that Nova cannot obtain the benefit of section 14.1 of the OSA because it was not acting as the Operator when it imposed ethane allocation and failed to optimize production.

[1069] I agree with Dow that much of the misconduct for which Dow sues is not “Operator” conduct. The Operator was supposed to secure Pool ethane for the Co-owners and to run E3, but there is no suggestion that the Operator ran E1 or E2. Nothing in OSA supports the notion that the Operator took Dow’s ethylene for itself in the capacity of Operator. When NOVA imposed “ethane allocation” it did so through its Co-owner nominations.

[1070] To the extent that Nova can be said to have acted as Operator, the directions of the Nova EBT with respect to ethane allocation and failure to produce to capacity resulted in Nova’s breach of Section 3.2(c) of the OSA, as this conduct caused Nova as Operator to be in breach of its duties.

d) Gross Negligence or Wilful Misconduct

[1071] Even if Nova was acting as Operator with respect to the breaches, and is entitled to rely on the limits of liability set out in section 14.1 of the OSA, the next issue is whether Nova acted within the definitions of Wilful Misconduct and/or Gross Negligence.

[1072] “Wilful Misconduct” is defined as “a breach of a material provision of [the OSA] which results from a deliberate action in violation of the terms of [the OSA] or from a failure to act in accordance with the terms of [the OSA]. It does not include an act or omission that was done in an emergency or in accordance with the unanimous approval of the E3 Management Committee, or with the express disclosure by the Operator and the concurrence (without express objection by either Co-owner) of the [E3] Management Committee” [emphasis added].

[1073] “Gross Negligence” is defined as conduct in respect of the Operations that is “a marked departure from the standard of conduct of a reasonable person acting in circumstances known or that ought to have been known at the time of the alleged misconduct, which constitutes, in effect, an utter disregard for harmful, foreseeable and avoidable consequences.”

[1074] It does not include an “act or omission of an employee, agent, consultant, contractor or representative of the Operator which constitutes or results from an error in judgment or an honest mistake”, unless such act or omission in context amounts to conduct of the Operator of the nature described above.

[1075] It does not include ordinary negligence, or an act or omission that was done with the unanimous approval of the E3 Management Committee or, “with the express disclosure by the Operator and the concurrence (without express objection by either Co-owner) of the [E3] Management Committee”.

[1076] I find from the evidence that Nova, to the extent that it acted as Operator, engaged in a deliberate and continuing course of conduct to favour the interests of Nova as Co-owner, both with respect to imposing ethane allocation and failing to operate E3 with the objective of optimizing production. This conduct both breached the terms of the OSA and constituted a failure to act in accordance with the terms of that agreement, in other words, with Wilful Misconduct.

[1077] I also find that, to the extent that Nova employees were acting as Operator when they misrepresented or failed to fully disclose the reality of ethane allocation, they were guilty of failing in their responsibilities of candour and disclosure as agent of the Co-owners, and are therefore guilty of Wilful Misconduct.

[1078] To the extent that Nova as Operator did not implement ethane allocation, or was not responsible for the failure of E3 to be run with the objective of optimizing production, its failure to act was a “marked departure from the standard of conduct of a reasonable operator and in utter disregard for the harmful, foreseeable and avoidable consequences to Dow, and thus it acted with Gross Negligence.

[1079] Turning first to the allocation claim, Nova submits that it cannot be considered to have acted either with Gross Negligence or in Wilful Misconduct with respect to ethane allocation because ethane allocation and the manner in which it ran E3 was a good faith attempt to deal with its ethane supply shortage in an even-handed and fair manner. It submits that the “Operator” did not believe that providing Dow with its EPP of E3’s production was in accordance with the OSA, as that “would have resulted in one co-owner absorbing 100% of the shortfall”. Mr. Broenink and Mr. Flint testified to this effect, but neither was convincing or credible. Far more credible was the evidence about Nova’s attempts to limit Dow’s share of E3’s production, from the early attempts to prevent Dow from being the successor to UCC’s joint venture interest to the attempts to obfuscate the real nature of ethane allocation, to convert part of Dow’s EPP of ethylene produced at E3 to Nova and to operate E3 only to the extent of its needs and to the prejudice of Dow.

[1080] It is improbable, and inconsistent with Mr. Broenink’s evidence of the creation of ethane allocation, and in the context of what was occurring at Nova at the time, that Nova as Operator was of the view ethane allocation had a basis in the contracts. It is improbable and inconsistent with Nova’s “wish list” of objectives with respect to Dow as its major competitor that Nova personnel had a credible belief that the OSA did not require the optimization of production from E3, that unilateral curtailment of production by the Operator was justified or that each Co-owner was not entitled to take its EPP of production.

[1081] Nova submits that the Operator had no choice but to conduct itself as it did, and that ethane allocation was a reasonable decision. This ignores the fact that there was always enough ethane to fill E3 to capacity, that Nova did not need to fill E1 and E2 to capacity to cover its internal and external demands, and in fact did not do so. Nova as Co-owner or Nova as Operator had a choice: to run E3 in accordance with the joint venture agreements. Instead, it ran E3 in accordance with its own commercial objectives.

[1082] Nova refers to its conduct during three different time periods in submitting that it did not act with Gross Negligence or in Wilful Misconduct:

- a) June 2001 to September 2001

[1083] Nova notes that there was an agreement with Dow to impose ethane allocations during this period. That is correct, and Dow is not claiming damages for this period of time. However, the agreement with Mr. Fergusson and Mr. Williams was reached on the basis of Nova's allegation of an ethane shortfall. Dow submits, and I accept, that the truth was that Nova had no need to put E1 back on-line, as its demands for ethylene could be fully met without doing so. At best, Mr. Broenink, if he was acting as Operator, acted with a reckless disregard for the truth, in the sole interests of Nova. As noted in Appendix A, the representations made to Mr. Fergusson and Mr. Williams, who were new to the situation, were not accurate, but the risk of having to ration ethane to E3 two months into a three month performance test coloured Dow's acceptance of what it was told was to be a temporary situation. Any suggestion that this was a good faith attempt to resolve a problem lacks credibility, particularly given Mr. Broenink's boast in Nova's June 4, 2001 internal newsletter about the result.

[1084] These representations were not errors in judgment or honest mistakes, but a deliberate strategy to further Nova's interests.

b) September 2001 to November 2004

[1085] Nova seeks to characterize its conduct during this period of time as either resulting from an honest mistake, or continuing ethane allocation in good faith, relying on the following submissions:

- a) the Operator continued to face the same ethane supply challenges. As I have found, there was always enough ethane to fill E3, and the supply challenges were based on a false representation of demand, an artificial construct and a lack of disclosure as to the actual operations at E3;
- b) Mr. Broenink advised Ms. Eastman that E1 resumed operations in September 2001 and continued to advise of ethane allocation through the monthly nomination procedure. Again, the evidence establishes that the real nature of ethane allocation was not disclosed, or at least was inadequately disclosed, and at an inappropriate level of Dow seniority. Mr. Broenink knew that ethane allocation, albeit in a different form, had only been approved by senior Dow personnel until E1 was back on line;
- c) ethane allocation was raised at the E3 Management Committee meetings of March 18, 2002, November 27, 2003, and July 14, 2004, as well as with Mr. Fergusson on July 11, 2002. However, at the March 18, 2002 meeting, Mr. Tulk reported, inaccurately, about the nature of ethane allocation. Mr. Tulk conceded that he never told Dow what amounts of ethane Nova fed to each of the three crackers and had never been at an E3 Management Committee or other meeting where anyone from Nova told Dow about this, or disclosed that each plant did not in fact receive its pro-rata share of supply based on nameplate. The November 2003 meeting merely referenced the continuance of those allocations as did the July 14, 2004 meeting. With respect to the July 11, 2002 email to Mr. Fergusson, this was followed almost immediately by Mr. Fergusson's refusal to sign the draft Joffre Site Optimization Agreement. Mr. Broenink's testimony that this was Dow's reaction to propane cracking rather than Site-wide optimization is not credible;

[1086] Other submissions with respect to disclosure about what was occurring have been dealt with previously in this decision.

[1087] Nova submits that there can be no Gross Negligence or Wilful Misconduct where the act or omission was done with the express disclosure by the Operator and the concurrence (without express objection by either Co-owner) of the E3 Management Committee.

[1088] However, the evidence establishes that the truth of how of ethane allocation worked was not disclosed to Dow at an appropriate senior level until November 2004, and was misrepresented at the senior level before that. Inaccurate or misleading disclosure is not express disclosure.

[1089] In any event, the exclusion contained in the definition of Gross Negligence and Wilful Misconduct refers to “any act or omission ... with the express disclosure by the Operator and the concurrence... of the E3 Management Committee. There was no concurrence of the E3 Management Committee to ethane allocation, and certainly no agreement at the E3 Management Committee level that E3 could be run at rates lower than its productive capability, except at specific times for which Dow is not claiming damages.

[1090] The budgets approved by the E3 Management Committee were not concurrence by Dow of ethane allocation, because they were approved by Dow on the basis of a misrepresentation as to “demand’ for ethane, and without the knowledge that Nova often fed proportionately more ethane to E3 than it fed to E1 and E2 and took a higher EPP of ethylene produced by E3 for itself.

[1091] Nova witnesses confirmed that Nova did not consider the approval of budgets to be anything like a direction to run at lower rates. Dow submits, and the evidence supports this, that contentious issues like low production were often taken off-line from the E3 Management Committee meetings in an attempt to maintain an amical atmosphere. There is a plethora of evidence that Dow complained of low production.

[1092] Nova could not have been honestly mistaken about Dow’s concurrence with its actions, given Mr. Fergusson’s vehement refusal to consider Site optimization and his continued questioning of why ethane allocation was necessary. Mr. Fergusson’s concession that he understood that Dow owned 29.7 percent of the Pool is not a concession about the true nature of ethane allocation.

[1093] The evidence establishes that Mr. Broenink and the other members of the EBT knew that ethane allocation had no basis in the joint venture agreements. Nova attempted to have Dow satisfy or endorse ethane allocation on several occasions without success. The argument that ethane allocation is implied by Section 4.6 of the OSA did not arise until August, 2004.

[1094] Even then, as late as August, 2004, Mr. Flint provided an inaccurate description in response to Mr. Ramachandran’s direct questions about ethane allocation; inaccurate because it did not disclose that Nova was allocating more ethane to E3 than it was representing to Dow, and taking the further ethylene produced at E3 for itself.

d) Post-November 2004

[1095] Nova’s suggestion that Mr. Ramchandran “expressly concurred” with ethane allocation is disingenuous and unsupported by the evidence. Negotiations over streaming agreements in an attempt to keep E3 operating at a time when market dynamics were very favorable for continued production of ethylene is not concurrence with ethane allocation, and Mr. Ramachandran made his disagreement with Nova’s entitlement to impose ethane allocation clear.

[1096] The evidence is clear, both from Nova's internal communications and repeated requests and demands from Dow that Nova knew that Dow was short of ethylene and wanted more of E3's production. By running E3 as it did, Nova left Dow short of ethylene while meeting its own needs. It is noteworthy that Nova's counterclaim does not include a claim for loss of ethylene sales, even though it asserts that Dow should have disposed of its ethane contracts so that Nova could acquire additional ethane to fill the Pool.

[1097] Dow submits that examples of this include:

- a) Presentation slide 28 (Exhibit 82, Tab 26) shows estimated feedstock demand with a shortfall of 24,000 barrels per day. The presentation indicated that Nova could run at low conversion, crack a small amount of propane, and the Nova shortfall would be gone and any shortfall would be Dow's;
- b) Presentation slide 5 (Exhibit 96, Tab 8) indicated a small surplus for Nova. "Dow E3" is shown as "merchant" demand, receiving 87% of its "contract." The explanation is that Dow E3 remains on ethane allocation. An updated slide in the presentation estimates Nova's surplus at 37 million pounds; "Dow E3", gets 94% of its contract, again with the explanation that this is due to ethane allocation. The 2005 forecast indicates Dow would be short, receiving 80% of its "contract." Again, the explanation is "ethane allocation." Another slide indicates that in 2006, Nova would be balanced, and Dow would be short at 87%, reflecting ethane allocation. Again in 2007 and 2008, Nova is forecast to be balanced and Dow is projected to be short.

[1098] Nova's expert witness Mr. Wallsgrove reviewed the data Nova had allowed him to see and concluded that E3 could have consistently been run at a rate of [REDACTED] or [REDACTED] BPY. From the evidence, I accept that Nova chose not to run it at levels that were even close to this.

[1099] With respect to Nova's failure to optimize production from E3, the failure to remedy the alleged shortfall by taking reasonable and achievable steps to do so and the failure to take timely steps to remedy mechanical issues, none of this conduct falls within the concept of an "honest mistake", and there was no credible or persuasive evidence otherwise even in the credible testimony of Nova's lay witness. At any rate, no language in the definition of Wilful Misconduct or Gross Negligence would excuse a deliberate breach of the joint venture agreements on that basis. Rather, the evidence is that ethane allocation was a creation of Mr. Broenink and the EBT to deal with the unpalatable reality of Nova's contractual duties to Dow under the joint venture agreements.

e) Loss arising as a result of joint ownership on use of E3

[1100] The limitation on liability of Nova as a Co-owner under section 5.01 of the COA precludes liability for any Excluded Damages "as a result of the joint ownership or use of E3."

[1101] Dow submits that its losses do not arise from the joint ownership or use of E3, but rather from the way that Nova chose to run the Plant and the Joffre Site, specifically its operation of E3 to suit its own commercial purposes, its failure to run E3 at full rates, and its misappropriation of some of Dow's products. Nova responds that, as Co-owner, it was not responsible for operating the Plant.

[1102] Clearly, however, on the facts as I have found them, Nova as Co-owner operated E3 through the directions of the EBT. Nova as Operator, to the extent it operated as such, delegated

the daily operations of E3 to the EBT. Thus, I must consider whether the exclusion language that forms part of section 5.01 protects Nova as Co-owner from Dow's claims.

[1103] For the same reasons as previously expressed, I find that the definition of Excluded Damages does not protect Nova from Dow's claims of ethane allocation, whether as breach of contract or conversion.

[1104] Nova as Co-owner's liability for the optimization claim arises from the breach of section 3.2 (c) in causing the Operator to be in breach of its OSA duties under Section 4.3 and 4.4.

[1105] . Dow's claim against Nova as Co-owner for this category of damages is not precluded by the limitation of liability provision in the COA.

f) Declaratory Relief

[1106] In addition to damages, Dow seeks a declaration that Nova's conduct as Operator constitutes "Wilful Misconduct" and/or "Gross Negligence" as defined in the OSA, entitling it to remove Nova as the E3 Operator.

[1107] Section 8.1 of the OSA provides that "the Operator may be removed on three Business Days prior written notice to that effect by a Co-owner in the event that ... the Operator has acted with Gross Negligence or Wilful Misconduct in the performance of the Operations."

[1108] As I have noted, the conduct of Nova as Operator that forms the basis of this litigation consistently reflects both Wilful Misconduct and Gross Negligence as defined. To the extent that Nova acted as Operator when it failed to run E3 to its capacity and its failure to prevent conversion of part of Dow's share of the products produced at E3 were not the result of inadvertence or oversight. They were not accidental. Rather they were deliberate actions and failures to act, in violation of the terms of the OSA, or at best on utter disregard for harmful, foreseeable and avoidable consequences.

[1109] Therefore, I grant the relief sought by Dow and declare that Nova's conduct constitutes "Wilful Misconduct" and/or "Gross Negligence" as defined in the OSA.

2. Concurrent Claims in Tort and Contract

[1110] The allocation claim is framed in the pleadings as a breach of contract, the tort of conversion and an unjust enrichment. The ethane purity claim is framed as a breach of contract and an unjust enrichment.

[1111] Nova submits that the conversion and unjust enrichment claims are not sustainable, on the basis of its interpretation of *BG Checo International Ltd v British Columbia Hydro and Power Authority*, [1993] 1 SCR 12.

[1112] The relevant issue in *BG Checo* was whether the terms of the contract in that case operated to exclude the defendant's potential liability for the tort of misrepresentation.

[1113] The Supreme Court found that BC Hydro was liable to BG Checo for breach of contract, but found that the contract did not preclude BC Checo from suing in tort.

[1114] The Court found that, as a general rule, where a given wrong *prima facie* supports an action in contract and in tort, a plaintiff may sue in either or both, unless the contract indicates that the parties intended to limit or negative the right to sue in tort:

The mere fact that the parties have dealt with a matter expressly in their contract does not mean that they intended to exclude the right to sue in tort. It all depends on how they have dealt with it: at 27. [emphasis in original]

[1115] LaForest and McLachlin, JJ. for the majority referred to three situations that may arise when contract and tort are applied to the same wrong, as set out at 28 – 30:

- a) First is where the contract stipulates a more stringent obligation than the general law of tort would impose. In this case, Dow submits that section 3.2(c) of the OSA, which provides that each co-owner agrees not to do anything, or fail or omit to do anything it is obligated to do, that could cause it to be in breach of the OSA is such a stringent obligation. In any event, the right to sue in tort is not extinguished in this situation;
- b) The second class of cases is where the contract stipulates a lower duty than that which would be presumed by the law of tort in similar circumstances. The Court noted that this occurs most often when the parties stipulate that the usual liability imposed by the law of tort is not to bind them. There is no such exclusion in the limitation of liability clause with respect to the co-owners but there is a limitation arising from the second part of the definition of Excluded Claims, “loss of or damage to the Plant or the Products,” that may apply. However, the Court is clear that the plaintiff may still sue in tort if the exclusion does not entirely negate tort liability;
- c) The third category of cases is where the duty in contract and the common law duty in tort are co-extensive. Apart from the exclusion clauses that have been discussed, this appears to most closely fit the situation in this case. The contractual obligation not to do anything that may breach the contracts or to cause the Operator to do anything that may breach the contracts surely implies an obligation not to convert ethylene and co-products owned by Dow to Nova’s own use. In *BG Checo*, the Court found that the contract did not negate BC Hydro’s common law duty not to negligently misrepresent a key fact: at 30. In this case, while the limitation of liability clause may, if I am wrong in my analysis, negate the allocation claim in contract, it would not apply to a tort, such as conversion, that is “independent of the contract in the sense of falling outside the scope of the contract”: at 30.

[1116] I do not accept Nova’s argument that there is no independent common law duty not to convert property outside of the contract. Conversion is surely one of those torts that exists outside of contract.

[1117] Nova submits that to find a concurrent right to sue in tort in this case would be an attack on the principle of primacy of private ordering. However, as the Court noted in *BG Checo*, it is only to the extent that private ordering contradicts a tort duty that the tort duty is diminished:

The rule is not that one cannot sue concurrently in contract and tort where the contract limits or contradicts the tort duty. It is rather that the tort duty, a general duty imputed by the law in all the relevant circumstances, must yield to the parties’ superior right to arrange their rights and duties in a different way. In so far as the tort duty is not contradicted by the contract, it remains intact and may be sued upon: at 27.

[1118] In this case no express or implied contractual obligation contradicts the tort duty that arises independently of contract.

[1119] The Supreme Court in *BC Checo* also noted that, in situation of concurrent liability in tort and contract:

... it would seem anomalous to award a different level of damages for what is essentially the same wrong on the sole basis of the form of action chosen, though, of course, particular circumstances or policy may dictate such a course: at 38.

[1120] With respect to the tort of conversion, no such particular circumstances exist.

3. The Test for Unjust Enrichment

[1121] For an action in unjust enrichment to succeed, the facts of the case must establish an enrichment, a corresponding deprivation, and the absence of any juristic reason for the enrichment: *Garland v Consumers' Gas Co*, 2004 SCC 25 at para 38, citing *Rathwell v Rathwell*, [1978] 2 SCR 436 at 455.

[1122] With respect to the allocation and purity claims, the enrichment and deprivation are clear, but the question is whether a juristic reason exists to deny recovery. The presence of a contract can be a juristic reason, and therefore Dow cannot not make out a *prima facie* case for unjust enrichment.

[1123] However, as Professor Mitchell McInnes has noted in *Canadian Law of Unjust Enrichment and Restitution* (Markham, Ontario: LexisNexis Canada Inc, 2014) at 652, the general proposition that restitution is not available if the parties' relationship is governed by contract is somewhat narrower than it sounds. The question is whether the impugned benefit, having occurred within the context of a contract, is governed by the contract. As Professor McInnes comments, unjust enrichment applies by default to redress situations that the parties have not addressed themselves: "restitution should be barred only to the extent that it is consistent with the choices that the parties have made for themselves": at 652.

[1124] The allocation claim arises from the imposition of ethane allocation, a concept that I have found does not exist in the joint venture agreements. Thus, the risks of loss arising from the concept have not been dealt with by contract: there is "a gap in the contractual allocation" of risks: McInnes at 653. Restitution for the loss created by ethane allocation does not rewrite the parties' bargain.

[1125] The facts of this case are similar to those in *Aber Resources Ltd v Winspear Resources Ltd*, 2000 BCSC 463. In that case, in a joint venture context, the alleged breach was that the defendant operator sought to exclude the plaintiff from funding an annual operational program and funded it itself, citing the fact that the defendant had failed to provide written notice within the prescribed period. The plaintiff also failed to provide written notice. The Court found that the joint venture agreement did not allow either party to take over sole funding of programs without notice, nor did it provide what would happen if one party appropriated the interest of another when not entitled to do so under the agreement. Shaw, J decided that it would be unjust to allow this situation, and that an action for unjust enrichment would not subvert the agreement, but would support its essential aim of profit sharing.

[1126] What if it is not entirely clear whether an enrichment pertains to an allocated risk under the contract? Professor McInnes points out that the courts have not formulated a test that would generate an appropriate answer in every situation: McInnes at 653.

[1127] Shaw, J in *Aber* cited *Luscar Ltd v Pembina Resources Ltd*, 1994 ABCA 356, leave to appeal to SCC dismissed, 24496 (August 17, 1995), where Conrad, JA observed that the “distinction between using unjust enrichment to subvert a bargain and using it to obtain the benefit of a bargain is a proper one”: at para 131. In *Luscar*, the Court commented:

By analogy [to tort and contract], in a situation where contract and equity are applied to the same set of facts, the mere fact that the parties have dealt with the matter expressly in their contract does not necessarily mean they intended to exclude the right to sue in equity, if such an independent right exists. The parties should not be prohibited from seeking the appropriate remedy for the wrong that occurred. Conceptually, there is no reason an obligation could not give rise to an equitable cause of action as well as a contractual one. It depends on the characterization of the wrong, it is essential to determine whether there is an independent equitable obligation: at para 56.

[1128] While the better view may be that an action in unjust enrichment is not an action in equity, the reasoning of the Court of Appeal, that there is no reason that an obligation could not give rise to an action in unjust enrichment as well as in contract, remains valid.

[1129] The lack of a contractual basis for ethane allocation gives rise to an independent obligation.

[1130] Thus, the allocation claim that was pled in terms of breach of contract and unjust enrichment can proceed against Nova as Operator in unjust enrichment, and against Nova as Co-owner in conversion and unjust enrichment, even if I am incorrect and the action is barred from proceeding in contract by reason of the second part of the definition of Excluded Claims. The purity claim can proceed against Nova as Operator and Nova as Co-owner as a claim in unjust enrichment, even if barred from proceeding in contract.

4. Limitations of Actions

[1131] Nova submits that Dow’s two main claims, the allocation claim and the optimization claims, are statute-barred prior to June 29, 2004 under the two-year limitations period. It alleges that the Dow plaintiffs were aware, or should have been aware, of Nova’s misconduct with respect to these claims prior to June 29, 2004, the date which is two years prior to the filing of the Statement of Claim. If correct, this argument would exclude damages suffered through May 2004 as Nova’s reporting to Dow about E3’s June 2004 production did not occur until sometime in July 2004.

[1132] Nova also submits that the ethane fixed cost adjustment and life-to-date claims are barred in their entirety under the ultimate ten year limitation period. Nova does not allege a limitations defence with respect to Dow’s other claims relating to Liquid Co-Products, Ethane Purity and Infrastructure Revenues.

[1133] The relevant legislation in section 3 of the *Limitations Act*, RSA 2000, c L-12, which reads as follows:

3(1) ... if a claimant does not seek a remedial order within

- a) 2 years after the date on which the claimant first knew, or in the circumstances ought to have known,

- (i) that the injury for which the claimant seeks a remedial order had occurred,
- (ii) that the injury was attributable to conduct of the defendant, and
- (iii) that the injury, assuming liability on the part of the defendant, warrants bringing a proceeding,

or

- b) 10 years after the claim arose,
whichever period expires first, the defendant ... is entitled to immunity from liability in respect of the claim.

[1134] The Alberta Court of Appeal describes the test to be applied whether considering whether a claimant knew or ought to have known of a cause of action in *Nasrin Karim Professional Corp v Bank of Nova Scotia*, 2007 ABCA 10 at para 56 as follows:

The principle of discoverability does not require perfect knowledge ... Mere suspicion is not sufficient to trigger the running of a limitation period; the plaintiff can be said to have “known” of the claim only when he has some support for his suspicion ... [citations omitted]

[1135] The ultimate ten year limitation period operates irrespective of a claimant’s knowledge or diligence.

[1136] Section 3(3) establishes when a claim arises, including:

- a) a claim or any number of claims based on any number of breaches of duty, resulting from a continuing course of conduct or a series of related acts or omissions, arises when the conduct terminates or the last act or omission occurs;
- b) a claim based on a breach of a duty arises when the conduct, act or omission occurs;

...

[1137] The claims at issue are all claims that fall under (3)(a).

[1138] Most “claims” arise upon the breach of contract or wrongful act, regardless of whether or not the claimant has knowledge of any damages suffered: *James H Meek Trust v San Juan Resources Inc*, 2005 ABCA 448 at paras 41-43.

[1139] Pursuant to section 3(5) of the *Act*, the Dow has the burden of proving that a remedial order was sought within the limitation period set out in section 3(1)(a), while Nova has the burden of proving that a remedial order was not sought within the limitation period set out in section 3(1)(b).

[1140] Turning first to the allocation claim, as indicated previously under Part VI. E. 2 of this decision, the only time that Dow could be considered to have had sufficient and uncontradictory information about the nature of ethane allocation, being the conversion of its EPP share, prior to June 29, 2004, which was the two years prior to the filing of the Statement of Claim in this litigation, was June 2003. As noted previously, Dow was later presented with a description of ethane allocation that contradicted the information Mr. Fergusson could have learned from Mr. Miller. Therefore, Dow’s claim for loss from ethane allocation imposed in June 2003 is barred from recovery.

[1141] With respect to the optimization claim, Dow has conceded that Nova as Operator advised Dow that E3 would not be running at maximum capacity at various Management Committee meetings (including on October 16, 2001 and March 18, 2002); Dow raised concerns that E3 was not being operated at full production capacity in 2002, and perhaps earlier.

[1142] Thus, to the extent that the damages claimed in this period of time relate to the optimization claim, they are statute-barred.

[1143] As Dow's life-to-date and ethane fixed cost adjustment cause of action for breach of contract relates to a failure to make periodic payments, the ten-year limitations period found in section 3(1)(b) of the *Limitations Act* began to run in 2000 when the Operator began applying the life-to-date method in calculating Ethane Variable Costs, and in 2001 with respect to the ethane fixed cost adjustments. The limitation period is not extended by reason of the fact that there has been a series of breaches: *Meek* at paras 44-48.

[1144] Therefore, both of these claims are statute-barred with respect to the damages period that ends in 2012.

5. Corporate Group Issue

[1145] The facts underlying this issue are as follows:

- a) In October 2001, UCC amalgamated with TDCC's Canadian affiliate, becoming the plaintiff, Dow Canada;
- b) As a result, Dow Canada;
 - (i) continued as the co-owner of E3;
 - (ii) became liable for all of the UCC's obligation to Nova under the joint venture agreements;
 - (iii) continued to have access to ethylene through LHC-1, the E1 Toll and two cost-of-service arrangements at E2;
 - (iv) continued to own the Fort Saskatchewan facilities until they were sold to ME Global Canada Inc in 2004 or closed;
 - (v) became the owner and operator of LP7, Prentiss 1, and co-owner of AOG, which in turn owned and operated Prentiss 2 until Prentiss 1 and AOG were sold to ME Global.

[1146] At the same time, UCESA merged with Dow Europe GmbH, becoming the plaintiff Dow Europe. As a result of the merger, Dow Europe became the Dow entity entitled to E3's production; owned all ethylene processed, and the polyethylene produced, at LP7; and could request incremental ethylene from Dow Canada for use at LP7 as required.

[1147] Section 6.04(a) of the COA allows a party to transfer all or a part of its Co-owners' interest to a third party. In the event of a partial transfer, as occurred here, the transferor (Dow Canada) remains responsible for exercising any rights transferred to the transferee (Dow Europe).

[1148] Nova submits that, while this provision provides Dow with a procedural right to sue on Dow Europe's behalf for the non-performance of one of the contractual rights assigned to Dow Europe, it does not give Dow Canada a right to claim damages on its own behalf.

[1149] Nova relies on section 20 of the *Judicature Act*, RSA 2000, c J-2, which states that when a legal chose in action is assigned by absolute assignment, that absolute assignment is effective at law to transfer the legal right to the chose in action and all legal and other remedies for the chose in action, if express notice of the assignment has been given to the party from whom the assignor would have been entitled to claim the chose in action. Nova submits that the original assignment agreement by which UCC assigned its rights to UCC's share of the ethylene produced at E3 meets all the conditions of an absolute assignment, in that UCC assigned all its interests to its share of E3 ethylene production, and notice was given to Nova.

[1150] An absolute assignment is “an assignment which fully and complete gives to the assignee all the rights and remedies for default of those rights which the assignor has, without any reservation or retention by the assignor of any of them”: *Imperial Oil Ltd v Crane* (1962), 39 DLR (2d) 79 (Nfld CA) at para 9.

[1151] It is clear from the fact that Dow Canada continues as the owner of the physical asset of E3 that the transfer was only a partial transfer of rights. In addition, section 6.04(b) of the COA provides that the transferor, Dow Canada, remains responsible for exercising the transferred rights. This was not an absolute transfer, and section 20 of the *Judicature Act* has no application.

[1152] Nova submits that, even if Dow Canada can advance a claim for damages, the Court must assess those damages based on the plaintiffs as separate corporate entities acting in their own rational economic self-interest.

[1153] Nova submits that “[t]he Plaintiffs have calculated their damages on the basis that the Dow plaintiffs’ businesses are operated in a cooperative and joint fashion”. That state of affairs is true and has been amply established by the evidence, but Nova argues that this reality should be displaced by “the reality that the Plaintiffs are separate corporate entities”. Relying on Mr. Williams’ comment that, in the but-for world, every corporation, even affiliated ones, would act “solely in [their] rational economic self-interest”, Nova submits that “the Court must...assess...damages based on the Dow plaintiffs as separate corporate entities acting in their own rational economic self-interest”.

[1154] This, however, does not take actual reality into account. Dow Europe is not a party to the E1 Toll, and has no ethane supply contracts to feed it. Had Dow Canada chosen to maximize its own derivative production rather than providing E1 Toll ethylene to help Dow Europe mitigate its E3 shortfall, Dow Europe’s damages would have been higher. In the but-for world, with an assured supply of its full share of ethylene from a fully optimized E3, there can be little doubt that a solely self-interested Dow Europe would have debottlenecked LP7 even sooner than it did, increasing its own polyethylene-making capacity rather than selling ethylene to Dow Canada for manufacture at Fort Saskatchewan. In such a scenario the Dow plaintiffs’ damages would have been higher still.

[1155] Because of the pricing set by the intercompany transfer arrangements, Dow Canada’s claim in this action is a negative number. While at first glance this may seem odd, this result is a real-world illustration that the Dow parent company is indifferent to which of its affiliates records a particular profit. Nova argues that “TDCC has caused” losses, but the intercompany transfer arrangements bind the Dow plaintiffs, and they have fairly proposed that Dow Canada’s “negative loss” be set off and deducted from Dow Europe’s damages.

[1156] Nova argues that “Dow Canada has no claim for loss of ethylene from E3” but, as it concedes, following the UCC’s assignment of certain rights to UCESA, Dow Canada continued as the Co-owner of the physical E3 facility. As a result, it concedes, “because of the manner in which Nova chose to operate the site... Nova utilized a portion of Dow’s ownership interest in E3...[a]nd did not compensate Dow in any way for that use”.

[1157] Mr. Mikulka’s method of calculating damages in recognition of the reality of intercorporate arrangements that bind these plaintiffs makes sense, and I find that, in the special circumstances of this case, both have properly claimed damages.

F. Infrastructure Revenues Claim

[1158] This claim is for Dow’s contractual share of certain infrastructure revenues that it submits were held in trust for it by Nova.

[1159] The basis of this claim is as follows:

- a) Pursuant to one of the joint venture agreements, the Asset Transfer Agreement, dated July 11, 1997 (ATA), Nova transferred to UCC an undivided interest in certain shared common facilities located at the Joffre Site (the Infrastructure).
- b) By a Trust Agreement dated January 11, 2000, Nova holds the legal title to UCC’s (now Dow Canada’s) undivided interest in the Infrastructure in trust for UCC’s sole use, enjoyment and benefit, and Nova expressly holds all benefits, advantages, profits, receipts and revenues whatsoever accruing from or on account of such interest in trust fully for the benefit, use and ownership of UCC, to be forthwith paid over to UCC.
- c) Effective December 31, 2001 and December 15, 2004, respectively, Nova sold E1 and E2 to its affiliate, NCCL. Effective December 15, 2002, Nova sold its PE1 derivative plant to NCCL as well. Pursuant to these contracts with NCCL, Nova charged and recovered substantial infrastructure capital fees for NCCL’s use of the Infrastructure, but Dow submits that Nova concealed from Dow Canada that it had recovered any such fees until approximately seven years into this litigation.

[1160] In its pleadings, Nova defends this claim on the following basis:

- a) According to section 3.5(c) of another joint venture agreement, the Infrastructure Co-owners Agreement dated July 11, 1997 (the ICA), UCC has no right to receive revenue from the Infrastructure except as agreed between the Co-owners. Dow submits, and I agree, that this does not aid Nova, since the Co-owners plainly did agree by the express language in the Trust Agreement that “all benefits ... profits, receipts and revenues whatsoever accruing to, from or on account of the Trust Interest will ... be received and held by Nova ... in trust fully for the benefit ... of [Dow] ... and shall be forthwith paid over ... to [Dow], subject to ... the [ICA] and the obligations of Nova as trustee hereunder.” The ICA does not preclude an agreement between the parties in section 3.5(c).
- b) Nova submits that the Trust Agreement “cannot and does not, create rights”, but section 1(a) of the Trust Agreement is both a declaration of trust and an acknowledgement of an agreement that revenues accruing from or on account of the Trust Interest will be held in trust for Dow. This is consistent with the approach taken

to revenues to be received from non-transferable assets set out in section 3.5 of the ATA.

- c) Nova submits that the payment from NCCL to Nova pertains to infrastructure at the Joffre Site that is not entirely co-extensive with the Infrastructure. However, Mr. Flint testified that the common facilities referred to in the memorandum of understanding (MOU) between Nova and NCCL regarding the transfer of E1 are the facilities required to operate E1, E2 and E3, including such things as electricity supply, water supply for cooling purposes, water supply for potable purposes, nitrogen services and any other maintenance services that are required.

Better evidence than this is the schedule to the MOU that references the assets transferred and the exhibit to the purchase and sale agreement for E1 that lists the property to be transferred, which appears to be consistent with Mr. Flint's answer. No witness at trial testified on this issue.

Mr. Flint gave the same answer with respect to E2, and also testified that he was not aware of any other infrastructure than the defined infrastructure that is the subject of the ICA that is captured by the phrase "existing common facilities."

- d) Nova also submits that UCC (and thus Dow) only acquired a small interest in the Infrastructure tied to its rights in E3, being only rights that directly pertain to Dow's use of the Infrastructure to provide services to E3. However, section 2.1 of the ATA transfers to UCC "Union Carbide's Undivided Interest in the Infrastructure ... held by Nova in trust ... pursuant to the Trust Agreement." Union Carbide's Undivided Interest in the Infrastructure is a defined term, meaning an undivided interest in the Infrastructure to be conveyed by Nova to UCC, which is calculated in accordance with a formula. Infrastructure is defined by reference to the Project Management Agreement, and means the Existing Infrastructure, the Nova Infrastructure and the Additional Infrastructure. Schedule B to the ATA entitled "Existing Infrastructure" describes the "Assets to be transferred". "Existing Infrastructure" is a defined term meaning:

... the equipment, pipelines (other than the ethylene pipeline, compression and terminus facilities), buildings, utilities, storage, rail lines, roads and related facilities, as in existence prior to construction of the Additional Infrastructure and the NOVA Infrastructure, that are located outside the battery limits of Nova's existing ethylene, polyethylene and hydrogen purification facilities at the Joffre Facility, and that are used in support of the operation of NOVA's plants known as "ethylene-1" or "ethylene-2" or would be reasonably required for the operation of the Plant and an interest in the land underlying such assets. Specifically, "**Existing Infrastructure**" will consist of the assets listed in Schedule B and the Infrastructure Lands. [emphasis added]

- e) Additional Infrastructure refers to infrastructure to be constructed as part of E3. Nova Infrastructure means additions or expansions of the Existing Infrastructure and the

Additional Infrastructure directed and solely paid for by Nova in order to service the Joffre Nova Facilities. Joffre Nova Facilities include E1, E2 and PE1. Thus, the conveyance of infrastructure was not limited to E3 infrastructure or restricted to benefits received as a result of the provision of Infrastructure services to E3 and it is not a barrier to Dow's claim that the fees paid by NCCL relate to the use of Infrastructure and common facilities only to provide services to E1, E2 and PE1.

[1161] Nova submits that Dow's interpretation of the trust provisions is contrary to the purpose of the joint venture agreements, which Nova submits was only "to reflect Dow's status as a Co-owner of E3" and that the parties "did not intend to give Dow Canada greater rights over the Infrastructure than was necessary to accomplish this objective".

[1162] There is no evidence of this intention other than Nova's present statement of it, and this interpretation is not supported by the language of the agreements. Nor is the agreement to give a Co-owner of the Infrastructure a portion of the revenues from its use "a commercial absurdity", as submitted by Nova

[1163] Nova submits that a review of the relevant contracts demonstrates that Dow did not acquire an interest in all of the infrastructure and facilities for which the fees are paid. As noted by Dow, this contradicts evidence by the corporate representative of Nova that payments by NCCL do not relate to more than the Infrastructure. In the absence of evidence contradicting this admission, I must accept it.

[1164] Finally, Nova submits that "[t]he capital fee charged to NCCL represents payment by NCCL for use of Nova's interest in the Infrastructure", but the MOUs do not say that. In any event, as Nova concedes, Nova and Dow each has "an undivided interest in and to the Infrastructure, "so NCCL could never use just the Nova part, as Nova now contends it does.

[1165] Particulars of Dow Canada's claim in this regard, calculated through December 31, 2013, are as follows:

| Annual Infrastructure Revenue | | | | | |
|--------------------------------------|-------------|-----------|-------------|--|------------------------------|
| Year | E1 | E2 | PE1 | Dow Canada's Undivided Interest | Amount Owning by Nova |
| 2002 | \$6,600,000 | | \$225,000 | 13.91% | \$949,358 |
| 2003 | \$6,600,000 | | \$5,400,000 | 13.87% | \$1,664,400 |
| 2004 | \$6,600,000 | \$275,000 | \$5,400,000 | 13.85% | \$1,700,088 |

| Annual Infrastructure Revenue | | | | | |
|--------------------------------------|-------------|-------------|-------------|--|-------------------------------------|
| Year | E1 | E2 | PE1 | Dow Canada's Undivided Interest | Amount Owing by Nova |
| 2005 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.82% | \$2,570,520 |
| 2006 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.77% | \$2,561,220 |
| 2007 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.72% | \$2,551,920 |
| 2008 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.69% | \$2,546,340 |
| 2009 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.68% | \$2,544,480 |
| 2010 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.67% | \$2,542,620 |
| 2011 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.63% | \$2,535,180 |
| 2012 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.52% | \$2,514,720 |
| 2013 | \$6,600,000 | \$6,600,000 | \$5,400,000 | 13.42% | \$2,496,120 |
| | | | | TOTAL | \$27,176,966.00 |

[1166] This part of Dow's claim is thus allowed pursuant to the terms of the agreements between the parties.

IX. Additional Relief

A. Currency Conversion

[1167] Both parties agree that, although the damages experts assessed the Dow plaintiffs' damages in US dollars, they must be converted to Canadian dollars in the judgment. However, Nova submits that the appropriate date for conversion is the date of breach, relying on the so-

called “breach date” rule. Dow submits that this rule has been disregarded in modern authority for some time.

[1168] In *Kellogg Brown & Root Inc v Aerotech Herman Nelson Inc*, 2004 MBCA 63 at paras 89-93, leave to appeal to SCC refused 30448 (February 15, 2005), the Court noted that the “breach date” rule is based on a series of cases that adopted a now-obsolete British rule, reversed by the House of Lords in *Miliangos v George Frank (Textiles) Ltd*, [1976] AC 443. In that case, the House of Lords held that “the court was free to choose any conversion date that served the interests of justice”: *Kellogg Brown* at para 93.

[1169] Alberta case law has followed this approach: *Stevenson Estate v Siewert*, 2001 ABCA 180 at para 16; *Salna v Awad*, 2010 ABQB 419 at paras 66-67, aff’d 2011 ABCA 20; *1081748 Alberta Ltd v Enervest Resource Management Ltd*, 2008 ABQB 793 at paras 62-67; *Jin v Ren*, 2015 ABQB 115 at para 108, aff’d 2016 ABCA 80, leave to appeal to SCC refused 37023 (October 13, 2016); *Alpine Canada Alpin v Non-Marine Underwriters*, 1999 ABQB 454 at para 35.

[1170] In nearly all of these cases, the burden of currency fluctuation was placed on the wrongdoer because that was fairer to the plaintiff.

[1171] The damages in this case relate to a twelve-year period during which the value of the Canadian dollar against the US dollar has fluctuated, at one point being significantly stronger than it is now. As noted in *Kellogg Brown*, its current path “is a matter of speculation into which I have no intention of entering”: at para 109. I accept that the innocent plaintiffs should not bear the risk of the fluctuating exchange rate, but given the nature of the wrongdoing, this goal is difficult to accomplish without a detailed analysis of breaches against currency rate.

[1172] With that goal in mind, however, I find that, to the extent it is possible to calculate interest in this way using the Mikulka method, the exchange rate for the allocation damages will be as of September 1, 2001, and the exchange rate for the balance of the damages will be as of the date of judgment. If it is not possible to isolate allocation damages in this manner, the exchange rate will be as of the date of judgment.

B. Interest

[1173] Pursuant to section 9.02(a)(ii) of the COA, Dow is entitled to interest at a rate equal to the prime lending rate of interest expressed as a rate per annum set by Citibank Canada, Main Branch, Toronto, Canada plus two percentage points per annum, calculated daily and payable monthly, but not compounded. If the parties are unable to agree on the amount of interest, Dow may submit its calculations to the Court, with short written submissions from both parties as to the reason for the disagreement.

C. Other Relief

[1174] If the parties are unable to agree on the top-up of damages to the date of judgment in accordance with the principles I have accepted for the calculation of damages, they may make further submissions to the Court on that and other ancillary issues. I also reserve on the issue of the appointment of a receiver or monitor until I hear further from the parties.

X. Conclusion on the Dow Claim

[1175] In order to be successful in this litigation, Dow was obliged to establish that:

- a) the joint venture agreements give no rights to anyone except the Co-owners and Operator of E3 (Dow and Nova). No third parties or other plants have rights under the OSA, other than through the Co-owners;
- b) there was no ethane shortage, in that Nova always had enough ethane to fill E3 and had the ability and freedom to acquire additional ethane;
- c) Nova was the appointed agent of the Co-owners but failed to follow its principals' requests to operate E3 with the objective of maximizing production;
- d) E3 had more capacity than Nova submitted at trial;
- e) the mechanical issues that Nova submits constrained E3's productive capability were not unusual maintenance issues that should have affected capacity, and Nova at any rate was not diligent in resolving them; and
- f) when Nova imposed ethane allocation, it took for itself some of the ethylene to which Dow was entitled, without justification under the joint venture agreements or elsewhere.

[1176] I have found in these Reasons for Judgment that Dow has established these facts and has proved on a balance of probabilities that Nova has breached the joint venture agreements both as Operator and as Co-owner and has converted some of the ethane that Dow was entitled to from E3.

[1177] I assess damages against Nova for these breaches as follows:

- a) With respect to the allocation claim and the optimization claim, the amounts as calculated by Mr. Mikulka with the following adjustments:
 - (i) the removal of allocation damages claimed for the month of June 2003; and
 - (ii) the removal of optimization damages claimed for the period prior to June 29, 2004;
- b) Damages relating to the liquid co-products claim in the amount of \$39,777,088;
- c) Damages relating to the ethane purity claim in the amount of \$19,238,330;
- d) An adjustment credit to Nova in the amount of \$2,627,659; and
- e) Damages relating to the infrastructure claim in the amount of \$27,176,966.

[1178] I also grant Dow a declaration that the conduct of Nova as Operator constitutes Wilful Misconduct and Gross Negligence.

[1179] The monetary damages will be converted to Canadian dollars in accordance with the directions in this judgment.

[1180] In accordance with the terms of the joint venture agreements, Dow is entitled to interest at a rate equal to the prime lending rate of interest expressed as a rate per annum set by Citibank Canada, Main Branch, Toronto, Canada plus two percentage points per annum, calculated daily and payable monthly but not compounded.

NOVA COUNTERCLAIM

XI. Introduction to the Counterclaim

[1181] Nova counterclaims in the amount of \$50,000,000 USD and \$719,260.40 CAD on the basis of breach of contract, failure to pay, and unjust enrichment. Nova also seeks specific performance or a mandatory injunction, and in the alternative, declarative relief.

XII. Amendment of Pleadings

[1182] At the conclusion of the trial evidence, Nova applied for leave to amend its reply and file the Fifth Amended Reply to the Statement of Defence of the Third Amended Counterclaim (the Reply). The amendments include adding a paragraph alleging that if any provisions of the OSA are found to be illegal or unenforceable, which is denied, then the merger between UCC and Dow Canada was in breach of the Regulations, including the *Competition Act*, RSC 1985, C c-34, and is therefore a material breach by Dow Canada pursuant to section 3.2 of the OSA. “Regulations” is a defined term under the OSA, and includes statutes and the law. The amended Reply would also remove the paragraphs of the counterclaim relating to metering and accounting claims.

[1183] Nova advised Dow of its intention to seek leave to amend the Reply by letter dated September 14, 2015. The application was argued on October 1, 2015.

[1184] Dow opposed the addition of the above-described paragraph, and did not oppose removing the paragraphs relating to the metering and accounting claims, as those counterclaims had already been abandoned.

[1185] Nova argued that it sought to add the paragraph as an alternative plea. Section 3.2(a) of the OSA is referenced in the immediately preceding paragraph, and a breach has already been pled. Nova also pointed to the Statement of Defence to the Third Amended Counterclaim, which pleads unenforceability. Nova submitted that the amendment it seeks may be over-pleading, but the reason Nova sought to amend the Reply at this stage was to ensure Dow was not taken by surprise by this argument.

[1186] The Court can permit amendments to pleadings after pleadings have closed, pursuant to rule 3.65 of the *Alberta Rules of Court*, AR 124/2010. The threshold for amending pleadings is very low, given the importance of accurate pleadings: *Ignition Energy Ltd v Direct Energy Marketing Ltd*, 2011 ABQB 90 at paras 10-11. In *Ignition* at para 11, the Court cites the classic rule from *Balm v 3512061 Canada Ltd*, 2003 ABCA 98 at para 43 that an “amendment should be allowed, no matter how careless or late, unless there is prejudice to the other side”. Further, the Court of Appeal commented that: “There is no deadline for amending, and pleadings can even be amended at trial; but that does not mean that the passage of time is irrelevant”: *Attila Dogan Construction & Installation Co v AMEC Americas Ltd*, 2014 ABCA 74 at para 24.

[1187] The court will grant leave to amend a pleading unless one of the following exceptions applies:

- a) the amendment would cause serious prejudice to the opposing party, not compensable in costs;

- b) the amendment requested is “hopeless” (an amendment that, if it were in the original pleadings, would have been struck);
- c) unless permitted by statute, the amendment seeks to add a new party or a new cause of action after the expiry of a limitation period; and
- d) there is an element of bad faith associated with the failure to plead the amendment in the first instance: *Horst Tyson Dahlem Professional Corp v John F Schneider Professional Corp*, 2013 ABQB 601 at para 7; *Foda v Capital Health Region*, 2007 ABCA 207 at para 10.

[1188] Nova argued that none of these exceptions apply: there is no prejudice; the amendment is responsive to Dow’s position on the legality and enforceability of the OSA and is therefore a legitimate amendment; it does not seek to add any new party; and there is no element of bad faith.

[1189] In response, Dow’s counsel noted that it was not clear from the amendment if it was a new allegation of fact or a new legal theory, or if, for example, it might have invited evidence. Also, the timing is not irrelevant; the timing matters. This was a new theory advanced on the last day of trial.

[1190] Although the application was argued following the completion of the evidence, Dow was given notice of the application by letter dated September 14, 2015, and I can identify no prejudice to allowing the amendment. I conclude leave should be granted to Nova to amend its pleading and file the Reply.

XIII. Facts

[1191] The findings of fact set out in the Dow claim decision, as well as those in Appendix A, are adopted and incorporated as findings of fact to the extent they are relevant to this counterclaim. Appendix B, the Acronym Glossary, is also adopted and incorporated into this counterclaim decision. Finally, Appendix C is adopted and incorporated into this counterclaim decision. It is a summary of the evidence of the three experts who testified on competition issues raised in the counterclaim: Drs. Waverman, Shehadeh and Mazzarotto.

[1192] The following additional findings of fact are specifically relevant to the counterclaim.

[1193] UCC and Nova entered into a joint venture to construct and operate the E3 ethylene cracker at Joffre, Alberta which began operating in 2000. Dow acquired UCC in 2001, and thus acquired its interest in E3. In its counterclaim, Nova alleges that Dow’s acquisition of UCC’s interest in E3, including the assumption of its contractual obligations, restricts Dow ability to acquire and retain ethane feedstock in the Pool Area.

[1194] On April 28, 1997, while negotiations with respect to the joint venture were ongoing, Nova and UCC made a joint submission to the Canadian Competition Bureau requesting an Advance Ruling Certificate (ARC) with respect to the proposed joint venture. The submission included the following statement:

In our view, the Proposed Transaction will not give rise to any substantial lessening or prevention of competition within the meaning of the merger provisions of the Act for the reasons described below.

[1195] The submission identified ethane and ethylene and their by-products as the relevant products markets for the purpose of the *Competition Act* and Western Canada as the relevant geographic market for ethylene.

[1196] The submission included the following statements:

- a) the proposed transaction “will not substantially change either party’s relative position in any of these markets or confer upon either party the ability to exercise market power or act independently of the market”; and
- b) the proposed transaction “does not involve the acquisition or elimination of an existing competitor or source of production or supply of ethylene in Western Canada.” The submission noted that, instead, the joint venture would result in the expansion of Nova’s existing ethylene production capacity. The submission stated that UCC’s only interest in ethylene production in Canada was its 50% ownership interest in a facility in Eastern Canada, and that, in Western Canada, companies associated with UCC purchased ethylene from each of Nova and Dow. Consequently, UCC’s participation in the proposed transaction would represent new entry into the production of ethylene in the Western Canadian market. “New entry and new supply are the antithesis of monopolistic behaviour.”

[1197] The joint venture agreements were attached to the submission, but the submission itself merely said that Nova would buy ethane for the Joffre Site, and did not reference any restrictions on UCC in that regard.

[1198] The ARC was issued on May 16, 1997, about two weeks later. It was renewed in 1998 and again in May 1999.

[1199] In August 1999, the Dow/UCC merger was announced.

[1200] Mr. Flint, who at the time was Vice President, Western Olefins, responsible for Nova’s feedstock and western ethylene business, and Mr. Tulk, who was then Nova’s Manager of the Western Feedstock Business reporting to Mr. Flint, both testified about Nova’s concerns about the merger and about discussions that occurred within Nova after the announcement. At that time, Mr. Tulk was responsible for the day-to-day activity of getting feedstock to the Joffre Site, as well as developing new feedstock projects.

[1201] They testified that Nova was concerned about having to share ethane contract information as required by the E3 joint venture agreements with the only other major purchaser of ethane in Alberta, and its major competitor. From the time of the announcement of the merger, Mr. Tulk explicitly directed Nova staff that information with respect to contracts for ethane supply that had been made available to UCC, including information with respect to contract volumes, prices and terms, was not to be made available to Dow. He requested UCC not to share with Dow existing information of that kind that it had received from Nova.

[1202] Mr. Tulk testified that he was concerned that if Nova did not do something to address the flow of information under the E3 agreements, Dow would have access to information about the costs of making ethylene at all four ethylene crackers in Alberta, through their cost-of-service agreements at E2 and the E3 agreements.

[1203] On April 3, 2000, Dow and UCC filed an application for approval of the merger with the Competition Bureau and the US Federal Trade Commission (FTC).

[1204] Mr. Flint testified that he had asked George Pan, then the head of Nova's Ethylene Business Team (EBT), for his thoughts on the merger. Mr. Pan noted in an email of May 11, 2000 to Mr. Flint that, without the merger, Dow had access to about 40% of ethylene supply in Alberta, Nova had about 30% and UCC had about 30%. With the merger, the ratio became Dow 70% and Nova 30%. Mr. Pan suggested that Dow should be required to divest its ownership in E3 in order to reduce its potentially dominant control of ethylene supply in Alberta. Mr. Pan was also concerned with Dow's access to Nova's cost data. Mr. Flint agreed with these concerns, and in a May 11, 2000 email, raised them with Mr. Boivin, a senior vice president of Nova.

[1205] Nova made submissions to the FTC and the Competition Bureau objecting to the merger, and arguing that, as a condition of approval of the merger, Dow should be required to divest its interest in E3.

[1206] Nova complained that the merger would give Dow Canada:

- a) an unfair advantage in the ethylene market because of Dow's access to and understanding of Nova's cost structure, including its ethane costs; and
- b) market power in the purchase of ethane by reason of its access to and knowledge of Nova's ethane supply arrangements. Nova requested that Dow Canada be required to divest its interest in E3 or, alternatively, that Dow Canada's access to information be restricted.

[1207] Nova's requests were not granted.

[1208] On May 15, 2000, Nova notified the Competition Bureau that the E3 joint venture transaction had closed and E3 was substantially complete.

[1209] Dow and UCC received approval of the merger on February 6, 2001, with a letter indicating that the Competition Bureau had conducted a comprehensive review of the proposed merger, had worked with the FTC in doing so, and had not found any issues with ethane or ethylene in Western Canada.

[1210] On February 14, 2001, Mr. Tulk met with Mr. Flint and Mr. Pan to discuss Nova's strategy about the merger. The notes of this meeting reflect discussions about feedstock supply to E3. They note the options of buying Dow out of E3 and using the E1 Toll and the LP7 ethylene supply as "potential deals". Under the heading "Dow Issues/Interfaces", the notes reflect outstanding issues with the E1 and E2 tolls. Under "E3", the notes reference "supply of feedstock to E3 – conflict, independence". Under the heading "Nova's Wish List", the notes include reference to "minimize ethylene to Dow" and "back Dow out of E3". Under the heading "Dow out of ethane pool", the notes reference "2 separate buyers", "Dow help out Nova ethane shortage", and "increases Nova autonomy in managing pool". Mr. Flint conceded that in the wake of the merger, Nova came to the view that it could not interact with Dow as it had with UCC.

[1211] Despite the lack of conditions imposed by the Competition Bureau, Nova continued to refrain from complying with section 5.1(e) of the OSA, which entitles the Co-owners of E3 to access to contracts entered into by the Operator for ethane, including a synopsis of each contract "having a material effect on the Pool", and section 5.2 of the OSA, which provides for meetings of a feedstock committee with representation from each Co-owner to review the Operator's strategy for ethane, and seek advice and consensus. Mr. Flint testified on cross-examination that those meetings stopped due to competition law concerns shared by both parties.

[1212] Following this, Dow continued to purchase ethane to supply to LHC-1 and for the E1 Toll without objection from Nova. Nova concedes that it was aware of Dow's ethane acquisitions in the Pool Area from the time of the merger.

[1213] On June 23, 2006, Dow served Nova with a Notice of Default pursuant to section 9.01(c) of the COA alleging defaults of the COA and the OSA relating to ethane allocation, failure to optimize production at E3 and other breaches, all of which are the subject of the Dow claim decision. Dow issued the statement of claim that commenced this litigation on June 29, 2006.

[1214] On July 21, 2006, Nova responded, stating that the Notice was invalid and the allegations baseless. Nova also noted that "[i]f further action is taken ... Nova ... will pursue all remedies available to it for Dow's improper actions under the Project Agreements".

[1215] On July 25, 2006, Nova served Dow with a Notice of Default pursuant to Article 9 and section 5.1(a) of the OSA, alleging that Dow's acquisition of "Ethane" from the Pool Area was contrary to section 5.1(a) of the OSA. The Notice references a variety of named facilities, "amongst others", which cover the majority of Dow's ethane supply portfolio. Mr. Tulk of Nova described this as "just a listing of all the agreements that they had that were producing spec ethane onto the Alberta gathering system". Mr. Flint acknowledged that Nova had known about all of the named facilities except one for years before the Notice was issued. Nova describes this as an "omnibus notice."

[1216] Dow responded by letter of July 27, 2006, indicating that the assertions and the facts underpinning the Notice:

... are made under the misguided notion that [Dow] is somehow in default under the [OSA] because of its acquisition of Ethane in the Pool Area. We examined this issue prior to the consummation of the Union Carbide merger and did so again before issuing Dow's Notice of Default. ... We have received firm advice of counsel that those provisions of the OSA that purport to preclude [Dow] from acquiring Ethane in the Pool Area and the consequences of breach of them should be regarded as unenforceable. This is because [Dow] and Nova would be parties to an agreement to prevent or lessen, unduly, competition ... if they were to abide by the exclusivity provisions. This is a criminal offence.

...

Nova Chemicals has sanctioned, built on and profited by [Dow's] acquisition of Ethane in the Pool Area as a result of various commercial arrangements with [Dow] with respect to the processing for [Dow] or acquisition from [Dow] of some of that Ethane. Until the last few days, we had believed this was because you understood and shared our analysis.

[1217] The letter indicates that the source of the illegality and unenforceability of the provisions is section 45 of the *Competition Act*, setting out offences in relation to competition.

[1218] The letter also notes that:

Before the Union Carbide merger, there were two main competitors for Ethane in the Pool Area (Nova and [Dow]). Our position has been that this competition needs to be maintained after the merger and the substance of this position was communicated to [Nova] shortly following the merger. We have, to your

knowledge, refrained from exercising rights under the OSA related to Ethane acquisitions by Nova to be consistent with this position.

[1219] In response the following week, Nova's then-President of Olefins wrote:

I specifically wish to note that Nova Chemicals does not agree with Dow's analysis of the competition law aspects of the prohibition on purchasing Ethane in the Pool Area. The Canadian Competition Bureau reviewed the E3 agreements at the time of establishing the [joint venture] and would have had the opportunity to do so again when Dow acquired Union Carbide. We received no comments from the Competition Bureau at either time on this point. As well, we have no recollection of any conversation with or written notice from Dow at or subsequent to the time of the merger with Union Carbide on this point.

We have had conversations with Dow over the years, firstly as to the matter of unwinding the Pool and the provision of Dow of some of the Ethane Nova Chemicals' has contracted, and more recently around Dow's suggestion that it assign some of its ethane contracts to Nova Chemicals in exchange for preferential loading of E3. Dow has made numerous suggestions and requests in these and other regards but at no time until your letter has Dow suggested that the clause in question is unenforceable on the grounds that compliance with it constitutes a criminal violation of the *Competition Act*.

[1220] On March 28, 2007, Nova served Dow with a second Notice, stated to be pursuant to section 5.15 of the OSA. This Notice indicated that Nova objected to Dow's acquisition of ethane from Interpipeline Fund (IPF) at the "Empress V" facility, and referred to an IPF press release of October 17, 2006 describing the acquisition.

[1221] While Mr. Flint acknowledged that Nova had known about the proposed transaction since 2001, he testified that Nova did not know the "precise impact" until the press release. On May 29, 2007, Nova informed Dow that, given Dow's failure to comply with section 5.15, it was in "material breach" and that Nova may avail itself of its rights under Article 9 of the COA.

[1222] On August 8, 2007, Nova issued a third Notice, this one relating to Dow's Keyera Rimbey gas plant ethane acquisition.

[1223] On March 9, 2010, Dow issued a Notice of Default relating to its ethane purity and liquid co-products claims, which are referenced in the Dow claim decision.

[1224] On October 25, 2010, Nova issued a Notice pursuant to section 3.2 of the OSA, objecting to Dow Canada's opposition to an application before the Energy Resources Conservation Board by Tylor Processing Inc. to extract ethane from one of its plants at Harmatton, Alberta. Nova had an agreement to purchase this ethane.

[1225] Finally, on October 26, 2012, Nova issued a Notice pursuant to section 5.15 of the OSA with respect to the Keyera Rimbey gas plant "deep cut" project. This Notice referred to a Keyera press release dated October 1, 2012. Mr. Flint acknowledged that Nova knew that this project would not produce ethane for Dow until October 2015, and also knew that Nova would not have an ethane shortfall by that time.

XIV. Positions of the Parties on the Counterclaim

A. Nova's Position

[1226] Nova submits that if Dow acquires Ethane in the Pool Area other than from the Pool, Nova may elect to trigger the procedures and remedies set out in section 5.15 of the OSA. Nova argues that it is entitled to object should it consider that an Ethane acquisition by Dow (other than in circumstances not relevant to this action) is not in Nova's best interest as a Pool User. In such circumstances, Nova may in its sole discretion issue a Section 5.15 Notice to Dow objecting to Dow's Ethane acquisition.

[1227] Nova concedes that, while its decision as to whether to issue a Section 5.15 Notice is discretionary, the criteria that must support that decision are not. The objection must be governed by Nova's interests as a Pool User. Nova's best interests as a Pool User will include consideration of all of its Ethane needs, including for use at E1, E2, and E3. In this regard, Nova may act in its economic self-interest, but also remains subject to the general principle of good faith and the duty of honest performance set out in section 3.11 of the COA: *Bhasin* at paras 33, 70, 73, 86 and 93 .

[1228] Upon receipt of a Section 5.15 Notice from Nova, Dow is required to provide Nova with the full particulars of the ethane acquisition contract at issue. Dow then has 60 days to make:

- a) a cash payment to Nova; and
- b) an election as to how to dispose of the contract.

[1229] Nova says failure to comply is a material breach of the OSA, entitling Nova to terminate the joint venture under Article 9 of the COA.

[1230] Nova states that it issued the July 25, 2006 notice because it realized from Dow's commencement of litigation that Dow was no longer willing to work with Nova to address what Nova characterizes as an ethane shortage. Nova submits that, at that point, it realized that, not only was Dow impeding Nova's ability as Operator to secure Ethane for Nova as a Pool User in what it says was an ethane-short environment, Dow was seeking to hold Nova liable for the resulting Ethane shortage in the Pool and therefore for use at E3.

[1231] Nova also submits that, over the years, Dow deliberately concealed from Nova its belief that the section 5.15 remedies were illegal, while at all times seeking the benefits of the Ethane Services provided by Nova.

[1232] Nova seeks a judgment:

- a) declaring that Dow has failed to comply with section 5.15 of the OSA;
- b) declaring that, as a result of Dow's breaches of section 5.15 of the OSA, Nova is entitled to terminate the E3 joint venture and access the remedies contained in section 9.02 of the COA;
- c) in the alternative to (b), an order for specific performance, requiring Dow to comply with the procedures contained in section 5.15 of the OSA in respect of each of the Section 5.15 Notices of Objection issued by Nova;
- d) granting payment in the amount of \$10,823,806.00 CAD under section 5.15(b)(i) of the OSA;

- e) granting payment in the amount of \$3,758,642.00 USD for damages arising from operating E3 at low conversion;
- f) declaring that Dow has breached its contractual duty to act honestly and in good faith under section 3.11 of the COA and, as a result, Nova is entitled to terminate the E3 joint venture and access the remedies contained in section 9.02 of the COA;
- g) granting payment in the amount of \$428,814.89 CAD for damages arising from the liquid co-product claim;
- h) declaring that Dow shall continue to pay the amount of \$10,471.67 CAD per month for the liquid co-product services provided by Nova until such time as Nova and Dow can conclude a definitive agreement to replace the Marketing Agreement;
- i) granting payment in the amount of \$334,426.52 CAD for damages arising from the water usage claim; and
- j) interest on all amounts owing from the date such amount became payable to the date of payment.

B. Dow's Position

[1233] Dow notes that Nova did not assert the position it takes in the counterclaim during five years of E3's operation, until Dow sued Nova in mid-2006. Although the notices it sent Dow suggest that Nova may exercise rights under Article 9, it never purported to do so. Dow submits that Nova has invented a concept that is not in the OSA called "sufficient ethane contracts", under which it is entitled to require Dow to dispose of "sufficient ethane contracts to allow Nova to fill the Pool".

[1234] Dow submits that the counterclaim must fail because:

- a) Nova's ethane case is not supported by the evidence;
- b) Nova's interpretation of the Article 5 provisions are contrary to the joint venture agreements and are over-reaching. Dow submits that the correct interpretation is that Nova was to be the E3 Co-owners' sole ethane buying agent for the joint venture Pool, and thus the Joffre Site; and
- c) in the alternative, parts of Article 5 are unenforceable, either as a common law restraint of trade or as a violation of competition law, or both, and both parties have long recognized this.

XV. Relevant Contractual Provisions

[1235] The following provisions of the E3 joint venture agreements are relevant to the issues in this counterclaim. Section 5.1 of the OSA provides that:

Subject to the terms and conditions of this Agreement ... Ethane Services will be provided, and all activities in respect thereof will be conducted, in accordance with the following principles with the objective of securing for the Co-owners the lowest cost, secure supply sources of Ethane for the Pool:

- (a) only the Operator shall acquire Ethane from the Pool Area; ...

[1236] Ethane Services are defined as “that portion of Services to be provided by the Operator relating to the acquisition ... of Ethane ...”.

[1237] Services are “all services and utilities to the extent required to be supplied to or at the Plant to permit the Operator to conduct the Operations ...”.

[1238] Ethane means “an ethane rich hydrocarbon mixture conforming to the quality and component specifications established by Operator from time to time”.

[1239] Nova submits that the Operator established the quality and component specifications for Ethane during E3’s design phase in 1998, through the “Feedstock specification of the Process Design Basis.” However, it is clear that the quality and component specifications are not static, and that Nova as Operator has updated them from time to time.

[1240] The Pool is defined as “at any particular time ... the aggregate of all Ethane acquisition, storage and transportation arrangements ... existing at such time which have been entered into or obtained by Operator in providing the Ethane Services.”

[1241] “Operations” means the work and activities performed by the Operator in respect of the Plant pursuant to the terms of the OSA or in accordance with the direction of the E3 Management Committee.

[1242] The Pool Area is defined as “the geographic region of Western Canada from which it is then physically possible to transport Ethane to the area surrounding Ft. Saskatchewan, Alberta”.

[1243] Section 5.1(e) of the OSA provides that:

Pool Users shall not be entitled to have access to, receive copies of or assert an interest in any rights, contracts or arrangements obtained or entered into by Operator in providing the Ethane Services, provided however, the Operator will provide to Pool Users:

- (i) a synopsis of each contract for the acquisition or transportation of Ethane, and of each other contract with respect to Ethane Services (excluding contracts of one Month or less in duration) having a material effect on the Pool, ... and
- (vi) with respect to contracts of one Month or less in duration with Affiliates of Operator, a monthly summary identifying the price and volume of each transaction.

[1244] Pool Users means:

- a) Nova, in respect of the quantity of Ethane that Nova has requested from the Operator and the Operator has agreed to supply for E1, E2, E3, future site facilities, a minor pipeline use and additional ethane that Nova may request (but never has); and
- b) Union Carbide (now Dow) with respect to the quantity of Ethane that Dow has requested delivery of from the Operator and the Operator has agreed to supply for E3, future site facilities and additional ethane that Dow may request (but never has).

[1245] Section 5.2 of the OSA provides for the establishment and operation of a Feedstock Subcommittee as follows:

The Management Committee shall establish a feedstock committee as soon as practicable after the execution of this Agreement. The subcommittee shall be

composed of equal representation from each Co-owner and representatives need not also be members of the Management Committee. Every three Months (or such other period of time determined by the Management Committee) the feedstock subcommittee shall meet with the Operator. At each meeting of the feedstock subcommittee the Operator will review its strategy for Ethane and Ethane Shrinkage acquisition including, but not limited to, tactical plans, inventory plans, commitments in respect of Ethane pre-production Fixed Costs, contract portfolio structure and Ethane transportation and storage systems and shall seek the subcommittee's advice, input and consensus regarding such strategy. Notwithstanding the above, the Operator shall not require the consent of Union Carbide, the Management Committee or the feedstock subcommittee prior to entering into any Ethane, Ethane Shrinkage or fuel gas acquisition, transportation or storage arrangement or prior to providing any of the Ethane Services in accordance with the provisions of this Article 5.

Section 5.8 of the OSA provides a procedure for when a Co-owner wishes to acquire ethane from the Operator for a use exclusive of its Joffre Ethane. This requires a request from the Operator and notice to the other Co-owner. The Operator is to comply with the request unless the other Co-owner, "acting reasonably" is of the opinion that the acquisition would significantly increase the average cost of the ethane to the Pool. If there is such an objection, the Operator will obtain the ethane for the sole account of the requesting Co-owner, unless the non-requesting Co-owner is of the view that complying with the request would significantly prejudice the Operator's ability to provide Ethane Services for the Pool. If the requesting Co-owner acquires ethane for its own account after all of these steps have been followed, the non-requesting Co-owner has the option of unwinding the Pool under section 5.17.

[1246] Section 5.15 of the OSA provides as follows:

Termination of [Dow's] Participation in the Pool

In the event [Dow] directly or indirectly acquires Ethane from any source in the Pool Area other than from the Pool except in the circumstances provided for in Section 5.8(e) [not relevant to this decision], then the following procedures will apply:

- a) should Nova consider [Dow's] Ethane acquisition not to be in the best interest of Nova as a Pool User, Nova may provide [Dow] with written notice of its objection to the Ethane acquisition;
- b) upon receipt of Nova's notice of objection [Dow] shall provide Nova with the full particulars of the acquisition contract and [Dow] shall have 60 days in which to:
 - (i) pay Nova an amount equal to the lesser of ten (10%) percent of the payments to be made by [Dow] over the first 12 Months of such contract, or \$1,000,000.00; and
 - (vii) dispose of the contract by any of the following methods:
 - (A) terminating the contract;
 - (B) assigning the contract to an unrelated third party for its own use; or

- (C) requesting the Operator to accept an assignment of the contract;
- c) should [Dow] request the Operator to accept an assignment of [Dow's] Ethane contract, Nova shall have the right to request the Operator to do one of the following:
- (i) accept assignment of the contract and include the Ethane volumes in the Pool;
 - (ii) accept assignment of the contract but not to include the Ethane volumes in the Pool with the total costs of Ethane acquisition associated with such contract, including Ethane acquisition, transportation and storage costs being for the account of Union Carbide; or
 - (iii) dissolve the Pool in accordance with Section 5.17;
- d) in the event that [Dow] fails to comply with the terms of this Section 5.15 , such failure shall be deemed to constitute a material breach of its obligations and shall avail Nova of its rights and entitlements under Article 9 of the COA.

[1247] Section 3.11 of the COA provides that each Co-owner “agrees to act honestly and in good faith, and in accordance with the provisions of this Agreement and the other Project Agreements, with respect to the ownership and use of the Plant, and to exercise the degree of care, diligence and skill that a reasonably prudent person would exercise as Co-owners in comparable circumstances”.

[1248] Article 9 of the COA provides that a breach in any material respect by a Co-owner that is not cured within 30 days of receipt of notice of such breach is an event of default. Section 9.02 provides as follows:

Rights Upon Default

- a) General: A Co-owner in respect of which no Default has occurred which is continuing (the “Non-Defaulting Co-owner”) shall have the right, in respect of any Defaulting Co-owner:
- ...
- (iii) to bring any action at law or in equity as may be permitted in order to recover damages or for such other remedy or remedies as may be available to it;
 - (iv) to pursue such rights and remedies as provided in the Project Agreements.
- b) Dissolution/Wind-up: In the event that a [material default] is not cured and is continuing for a period of at least three (3) months following receipt of notice of breach by the Defaulting Co-owner (and during which period the parties have been unable by diligent and good faith negotiations to resolve the same), then the Non-Defaulting Co-owner shall have the right, at its option and without limiting any other rights and remedies that may be available to it, to invoke the provisions of this Section 9.01(b) [*sic*] and to request an appraisal be made of each Co-owner's Selling Interest, in accordance with the provisions of Sections [*sic*] 7.01(c) hereof. Within ninety (90) days after receipt of the Appraised Price for each Selling Interest:

...

- (iii) if the Non-Defaulting Co-owner is [Dow], it shall notify the Defaulting Co-owner either that it wishes to purchase the Defaulting Co-owner's Selling

Interest at the Appraised Price or that it wishes to sell its Selling Interest to the Defaulting Co-owner at the respective Appraised Price; provided, however, that, if the Default arises from a material breach by Nova in the performance of its obligations in any capacity other than its capacity as a Co-owner, [Dow's] right hereunder shall be limited to the right to acquire Nova to purchase [Dow's] Selling Interest and that, in such event, the purchase price shall be equal to the Appraised Price plus twelve and one-half percent (12.5%) of such Appraised Price, and

- (iv) if the Non-Defaulting Co-owner is Nova, it shall notify the Defaulting Co-owner that it either wishes to purchase the Defaulting Co-owner's Selling Interest at the Appraised Price or that it wishes to sell its Selling Interest to the Defaulting Co-owner at the Appraised Price.

...

XVI. Issues

- A. What do sections 5.1(a) and 5.15 of the OSA mean?
- B. Given the interpretation of Sections 5.1(a) and 5.15 of the OSA, do they place restrictions on Dow's ability to acquire ethane for LHC-1?
- C. Has Dow breached its duty to act honestly and in good faith pursuant to section 3.11 of the COA?
- D. Did the Dow Plaintiffs breach the OSA by effecting the Dow/UCC merger?
- E. Are the notices issued by Nova valid?
- F. What are Nova's remedies for Dow's contractual breaches, if any?
- G. Are sections 5.1(a) and 5.15 of the OSA unenforceable as a common law restraint of trade?
- H. Are sections 5.1(a) and 5.15 of the OSA illegal and unenforceable under the Competition Act?

XVII. Analysis

[1249] The principles of contractual interpretation as outlined in the Dow claim decision are incorporated into this counterclaim decision, and form the basis for my analysis of the issues as it relates to interpretation of the contractual provisions.

A. What do Sections 5.1(a) and 5.15 of the OSA mean?

[1250] Nova starts with the proposition that, although section 5.1(a) of the OSA provides that only the Operator may acquire Ethane in the Pool Area, it does not prohibit Dow from acquiring ethane in the Pool Area, either through a request to the Operator to acquire ethane on behalf of Dow for uses other than at the Joffre Site, or by circumventing the section 5.8 proceeding and acting directly. By doing so, however, Dow opens itself to the risk that Nova may object and the section 5.15 remedies may be triggered. In other words, the material breach alleged by Nova is

not the acquisition of ethane; it is Dow's failure to comply with the procedures set out in section 5.15.

[1251] Nova submits that the section 5.15 remedies are the *quid pro quo* for the provision of Ethane Services, and that breach of section 5.15 can lead to termination of the Pool, on the basis that the principle on which the Pool was founded is no longer being followed. It submits that Dow, in purchasing ethane in the Pool Area, is competing with the Operator, contrary to the express requirements of the OSA for what it describes as a finite supply of Ethane for the Pool.

[1252] Dow submits that Article 5 merely restricts Dow from acquiring Ethane in its capacity as a Co-owner of E3, and that the Dow plaintiffs are only restricted from acquiring ethane for the purposes of E3.

[1253] Dow argues that this interpretation is consistent with the underlying principles of the OSA and the other joint venture agreements, in that the parties contracted in carefully described and limited capacities, and that the reach of the Article 5 restrictions is circumscribed by the roles that the parties have at the Joffre Site. Dow gives as an example section 21.6 of the OSA, which deals with insurance policies, but refers to Nova or Dow, "whether in their capacity as Operator, Co-owner or owner or operator of other facilities".

[1254] Thus, Dow submits, the OSA includes an express recognition that the parties have capacities other than the ones in which they entered into the OSA, such as "the owner or operator of other facilities". The nature of the parties as competitors is recognized in most of the joint venture agreements, which was necessary as, at the time, Nova had other facilities.

[1255] Thus, while section 5.1(a) is clear enough – only the Operator shall acquire Ethane from the Pool Area – Union Carbide, or now Dow, is restricted under section 5.5 in its capacity as Co-owner, and not in any other capacity. Co-owners are defined as Union Carbide and Nova in their respective capacities as owners of the Plant and not in any other capacity. UCC entered into the OSA "in its capacity as a Co-owner". If Dow Canada as a successor to UCC acquires Ethane in the Pool Area, not as a Co-owner but in another capacity, such as an owner of LHC-1, the provision in section 5.15 is not triggered.

[1256] Section 6.1 of the Options Agreement, which provides the Co-owners with an option to call for the construction of a fourth ethylene plant, provides that if UCC participates in or agrees to participate as an equity owner in the construction of a new or upgraded ethylene production facility in western Canada, it loses its right to participate in the fourth plant. Thus, the parties addressed their minds to the potential that UCC may construct another plant in the Pool area.

[1257] Dow submits that this means that the parties anticipated that UCC (or now Dow) would be able to obtain ethane for its new plant. While Nova responds that, in that eventuality, UCC or Dow should be required to request the Operator to supply ethane for that new plant as the OSA allows the Co-owners to do, Dow says that this argument makes no commercial sense, as Nova in its capacity as Operator can refuse such a request, and thus Nova could prevent its competitor, be it UCC or Dow, from constructing a new facility.

[1258] Under Nova's theory, only Nova would be allowed to acquire ethane in the Pool Area and enjoy any assurance of keeping it. This is inconsistent with the commercial context at the time the joint venture agreements were entered into. At that time, there were two purchasers of ethane in the Alberta marketplace: Dow and Nova. The joint venture entered into by Nova and UCC maintained that status quo. UCC was able to enter the Alberta market with a secure source

of ethane for its operations, and Nova was able to obtain a partner to share the massive expense of constructing and operating E3, and could avoid the entry of a third purchaser of ethane in the market. While Nova tends to characterize the joint venture as being unbalanced in favour of UCC, there is no evidence of that, and the joint venture agreements tell a different story.

[1259] The merger merely perpetrated the status of the market: there were still two buyers of ethane in the Alberta market.

[1260] Nova submits that the joint venture agreements sought to prevent its Co-owner from undermining its efforts to purchase ethane for the Joffre Site. That may be true, in that it prevented a third buyer of ethane, UCC, from entering the market. However, the merger did not change the *status quo* of the two buyers. It is important to note that there is no evidence that Dow Canada supplied Dow Europe, which is entitled to the output of E3, with ethane. Its acquisition activities remain, as before, directed to the supply of ethane for LHC-1 and the E1 Toll.

[1261] Dow says that the problem with Nova's theory is that Nova recognizes that a prohibition of ethane acquisition by Dow in a non-Co-owner capacity would effectively make Nova the single ethane buyer in a one-buyer market, plainly an anti-competitive result.

[1262] As Dow notes, Nova's position with respect to interpretation of the provisions has changed over the course of the litigation. Its July 25, 2006 letter alleges breach of section 5.1(a). Mr. Broenink testified that Nova's complaint was that Dow had purchased ethane in the Pool Area when it was not allowed to do so. Nova's first statement of defence repeated that section 5.1(a) banned the acquisition of ethane by Dow in the Pool Area, but also alleged that Dow was prohibited from acquiring ethane surplus to its needs from the Pool Area. These somewhat contradictory allegations continued to be asserted through the pre-trial period. At the beginning of the trial, Nova's position was that Dow is entitled to acquire ethane to meet its needs and to maintain a "comfortable" level of inventory. Mr. Flint testified that Nova had always maintained that Dow could acquire whatever ethane it needed to meet its needs, and that Nova had never maintained that Dow could not or should not compete with Nova for ethane in the Pool Area.

[1263] Nova's present position is that Dow can acquire all the ethane it wants, but if it does, Nova may impose severe consequences on it.

[1264] The consequences of this interpretation are troublesome for Nova's theory. The July 25, 2006 letter requires Dow to disclose particulars of the majority of its portfolio of ethane contracts, something the parties have both recognized from the beginning would be anticompetitive, and which Nova has ensured that it need not do by refusing to comply with sections 5.1(e) and 5.2 of the OSA. While on the one hand, Nova appears to acknowledge that Dow is entitled to acquire ethane to meet its needs and to maintain a comfortable level of inventory, plainly a divestiture by Dow of the contracts objected to by Nova in 2006 would not permit Dow to do so.

[1265] Section 5.15 is not permissive, but mandatory on Dow, and would result in serious issues with respect to competition under Nova's theory.

[1266] Nova now submits that, in complying with section 5.15, Dow need not dispose of all of the contracts to which Nova objects, as section 5.15 clearly provides. Instead, now Dow must dispose only of "sufficient" ethane contracts to allow the Operator to fill the Pool at the lowest cost to the Co-owners" or, apparently, in the alternative, of sufficient ethane contracts to allow the Operator to secure supply sources of Ethane for the Pool at the lowest cost to the Co-owners.

As noted by Dow, it is unclear how it was supposed to determine what this would require. This theory has no basis in the actual language of section 5.15.

[1267] Dow submits that these “contortions” of the contract would be avoided if section 5.1(a) only makes Nova the Co-owners’ ethane buying agent for the Joffre Site. Dow says that this is consistent with what Nova told the Competition Bureau in 1997, that Nova would buy ethane for Joffre.

[1268] Dow cites a statement in the letter to the Competition Bureau requesting the ARC to the effect that the OSA was an agreement for Nova to purchase and pool all ethane feedstock required for the Joffre Site. Nowhere in the letter is reference to the restrictions at issue. While the Co-owners can ask the Operator to supply Ethane from the Pool for other uses, that provision has not been used, and requires the Operator’s agreement.

[1269] Nova also told the Competition Bureau that the joint venture was going to retain the competition for ethane that already existed. Dow suggests that the way the submission to the Bureau was described may help explain why the Bureau did not find that the Article 5 restrictions were anticompetitive, but that is mere speculation.

[1270] On Dow’s theory, Dow did not breach section 5.15, and there is no need to consider whether the provisions are anticompetitive.

[1271] Dow’s interpretation of sections 5.1(a) and 5.15 is consistent with how the parties have operated since the completion of E3 and the commencement of operations. For five years, Nova was the sole purchaser of Ethane for the Pool. Dow has continued to acquire ethane for LHC-1 or for the E1 Toll or for other purposes not related to E3. Nova has not complained, but has promoted the use of the E1 Toll because, as Mr. Broenink testified, it was financially advantageous to Nova. Nova has purchased spot ethane from Dow on a number of occasions.

[1272] Nova stopped sharing ethane contract information with Dow and stopped holding Feedstock Subcommittee meetings in breach of sections 5.1(e) and 5.2 of the OSA, without complaint from Dow, because both parties recognized that compliance would improperly interfere with continued competition between Dow and Nova.

[1273] Nova has the following response to Dow’s interpretation of the Article 5 provisions:

- a) that they require a “notional severance” that reads down Article 5. I do not agree. Dow’s interpretation finds its source in the wording of the OSA, and requires no severance of any terms;
- b) that the purpose of having the parties execute the OSA in “capacities” was to define the role and obligations of the Operator, not to limit the obligations of the Co-owners. There is no evidence of the intention of the parties in this respect, and the wording of the agreements is inconsistent with this interpretation, in that it recognizes that the Co-owners have other capacities;
- c) that Dow’s interpretation makes the section 5.15 remedies redundant and meaningless. This is not correct: if Dow purchases ethane for use at the Joffre Site, it would be caught by section 5.15;
- d) that a reading of the whole of Article 5 shows that it is a complete code for the acquisition of Ethane for all of Nova’s and UCC’s needs in the Pool Area, both on and off the Joffre Site, for so long as the Pool continues to exist. If one of the

Co-owners wants Ethane for purposes other than at Joffre, then sections 5.7 and 5.8 (the Proprietary Ethane sections) provide the means by which Ethane is to be acquired. These sections – and Article 5 as a whole – only make sense if the OSA binds the Parties in the normal sense (i.e., completely). This submission is inconsistent with Nova’s own conduct in refraining from complying with sections 5.1(e) and 5.2;

- e) that Dow’s interpretation results in a “fundamental inequality” between the Co-owners, as Nova would not be able to purchase Ethane for its own use at E1 and E2 and exclude such volumes from the Pool, but Dow would be entitled to buy ethane for “any other uses it chooses”. This is not correct: Dow’s interpretation prevents it from acquiring ethane for use at E3 or the Joffre Site, other than for the E1 Toll, about which Nova had no complaint.

[1274] Where two interpretations of a contract are offered, one of which would validate the clause and the other would render it unenforceable, the former interpretation should be applied. I agree that the interpretation advocated by Dow is the more appropriate one, since it is consistent with the words of the contract, with the factual matrix at the time the contract was formed, and with the conduct of the parties in the five years prior to the litigation. I also find that Nova’s changeable position on the interpretation of Article 5 illustrates that the wording of section 5.15 is ambiguous. “In the face of ambiguity, the interpretation promoting business efficacy is to be preferred so long as it is supported by the text”: *IFP* at paras 86-87. As noted in *IFP*, such an ambiguity allows the court to consider the parties’ conduct post-contract, which I have done.

[1275] Dow submits, and I agree, that the interpretation is consistent with the reasonable expectations of the parties at the time they entered into the joint venture agreement. The expectation of the contracting parties, Nova and UCC, was that Nova would continue to compete with Dow for ethane, as it had in the past. Nova would be acquiring ethane for three plants on the Joffre Site, and Dow would be acquiring ethane for non-E3 or non-Joffre purposes, such as LHC-1.

[1276] Even if the words are capable of being interpreted as broadly as submitted by Nova, such interpretation should be rejected, as it would lead to a finding of unenforceability, as noted later in this decision. Thus, a validating interpretation is to be preferred: *Lancashire County Council v Municipal Mutual Insurance Ltd*, [1997] QB 897 (CA) at 910.

[1277] I accept the interpretation submitted by Dow, and I therefore find that Dow is not in breach of sections 5.1(a) and 5.15 of the OSA.

B. Do Sections 5.1(a) and 5.15 of the OSA place restrictions on Dow’s ability to acquire ethane for LHC-1?

[1278] Dow submits that LHC-1 is outside the scope of these provisions for five reasons:

1. Dow’s interpretation of these provisions is consistent with the capacities in which the parties signed the OSA.

By this, Dow means that these provisions restrict the Co-owners expressly in their capacities as Co-owners of E3 and not in any other capacity. Dow notes that the other joint venture agreements, such as the COA and the project management agreement like the OSA, defined the contracting parties in specifically limited capacities.

As noted previously, Dow refers to section 21.6 of the OSA, which states as follows:

The Operator shall use reasonable efforts to ensure that each insurance policy maintained pursuant to Section 21.4 includes:

- a) a provision that coverage is primary to any other coverage carried by either of the Co-owners;
- b) a cross liability and severability of interest clause;
- c) a provision that such policy shall survive the default or bankruptcy of the insured or claims arising out of an event before such default or bankruptcy; and
- d) a provision that the insurer shall waive all rights of subrogation in favour of Nova or Union Carbide, as the case may be, whether in their capacity as Operator, Co-owner or owner or operator of other facilities, and their respective Beneficiaries.

Thus, Dow submits, the OSA includes an express recognition that the parties to it have capacities other than the ones in which they have entered into the OSA, such as the owner or operator of other facilities. Dow says that the nature of the parties as competitors is recognized in most of the joint venture agreements, and that was necessary, as, at the time the agreements were entered into, Nova had other plants.

2. Dow's interpretation is consistent with what Nova told the Competition Bureau in 1997. Again, Dow cites a statement in the letter to the Bureau that the OSA was an agreement for Nova to purchase and pool all ethane feedstock required for the Joffre Site. Nowhere in the letter is a reference to the restrictions on UCC. While the Co-owners can ask the Operator to supply Ethane from the Pool for other uses, that provision has not been used, and requires the Operator's agreement.
3. Dow submits that because the Operator never set up any specifications for Ethane, Dow cannot be in breach for buying generic ethane, if there is such a thing.

Nova says that, prior to Nova's July 2006 letter, Dow had never complained about the fact that the Operator had not established specifications. Dow responds that the issue only arose when Nova suggested that Dow was in breach by purchasing ethane.

4. Dow's interpretation is consistent with how the parties have conducted themselves. Dow submits, until Nova's notice, both parties conducted themselves in the manner that Dow says that Article 5 contemplates and permits.

Dow notes that Mr. Flint, Nova's corporate representative, confirmed at trial that Dow may and should acquire whatever ethane it needed to meet its needs and that Nova never maintained that Dow should not continue to compete with Nova for ethane in the Pool Area. It is clear that Nova purchases ethane from Dow from time to time, both with respect to the E1 Toll and in spot purchases, without complaint.

5. As noted previously, Dow submits that its interpretation is consistent with the reasonable expectations of the parties at the time they entered into the joint venture agreements. Dow notes that the expectation of the contracting parties, Nova and UCC, was that Nova would continue to compete with Dow for ethane, as it had in the past. Nova would now be buying for three plants, rather than two, and Dow would be buying for LHC-1.

[1279] I find that Dow's submissions are persuasive, and that Nova has not made any cogent submissions to counter these arguments.

I find that sections 5.1(a) and 5.15 of the OSA, properly interpreted, do not place restrictions on Dow's ability to acquire ethane for LHC-1.

C. Has Dow breached its duty to act honestly and in good faith pursuant to section 3.11 of the COA?

[1280] Nova submits that Dow has breached its duty under section 3.11 of the OSA in three ways:

- a) first, Dow knowingly misled Nova at the time of the merger by failing to disclose its views as to sections 5.1(a) and 5.15 of the OSA, while at the same time promising to honour all covenants of the OSA;
- b) second, if Dow believed section 5.15 was illegal and unenforceable, it had a positive obligation to advise Nova of that belief so that Nova could take steps to protect its interests; and
- c) third, if Dow believed sections 5.1(a) and 5.15 of the OSA to be illegal, it sought to enjoy the benefits of Nova's contractual performance in respect of the Ethane Services in the belief that: (i) Dow would have no corresponding obligation to perform; and (ii) Nova would be unable to protect its interests in the manner agreed by the parties.

[1281] The factual basis that underpins Nova's submissions in this regard is found in events that occurred around the time of the merger.

[1282] On June 22, 2001, following the announcement of the merger but prior to the amalgamation of the Canadian Dow and UCC entities, UCC and UCESA executed an assignment agreement on the instructions of Dow. Under this agreement, UCC assigned to UCESA certain of the obligations and benefits under the E3 joint venture agreement. Nova submits that one of the primary purposes of the assignment agreement was to assign the Article 5 provisions, but there is no evidence of this, and the agreement does not specify Article 5.

[1283] UCC remained Co-owner of E3 and remains liable to Nova for the fulfillment of certain listed provisions of the joint venture agreements despite the assignment. This agreement required the consent of Nova, which was granted pursuant to a consent agreement dated May 3, 2001, signed by Nova on June 22, 2001.

[1284] The consent agreement provided that the assignment agreement would be binding on Dow. The agreement became binding on Dow in October 2001 when the Canadian merger was completed.

[1285] Nova submits that, while it was aware that Dow was buying ethane in the Pool Area, it was not aware of Dow's view that, as a result of the merger, Dow was not required to abide by the requirements of section 5.15.

[1286] It submits that, by the consent agreement, Dow "advised Nova of the exact opposite", that it obtained Nova's consent to the assignment by expressly representing its intention to be bound by all the terms of the OSA.

[1287] This is disingenuous. Nova knew at this point that Dow was intending to continue its acquisition of ethane for LHC-1 and for the E1 Toll, and also had begun itself to fail to comply with sections 5.1(e) and 5.2.

[1288] Dow Canada and Dow Europe were not the parties to the agreement, although they later became bound by it. It is therefore inaccurate to suggest that Dow “agreed to acquire Ethane in the Pool Area on Dow Europe’s behalf only in accordance with sections 5.7 and 5.8 of the OSA”. As Dow notes, there is no evidence that Dow Canada ever acquired ethane in the Pool Area on Dow Europe’s behalf, as that would have been ethane for E3, the only plant whose output Dow Europe owns. The evidence is that Dow Canada’s only acquisitions of ethane in the Pool Area were for its longstanding non-Joffre purposes, not for E3.

[1289] Mr. Flint testified at trial that, prior to him signing the agreement, no one from Dow advised him that it considered any of the provisions of the OSA unenforceable or criminal.

[1290] However, he also testified as follows:

[...] our philosophy [immediately after the merger] was to recognize that Dow had been already buying ethane in the Pool Area to support their LHC-1 plant, and Nova and Dow had an ethane streaming agreement [the E1 Toll] at the time that had Dow under the obligation of bringing ethane to the Joffre Site, so we recognized the reality that’s associated with Dow acquiring ethane in the Pool Area as soon as Dow acquired Union Carbide.

[1291] As set out previously, Nova knew about and acknowledged internally the competition concerns posed by the merger. Nova’s expressed surprise at Dow’s July 27, 2006 letter is over-stated and lacks credibility. Dow did not, as Nova submits, “lay in the weeds”. It did not conceal its acquisitions of ethane in the Pool Area, and Nova was aware from the time of the merger of the “reality that’s associated with Dow acquiring ethane in the Pool Area”. Nova is not an unsophisticated party that may not be aware of competition concerns.

[1292] As Nova itself notes, “the duty of honest performance requires only that a party not knowingly mislead or lie about matters directly linked to the performance of the contract, and the content of the organizing principle of good faith is “highly context-specific”: *Bhasin* at paras 69 and 73.

[1293] In the context of what occurred in this case, it cannot be said that Nova was denied a fair opportunity to protect its interests, had it honestly believed section 5.15 of the OSA to be enforceable against Dow in the circumstances. Nova’s conduct implies otherwise.

[1294] With respect to whether Dow had a positive obligation to advise Nova of its belief that section 5.15 of the OSA is illegal or unenforceable, there is no evidence other than letters exchanged during the course of litigation that Nova believed otherwise at the time of the merger. In the context of this case, I can find no positive duty to disclose a party’s belief about a legal position, either from the contractual provision itself or from *Bhasin*. In *Bhasin* at para 73, Cromwell, J. noted that the duty of honesty in contractual performance “does not impose a duty of loyalty or of disclosure or require a party to forego advantages flowing from the contract...” Further, “[t]he duty of honest performance ... should not be confused with a duty of disclosure or of fiduciary loyalty”: *Bhasin* at para 86.

[1295] Nova’s submission that Dow enjoyed the benefits of Nova’s Ethane Services without performing its corresponding obligations is an over-statement. Even if Dow did not comply with

the requirements of section 5.15, it has paid for Ethane Services in accordance with its contractual obligations.

[1296] Therefore, I find that Dow is not in breach of section 3.11 of the COA.

D. Did the Dow Plaintiffs breach the OSA by effecting the Dow/UCC merger?

[1297] Nova submits that the section 5.15 remedies were legal and enforceable when the E3 JV was formed. If the section 5.15 remedies are illegal and unenforceable today, it is only because of the Dow-UCC merger. As such, it submits that the Dow plaintiffs caused the section 5.15 remedies to become illegal and unenforceable. Moreover, causing part of the OSA to become illegal or unenforceable is, itself, a material breach of the OSA.

[1298] If I am wrong in holding that Dow is not in breach of sections 5.1(a) and 5.15 as they are properly interpreted, I must address this submission.

[1299] The reality is that, from the time of the merger, the parties did not conduct themselves in any way that would have been illegal as a restraint of trade or under the *Competition Act*. It is what Nova first argued in 2006 that they should do that would have caused the illegality and put the parties in breach. As a result of how the parties have conducted themselves, there has not been a breach of any enforceable term of the OSA.

[1300] The Dow plaintiffs did not materially breach the OSA through the merger, since both they and Nova recognized that the merger caused certain portions of the OSA to be inoperable. They did not conduct themselves “of their own motion” to bring about the impossibility of performance of the contract, as their merger was a by-product of the larger merger of their parent companies.

E. Are the Notices issued by Nova valid?

[1301] If I am incorrect, and the interpretation of sections 5.1(a) and 5.15 of the OSA are as submitted by Nova, the issue becomes whether Nova has properly complied with section 5.15(a), in that it has credibly considered Dow’s acquisitions of ethane that it objects to in the notices “not to be in the best interests of Nova as a Pool User”. Although section 5.15(a) does not require Nova to act reasonably, section 3.11 of the COA provides that each Co-owner will act honestly and in good faith with respect to the ownership and use of E3.

[1302] Nova concedes that a decision on whether an acquisition is not in the best interests of Nova as a Pool User must be determined in good faith with reference to Nova’s legitimate interests, which it describes as including allowing the Operator to acquire sufficient low cost secure sources of Ethane to fill the Pool.

[1303] The first issue is Nova’s submission that when Dow commenced its litigation in 2006, Nova realized that Dow was no longer willing to work with Nova to address the alleged ethane shortage. This lacks credibility and is unsupported by any evidence.

[1304] The evidence instead establishes that Dow was active in attempting to resolve the issue of alleged ethane shortage by amendments to the joint venture agreement, and by sales of ethane to the joint venture. What Dow would not accept was Nova’s imposition of ethane allocation and its failure to optimize E3’s production. The tenor of the correspondence at the time of the notices instead indicates that the notices were a defensive reaction to the litigation.

[1305] Nova submits that it is entitled to exercise its discretion to object to Dow's acquisition of ethane on the basis of its interest as a Pool User because Nova as Operator was unable to obtain a supply of ethane required to achieve the nameplate capacities of all three ethylene plants at the Joffre Site. It notes that, as a Pool User, it has different considerations than in its capacity as a Co-owner, and it has a "legitimate interest" as a Pool User in ensuring, "at the very least, there is sufficient Ethane to operate all three plants at their stated ethylene nameplate capacities, less any tolling capacity reserved to a third party".

[1306] It also submits that it is legitimate for it to determine that it is not in its interest as a Pool User for such competing acquisitions to continue until the Operator has secured sufficient feedstock to satisfy the Pool Users' requests for Ethane.

[1307] These submissions fail to be persuasive. The evidence establishes that (1) Nova always acquired enough ethane to fill E3; (2) Nova virtually always acquired enough ethane, and then made enough ethylene from it, to meet its own needs; and (3) if Nova had wished to secure more ethane, there was more to be acquired.

[1308] The criteria that Nova uses to submit that there was an ethane shortage is an artificial criteria unrelated to the reality of demand. The "Pool Users' requests for Ethane" identified as a legitimate basis for the exercise of Nova's discretion did not exist, other than the nominations for E3, and a self-serving letter issued three years after the litigation began.

[1309] While there may have been an ethane shortage in terms of the ability to fill all the ethane crackers in Alberta to their nameplate capacities, there was no shortage in terms of meeting Nova's demands, both internal and external, and no legitimate commercial purpose in meeting the artificial goal of the nameplate capacities of the three Joffre plants, less tolling agreements.

[1310] Nova's allegation that it was surprised by Dow's July 17, 2006 letter in response is not credible, given its five years of acceptance of Dow's continued acquisition of ethane in the Pool Area, and the acknowledgement from Mr. Flint and others that the parties had shared competition law concerns at the time of the merger. Dow concedes that there was no evidence at trial that it had specifically used the word "criminal" to Nova before, but it is clear from their conduct that both parties recognized there were competition concerns in enforcing section 5.1, both with respect to Dow's acquisitions of ethane and in respect of Nova's requirement to supply details of ethane contracts entered into for the Pool.

[1311] I agree with Dow's submission that Nova's concerns about anticompetitive behaviour extended beyond merely the disclosure of particulars of ethane contracts, and included the legality or enforceability of the ethane supply arrangements described in Article 5 of the OSA, about which legal advice was apparently sought and received.

[1312] It is also clear that Dow's continued acquisition of ethane did not make Nova's position after the merger worse, as alleged by Nova, as both before and after the merger, Dow was Nova's primary competitor for the supply of ethane. Dow submits, and the evidence establishes, that, as it was now a Co-owner of E3, it frequently supplied additional ethane for the Pool, over ■ million barrels of spot ethane.

[1313] Nova's submission that it only issued the Notices when it realized that Dow was unwilling to work in good faith towards a resolution of the alleged ethane shortage lacks credibility. The evidence is clear that Dow worked for years with Nova in an attempt to resolve the issue of under-utilization of E3. The timing and the tenor of the Notices imply that they are a

strike-back for the commencement of Dow's litigation, rather than any genuine consideration of the best interests of Nova as a Pool User.

[1314] Turning to Nova's first Notice dated July 25, 2006:

- a) as previously noted, it refers to breach of section 5.1(a) of the OSA, although Nova submits that it is not section 5.1(a) that is the breach at issue, but failure to comply with the provisions of section 5.15;
- b) it covers a substantial portion of Dow's ethane portfolio volumes that Nova admits could not possibly have been used at Joffre at this time;
- c) it was an "omnibus" listing of all of Dow's ethane sources known to Nova at the time, and there is no evidence that any assessment was made as to whether the acquisitions were not in the best interest of Nova as a Pool User;
- d) given the nature of the acquisitions referenced, it cannot be said that the objection was made in a timely manner;
- e) Mr. Flint advised that he could recall no discussion within Nova of what it expected Dow to do as a result of the Notice;
- f) the notice refers not only to Dow's ethane purchases, but also to Dow's C2+ purchases;
- g) Nova knew that a number of the listed ethane acquisitions had been entered into prior to the merger; and
- h) while it may be true that volume alone may not determine whether an acquisition is not in the best interests of Nova as a Pool User, there is no evidence of any other factor that would justify an objection to the acquisitions listed in the Notice.

[1315] I find that Dow has established from all of these factors that Nova failed to act in good faith in issuing this first Notice, and that it is invalid.

[1316] With respect to the March 20, 2007 Notice:

- a) Nova knew about this acquisition on October 17, 2006, but waited more than five months before sending the Notice;
- b) Dow submits that the project did not "upstream" any other Alberta extraction facility or "take away" any Empress V deep cut ethane from Nova. However, Nova submits the project would end Nova's ability to optimize Express 5 and Empress 2, which would be detrimental to Nova's interests as a Pool User; and
- c) Dow submits that Nova could have purchased this opportunity itself, but Mr. Tulk gave evidence that he believed that Dow Canada had all ethane opportunities under contract at Empress 5.

[1317] Thus, Dow has not established that this Notice would be invalid for failure to act in good faith, if Nova's interpretation of Article 5 is the correct one, except for reference to Article 9 of the COA, which will be explained later in this decision.

[1318] With respect to the August 8, 2007 Notice:

- a) Nova chose not to enter into an agreement with Keyera on this opportunity, which turned to Dow instead;
- b) Nova submits that Dow characterized this project as a “Robin Hood” project in that it took ethane away from Nova and gave it to Dow; and
- c) Dow submits that, arising from this project, Nova was able to acquire additional volumes that Dow was no longer acquiring.

[1319] I am unable to find that Dow has established on a balance of probabilities on the evidence before me at trial that Nova failed to act in good faith with respect to this Notice, and it would be valid, with the same proviso as set out with respect to the March 28, 2007 Notice.

[1320] The determining factor with respect to the October 26, 2012 Notice is that, when Nova issued the Notice, it knew that the project would not produce ethane until 2014, and the forecast was that, by then, a Pool ethane shortfall would no longer exist. This is proof on a balance of probabilities that Nova failed to act in good faith in issuing the Notice.

[1321] Finally, with respect to the October 25, 2010 Notice, which referenced Dow’s opposition to a proposed Harmattan Co-streaming project before the ERCB, this is a Notice under section 3.2(c) of the OSA as being “contrary to Dow’s obligations under Section 3.2(c) of the OSA not to do anything which could cause Nova to be in breach of the project agreements.”

[1322] The evidence discloses that Nova supported the Harmattan project, but it knew that IPF would be unhappy about it, and would likely challenge it, because it was going to reduce the ethane supply from Cochrane – a source of ethane for both Dow and Nova. IPF did oppose the project, and Dow supported IPF’s objection. IPF and BP led the opposition to the project at the ERCB and, subsequently, on appeal. In the circumstances, Dow cannot be said to have acted in bad faith.

[1323] The IPF/BP opposition did not prevail. The Harmattan project proceeded. Nova is receiving ethane from it even today, and Dow’s support of IPF did not cause any delay. There was no harm to Nova, no resulting contractual breach by Nova, no breach by Dow of section 3.2(c) of the OSA, and no default by Dow under the COA.

F. What are Nova’s remedies for Dow contractual breaches, if any?

[1324] Nova submits that the consequence of Dow’s failure to comply with section 5.15 is a material breach that entitles Nova to its remedies under Article 9 of the COA. It submits that, had Dow elected to assign some of its ethane contracts to the Operator, the Operator could have accepted this and added the ethane to the Pool for the benefit of all Pool Users. “The shortage of Ethane for use at the Joffre Site could have been eliminated with the assignment by Dow of some of its contracts, allowing sufficient Ethane for Nova to operate E3 at high conversion, to the benefit of both Co-owners”.

[1325] Nova says that the result of the first section 5.15 Notice would not be for the Operator to take assignment of all of the contracts, and that none would have been for the sole benefit of Nova as Pool User. Under section 5.15(c), the contracts would have been either included in the Pool, or excluded from the Pool and dedicated to Dow’s use alone, or the Pool may have been terminated, allowing each party to bring its own Ethane to E3.

[1326] Nova seeks a declaration that it, as Non-Defaulting Co-owner, has the right to invoke the provisions of section 9.02(b) and requests an appraisal be made of each Co-owner’s Selling

Interest in accordance with the provisions of section 7.01(c) of the COA, which sets out a buy-sell procedure that must be complied with if there is to be a disposition of a Co-owner's interest.

[1327] Dow responds that, despite Nova's position in its letters that it might exercise rights under Article 9 of the COA, it never purported to do so. Now, it seeks a declaration that it is entitled to force Dow to sell Nova its 50% share of E3.

[1328] Dow notes that what Nova's current pleaded version of Article 5 asks the Court to enforce against Dow is not what Article 5 provides. After inventing for the purposes of this action something called "surplus ethane", later abandoned, Nova invented something else called "sufficient ethane contracts". Under this theory, after Nova objected to virtually all of Dow's ethane supply contracts and demanded that Dow dispose of them, Dow was supposedly obligated not to dispose of those contracts but instead to dispose of "sufficient ethane contracts" to allow Nova to fill the Pool. Dow submits that this was the pleaded version of Article 5 on which Nova proceeded to trial.

[1329] More importantly, the Article 9 process may be initiated only by a "Non-Defaulting Co-owner" which is defined as a "Co-owner in respect of which no Default has occurred which is continuing". For present purposes, the relevant description of a "Default" is "the breach in any material respect ... by any Co-owner ... in the performance of its obligations" under any of the joint venture agreements "which breach is not cured within" 30 days after receipt of notice of such breach.

[1330] At the time Nova purported to invoke Article 9, it was not a Non-Defaulting Co-owner. It had received notice of several material breaches from Dow. As the Dow claim decision indicates, these breaches have been established by the evidence. They were not cured within the relevant time by Nova. Therefore, Nova's Notices of Default, to the extent they refer to the ability to resort to Article 9, are of no legal effect, as it was not entitled to initiate the Article 9 process.

[1331] Nova is thus not entitled to a declaration that it has the right to invoke section 9.02(b) of the COA.

G. Are sections 5.1(a) and 5.15 of the OSA unenforceable as a common law restraint of trade?

[1332] Dow submits that if Nova's interpretation of sections 5.1(a) and 5.15 are accepted, they would be unenforceable as an unreasonable restraint of trade on various grounds: they are ambiguous; they would be disproportional; and they would be contrary to the public interest.

[1333] At common law, a contract in restraint of trade is one that restricts a party's liberty to carry on trade freely with other persons not parties to the contract. Restrictive covenants and non-competition agreements are *prima facie* unenforceable as being in restraint of trade, and they are thus contrary to public policy unless they can be justified as reasonable with respect to the interests of the parties and the public: *Shafron v KRG Insurance Brokers (Western) Inc*, 2009 SCC 6 at paras 26-27, 43; *Senos v Pacesetter Performance Drilling Ltd*, 2010 ABQB 533 at para 34; *Martin v ConCreate USL Limited Partnership*, 2012 ONSC 1840 at paras 6, 31 and 36, varied on other grounds, 2013 ONCA 72; *Tank Lining Corp v Dunlop Industries Ltd* (1982), 40 OR (2d) 219 (CA) at para 30.

[1334] As a primary objection, Dow submits that the covenants are unreasonable and unenforceable because they are ambiguous in meaning and in practical application. If so, it is not possible to show that they are reasonable: *Shafron* at paras 27, 43.

[1335] Dow notes that the geographic boundaries of the Pool Area were uncertain at the time the contract was entered into, and remain uncertain because the Pool Area is defined “at a particular time” by what transport is “physically possible”. Thus, ethane acquired by Dow that at one time might fall outside the Pool Area, might fall within the Pool Area at a later time during the 80 years of the contract as a result of the expansion of pipeline networks. Also, “Western Canada” is undefined and may or may not include the Yukon, the Northwest Territories and Nunavut, important areas with respect to the potential of acquiring ethane from sources such as the Mackenzie River delta.

[1336] Dow is correct in noting that Nova’s conduct illustrates the geographic ambiguity of the “Pool Area”. It is clear from the evidence that Nova has treated the Pool Area as being synonymous with the Western Canadian Sedimentary Basin, not including all of the Territories, or even all of the provinces of Saskatchewan, British Columbia and Manitoba, but including the Williston Basin in North Dakota. With recent construction of the Vantage Pipeline to transport ethane to Joffre from an extraction facility in North Dakota, Nova has advised Dow that such ethane is Pool ethane and it has included the cost of acquiring the ethane in the Pool costs to be paid by Dow. It is irrelevant that Nova may have voluntarily included this ethane in the Pool, even if there was evidence of this.

[1337] Nova’s own expert witnesses note that the scope of the Western Canadian Sedimentary Basin itself is subject to change, testifying that “the geographic footprint of the WCSB expands with advances in shale gas drilling and recovery technology”.

[1338] The ambiguity of the provisions has also been demonstrated by Nova’s inconsistent and evolving interpretation of them, as discussed previously in this decision, and in the testimony of Dow expert witness, Dr. Leonard Waverman, which is reviewed in Appendix C to this decision.

[1339] Dow also submits that the phrase “in the best interest of Nova as a Pool User” is ambiguous, in that what Nova decides on any given day based on subjective considerations that only it could know is all that determines whether Dow is subject to section 5.15.

[1340] As an example, Dow notes that, with respect to the 2012 Notice of Objection, even though the Pool was full, Nova purported to object to the acquisition on the basis that the Pool may not be full in the future. Nova also submits that it can make its objection at any time.

[1341] As noted in *Globex Foreign Exchange Corporation v Kelcher*, 2005 ABCA 419 at paras 35-38, if it is impossible to predict when you are breaching a restrictive covenant because of the breadth of the prohibited activity, it is in essence unreasonable.

[1342] I find that Dow has established that ambiguity in the term “Western Canada” demonstrated by Nova’s conduct, the uncertainty inherent in the phrase “in the best interests of Nova as a Pool User” and the inconsistent and evolving nature of Nova’s interpretations of the restrictions, renders the restrictive covenants ambiguous, and therefore unenforceable.

[1343] The doctrine of restraint of trade requires a four-stage inquiry:

- a) Does the covenant restrain trade? It is clear that, as a restriction on acquiring a product, sections 5.1(a) and 5.15 are jointly a covenant in restraint of trade: *Esso Petroleum Co Ltd v Harper's Garage (Stourport) Ltd*, [1968] AC 209 (HL) at 330;
- b) Is the restraint one that is against public policy and therefore void? The restraint does not fall within any of the recognized exceptions, and it is certainly restrictive of Dow's ability to carry on trade freely with other persons not parties to the contract. In whatever interpretation it adopts of the restrictions, Nova submits that the provisions restrict UCC, and now Dow, from contracting freely or without restriction for the acquisition of ethane in the Pool Area. If Dow does acquire ethane in the Pool Area, Nova submits that it is entitled at its discretion to impose the severe consequences of section 5.15. Thus, the provisions are *prima facie* against public policy and void;
- c) Can the restraint be justified as reasonable in the interests of the parties? The reasonableness of a restraint of trade as between the parties is found in the proportionality of the restriction. The restraint should not extend beyond what is adequate to protect the legitimate interest of the party seeking to uphold it. The onus is on the party seeking to enforce the restriction to show reasonableness between the parties. Protection from "mere competition" does not suffice to establish reasonableness. In assessing the proportionality of a restraint as between the parties, the focus should be on the breadth of the activities restricted and on the temporal and spatial scope of the restraint: *Martin* at paras 27-28, 107; *Tank Lining* at para 20; *Shafron* at paras 27 and 43; *Senos* at para 34; and *Vancouver Breweries Ltd v Vancouver Malt & Sake Brewing Co*, [1934] AC 181 (PC) at paras 7-8.

If I am wrong in my conclusion on ambiguity, the issue becomes whether Nova has established that it had a legitimate business interest in the restriction, and that the restriction is reasonably proportionate to protect that interest in terms of geographic coverage, period of time and extent of activity sought to be prohibited: *Shafron* at para 26.

As noted in *Tank Lining*, reasonableness is determined in light of circumstances existing at the time the contract is made, but these circumstances "of course" include the parties' expectations of "what might possibly happen in the future": at para 18.

Nova has a legitimate business interest in preventing UCC or Dow from competing for ethane to supply to E3 at the Joffre Site generally. The parties have a legitimate interest in securing the lowest cost and secure supply sources of ethane for the Pool. However, neither Nova nor UCC had a reasonable expectation that the restriction would prevent Dow's acquisition of ethane in the Pool Area, whether at the time of execution of the agreements or subsequently. Nova witnesses acknowledged that it expected that Dow would continue to acquire ethane for use at LHC-1. Thus, Nova's own testimony supports Dow's submission that the attempt to interpret the restriction in such a way as to turn a two-buyer market into a one-buyer market is a disproportionate way to protect Nova's legitimate business interests.

It is necessary to consider the lengthy term of the agreements. The fact that the parties agreed to the 80-year term indicates a recognition that circumstances could change, and implies that the broad restriction posted by Nova is not reasonable, considering

the temporal scope of the restraint. As noted by Dow, recouping the costs of infrastructure does not justify a term of 80 years.

This is not, as Nova suggests, a situation where a party seeks to escape the burden of a contract that it has freely entered into. While Dow is, as a result of the amalgamation, the successor of UCC, it did not negotiate the agreements, and the merger changed the interests of both Nova and Dow in a number of ways, recognized in their conduct over the five years prior to the litigation.

- d) More important, however, is the issue of whether the restrictions are contrary to the public interest. The onus is on Dow to establish this. Reasonableness under this test does not have to be assessed only at the time the contract was formed: see *Elsley v JG Collins Ins Agency*, [1978] 2 SCR 916 at 926-927. Even if it did, the circumstances at the time of contract include the parties' expectations of what might possibly happen in the future.

While the court should hesitate before finding the provision of a contract entered into by two sophisticated parties with equal bargaining power unenforceable as failing to be in the reasonable interests of the parties, the public interest is not synonymous with private interests: *Tank Lining* at para 36.

As noted in *Tank Lining*, there can be circumstances where a restrictive covenant might produce economic and social effects demonstrably harmful to the public. Dow has presented evidence through the testimony of Dr. Waverman, analyzed in detail in Appendix C to this decision, that establishes that the restrictions in this case meet the standard of being contrary to the public interest.

I accept Dr. Waverman's opinion that, while competition between Nova and Dow has increased the prices paid for ethane, encouraged investments in ethane extraction, and resulted in increased production of ethane in Alberta, the implementation of the restrictions would at a minimum provide Nova with significant incentives to control Dow's ethane supply and ethylene production, and would reduce Dow's incentives to invest further in its ethylene and ethylene derivatives business. Ethane suppliers would achieve lower revenues and profits. I find that there is persuasive evidence in the opinions of Drs. Waverman and Shehadeh that the restrictions would reduce incentives for ethane suppliers to invest in existing or new capacity. It is common sense that the impact of the suggested restrictions on competition in an industry with only two major purchasers of ethane and two suppliers of ethylene would be especially significant.

Nova submits that the restrictions cannot be considered contrary to the public interest at the time the E3 joint venture was formed because the Competition Bureau approved the joint venture without any qualifications or conditions. However, as noted in *Tank Lining* at para 40, even when an agreement falls short of offending the *Competition Act*, "it will still have to face the test of the broader considerations of public interest applicable in civil actions". "Safeguarding the public interest in free and open competition ... requires that the court conduct a greater level of independent analysis": *Martin* (ONCA) at para 62.

Therefore, I find that the restrictions are contrary to the public interest, and thus unenforceable.

H. Are Sections 5.1(a) and 5.15 of the OSA illegal and unenforceable under the Competition Act?

[1344] Dow submits that sections 5.1(a) and 5.15 are illegal and unenforceable under the *Competition Act*, RSC 1985, c C-34. Nova submits that they are not, and that it is obvious from the Competition Bureau's review of the joint venture agreements at the time of the formation of the joint venture and from expert evidence that they are not. If I am wrong with respect to the interpretation of these sections and whether they are unenforceable under the common law of contract as a restraint of trade, I must consider whether they are unenforceable and illegal under the *Competition Act*.

1. Overview of Relevant Provisions of the Competition Act

[1345] I have taken the majority of this discussion from Dow's brief on this issue, with which I am in substantial agreement.

[1346] Until March 12, 2010, subsection 45(1) [formerly subsection 32(1)] of the *Competition Act* prohibited any agreement that unduly prevented or lessened competition. Two elements had to be considered in order to determine whether competition had been or would be unduly lessened – the market structure and the behaviour of the actors in question: *R v Nova Scotia Pharmaceutical Society*, [1992] 2 SCR 606 at paras 96-98 [PANS].

[1347] The aim of the market structure inquiry was to determine the degree of market power of the parties to the agreement. To attract liability under subsection 45(1), the parties to the agreement did not need to have the capacity to control the market, but merely “the capacity to behave independently of the market, in a passive way,” something achievable with only a “moderate amount of market power”: PANS at paras 100, 102-103.

[1348] The aim of the behavioural inquiry was to determine if the behaviour in question, the restriction, was likely to injure competition. The object of the agreement itself was the most important element of this inquiry, but not the only one. In the end, the question was whether the agreement was one likely to injure competition, without regard to the actual effect it may have had. This assessment was said to “lay somewhere on the continuum between a *per se* rule and a rule of reason”. This allows for discussion of the anticompetitive effects of the agreement, unlike the *per se* rule, but it does not permit a full-blown discussion of the economic advantages and disadvantages of the agreement, like a rule of reason would. Since “unduly” in section 32(1)(c) leads to a discussion of the seriousness of the competitive effects, but not of all relevant economic matters, this section creates a partial rule of reason.” PANS at paras 90-91, 107-111.

[1349] As of March 12, 2010, subsection 45(1) of the *Competition Act* was amended to apply, *inter alia*, to agreements between competitors or potential competitors to “fix, maintain, control, prevent, lessen or eliminate the production or supply” of a product. A market structure or behavioural inquiry was no longer required – any agreement that controlled or lessened the production and/or supply of a product was *per se* unlawful without any need that it be shown to have had, or be likely to have, anticompetitive effects. An agreement between competitors that affected only the purchase of a product was no longer *prima facie* prohibited by subsection 45(1) but it could be prohibited under section 90.1 if it substantially lessened or prevented competition or was likely to do so: *Competition Act*, sections 45, 90.1 (post-2010 amendments).

[1350] Subsection 45(4) of the amended *Competition Act* provided that any agreement, or part of one, that was directly related to and reasonably necessary for giving effect to a broader or separate agreement that did not itself breach subsection 45(1), did not contravene subsection 45(1). This principle, known as the “ancillary restraints defence”, had no role in Canadian competition law until the March 2010 amendments, and even thereafter it applied only to subsection 45(1) of the *Competition Act*. Because it is a defence, the party seeking to uphold an agreement on the basis of ancillary restraints bears the burden of proof.

[1351] As noted, section 90.1 of the *Competition Act* applies to all agreements between competitors, regardless of whether they relate to the purchase or supply of a product, and it empowers the Competition Tribunal to issue an order to prohibit an agreement likely to “prevent or lessen competition substantially” in a market. An agreement will prevent or lessen competition substantially where it is “likely to create, maintain or enhance the ability of the merged entity to exercise market power, unilaterally or in coordination with other firms”. Market power is the ability to “profitably influence price, quality, variety, service, advertising, innovation or other dimensions of competition.” Agreements under section 90.1 may be saved where “the agreement or arrangement has brought about or is likely to bring about gains in efficiency that will be greater than, and will offset, the effects of any prevention or lessening of competition that will result or is likely to result from the agreement or arrangement”, but the burden of establishing this “efficiencies defence” falls upon the party or parties seeking to uphold an agreement on the basis of any such efficiencies: *Tervita Corp v Canada (Commissioner of Competition)*, 2015 SCC 3 at paras 28, 44; *Competition Act*, s 96(1).

[1352] While there have been no decisions under section 90.1, the Federal Court of Appeal and the Competition Tribunal have considered the appropriate test for assessing “substantial prevention or lessening of competition” under other provisions of the *Competition Act*, and have similarly considered the efficiencies defence. In assessing competitive effects, their approach has been a “but for” analysis. Specifically, the court must look to events in the future to “determine whether “a merger or proposed merger prevents or lessens, *or is likely to prevent or lessen*, competition substantially”” [emphasis in original]. Factors enumerated in subsection 90.1(2), including entry barriers, effective remaining competition, and the availability and/or acceptability of substitutes, are to be considered. In assessing an efficiencies defence, it is necessary to determine if “the merger is likely to bring about efficiencies that are greater than and will offset the anti-competitive effects resulting from the merger”: *Canada (Commissioner of Competition) v Canada Pipe Company Ltd*, 2006 FCA 233 at para 38; *Tervita* at paras 48, 52-53.

2. Application to the Joint Venture Restrictions Pre-March 2010

[1353] Dow submits that the acts of agreeing and conspiring are ongoing acts such that delayed adherence to an agreement that unduly prevents or lessens competition may be found a violation of the *Competition Act*. In competition law matters, “an agreement to prevent or lessen competition ... becomes criminal when the prevention or lessening agreed upon reaches the point at which the participants in the agreement become free to carry on those activities virtually unaffected by the influence of competition”; in other words, when the effect becomes “undue”: *R v Howard Smith Paper Mills Ltd*, [1957] SCR 403 at 426.

[1354] Nova disagrees, suggesting that there is nothing in the *Howard Smith* case that refers to the agreement “becoming” illegal after a period of time or after a decision to enforce an agreement. However, the paragraph of the case cited by Nova appears to support Dow’s

interpretation of the case, rather than Nova's interpretation. It refers to an agreement "becoming criminal" when certain effects reach a point where the participants become "virtually unaffected by the influences of competition", "to the point mentioned": *Howard Smith* at 426-427. While the Court in *R v F(J)*, 2013 SCC 12 at para 44 comments that the "crime of conspiracy is complete once the agreement is reached", this is in reference to the *actus reus* of conspiracy, not the unlawful object of undue lessening of competition. In the same way, while the crime of conspiracy is complete when the agreement is formed, and accomplishing the goal of the agreement is not a constituent element of the offence of conspiracy (*R v Trieu*, 2008 ABCA 143 at para 31), a distinction can be drawn between when the crime of conspiracy becomes complete and when an agreement to prevent or lessen competition becomes criminal, or contrary to the *Competition Act*.

[1355] The cases cited by Nova do not support the view that section 45 is not a continuing offence. The Competition Bureau's competition collaboration guidelines indicate:

The offence is established at the time of the agreement between the competitors to engage in the conduct described in subsection 41.1 and is a continuing offence for the period of the conspiracy.

[1356] In other words, the conspiracy is established at the time the agreement is entered into for limitation period purposes, but the underlying offence can be continuing.

[1357] Both parties relied on *Garford Pty Ltd v Dywidag Systems International Canada Ltd*, 2010 FC 996, aff'd 2012 FCA 48.

[1358] This was a limitations case. The conduct in question was the negotiation and discussions leading up to and including three purchase agreements, and the issue was when the limitations period for prosecution under section 45(1) expired. The court in *Garford* referred to *Laboratories Servir v Apotex*, 2008 FC 855 at paras 479-490, aff'd 2009 FCA 222, leave to appeal to SCC refused 33357 (March 25, 2010). There, Justice Snider indicated in the context of a settlement agreement that the offence was the conspiracy, and the effect of the conspiracy on agreement was the undue lessening of competition: *Garford* at para 24, citing *Laboratories Servir* at para 482. She noted that "[w]hile the undue lessening of competition may continue, the act of conspiracy will, in most cases, occur at an identifiable time". She also noted that her conclusion may have been different if she had had evidence of continuing collusion or agreement among the parties to the settlement agreement: *Garford* at para 24, citing *Laboratories Servir* at para 483.

[1359] Justice Snider referred to *3516921 Ontario Ltd v Paccan of Canada*, 2004 FC 1565, commenting that, in that case, there was continuing co-operation between the plaintiffs, and an ongoing agreement that continued to be applied. Therefore, the agreement did not terminate and the act of conspiracy occurred every time a transaction occurred. She noted that "[t]his is a significant difference": *Garford* at para 24, citing *Laboratories Servir* at para 486.

[1360] The Court in *Garford* also referred to *Eli Lilly and Co v Apotex Inc*, 2009 FC 991, aff'd 2010 FCA 240, leave to appeal to SCC refused 33946 (May 5, 2011), in which it was held that behaviour subsequent to an agreement to assign patent rights was not relevant for the purpose of a limitations argument. The Court in *Eli Lilly* commented, however, that:

This being said, the Court is prepared to accept that conduct contrary to Part IV of the *Competition Act* may "be an isolated incident or can be ongoing", depending on which offence is in play in the circumstances. However, in the Court's view,

ongoing conduct can only be qualified as ongoing for the purposes of subs. 36(4) so long as it continues to constitute an offence under Part IV of the *Competition Act*: *Garford* at para 25, citing *Eli Lilly* at para 736.

[1361] The Court in *Garford* indicated that the authorities suggest that “a continuing offence requires a succession or repetition of separate offences of the same character or kind”: para 41.

[1362] The conduct at issue in this case is not a single incident like those in the cases cited, but an agreement that requires action by Nova every time Dow acquires ethane in the Pool Area that would lessen or control the production or supply of the product.

[1363] Therefore, I am not persuaded that an analysis in this case of whether section 45 of the *Competition Act* has been breached must be restricted to the time the OSA was entered into.

[1364] Though UCC remained a party to the OSA following the parent company merger on February 6, 2001 until its amalgamation with Dow Canada in October 2001, the claimed restrictions, if implemented by Dow and Nova, would have extended to Dow’s ethane acquisition activities as of the earlier date. This result would have occurred because the Dow plaintiffs became affiliates of the parent company, UC, upon the merger of the parent companies in February 2001.

[1365] Dow submits that the pre-2010 section 45 test for liability would have been quickly satisfied if the claimed restrictions had been implemented following the merger. Nova and Dow would have been parties to an agreement, the terms of which – specifically, the claimed restrictions – would have prevented or lessened competition to a significant extent. Nova and Dow, the only two significant purchasers of ethane and suppliers of ethylene in Western Canada, would have been aware, or ought to have been aware, that the effect of the restrictions would be to prevent or lessen competition significantly, both with respect to ethane and with respect to ethylene. This prevention or lessening would have been “undue” as a matter of law.

[1366] Dow submits that, in terms of competition for the purchase of ethane, both parts of the “structural-behavioural” analysis required prior to March 2010 would have been met.

[1367] With respect to the behavioural inquiry, Drs. Waverman and Shehadah are of the opinion that, in the face of high barriers to entry, the lack of substitutes, and the lack of alternative customers for ethane suppliers in Alberta, the implementation of the claimed restrictions would have removed or severely restricted Dow as the only significant option for ethane suppliers, and would have positioned Nova as the predominant buyer of ethane in Alberta.

[1368] Compared to this, Dr. Mazzorotto said only that it was not clear, although Nova itself recognized that Dow competing for ethane lowers Nova’s buying power and produces higher prices.

[1369] Drs. Waverman and Shehadah confirmed that the elimination or restriction of Dow as a competitor would have significantly lessened competition in the Alberta ethane market, reducing prices below the competitive levels that prevailed between 2001 and 2012 by an estimated 43% and reducing total ethane production by an estimated 6%. Dow submits that, as a matter of law, this significant prevention or lessening of competition would have easily met the test of unduly preventing or lessening competition in contravention of section 45 of the *Competition Act*.

[1370] The evidence was clear that, when a market is competitive, there is healthy competition among buyers and sellers so that each buyer and seller is a price taker. However, if a buyer or

seller instead has “market power” that enables it to profitably influence dimensions of competition such as prices, economic losses are imposed on society. The exercise of market power causes price and production to diverge from the normal competitive level.

[1371] Market power on the buyer side of the market, or “monopsony power”, is defined as the ability of one or several firms to profitably depress prices paid to sellers below a competitive level for a significant period of time, with a preceding or accompanying reduction in the total inputs purchased over the long term. These movements from competitive prices and quantities lead to inefficiencies, measured by deadweight loss. Additionally, since a monopsonist never has perfect knowledge, it cannot engage in perfect price discrimination with its various suppliers, so there is inefficient production.

[1372] As noted by Drs. Waverman and Shehadeh, the exercise of monopsony power leads to a transfer of wealth from the seller, in this case ethane suppliers, to the buyer, in this case, Nova, which lowers the profitability of sellers. The reduced profitability discourages existing and prospective sellers from investing in existing production capacity and/or capacity expansion, thus reducing production below the competitive level. Evidence of a reduction in output in the short run is not required in order to determine that anticompetitive effects will result from monopsony power; evidence of a wealth transfer is sufficient.

[1373] Drs. Waverman and Shehadeh indicated that the Alberta market is characterized by a large number of ethane extraction plants, and numerous actual and potential producers or suppliers. By contract, Dow and Nova are the only two significant purchasers of ethane in Alberta, competing with one another for the purchase of Alberta ethane production. Alberta ethane producers’ only real alternative to selling their ethane to Dow or Nova is not to extract ethane, and instead to leave it for heat value in the natural gas stream. Typically, ethane producers engage in negotiations with Nova and/or Dow for medium- or long-term contracts, which the parties frequently renegotiate, amend or expand. As in nearly all markets, these contracts reflect price dispersion as supply and demand conditions evolve over time. The evidence at trial confirmed that competition between Dow and Nova has raised prices for ethane and encouraged investment in extraction facilities.

[1374] In light of the limited alternatives available to Alberta ethane suppliers, and the relative ease of entry into ethane extraction, Dr. Waverman testified that ethane suppliers are very unlikely to have market power vis-à-vis Dow and Nova. I accept his view that it is near certain that the ethane prices that have existed in Alberta over the period on which the competition economics experts all based their consideration of the effects of the claimed restrictions do not reflect any market power on the part of the ethane suppliers, but instead reflect competitive pricing.

[1375] Had the restrictions been implemented, Dow would have been prohibited from, or at least severely constrained in, both bidding against Nova when contract renewal opportunities arose with existing ethane suppliers, and developing new sources of ethane supply. In the short run, this would have eliminated, or at least severely diminished, competition between Dow and Nova for ethane supply. Nova would have had the ability and incentive to decrease the prices paid for ethane, thereby suppressing both price and production below the competitive level and harming overall societal welfare. Moreover, since Dow would have had to turn to Nova in order to supply LHC-1 with ethane, Nova would have had both the ability and the incentive to restrict the amount purchased on behalf of Dow or, at a minimum, to supply ethane to Dow at prices that

substantially reduced or eliminated the financial returns Dow received on the production of that ethane into ethylene and/or ethylene derivatives. Because this would have had the effect of reducing the ethane utilized at LHC-1 and/or any additional ethylene plant in which Dow might have invested but for the claimed restrictions, their imposition on Dow would have had the effect of reducing the total ethane purchased to produce ethylene in Alberta. Over the long run, the monopsony power bestowed on Nova by application of the claimed restrictions would have reduced the returns earned by ethane suppliers, discouraging current extraction facility owners from investing in or expanding production capability and deterring or delaying potential ethane extractors from entering into the ethane production market in Alberta.

[1376] Dow submits that even the application of Nova's claimed section 5.15 restriction alone, whether the "sufficient ethane contracts" version or the broader version asserted in Nova's brief, would have contravened subsection 45(1) in effectively the same manner as an outright prohibition of Dow ethane acquisitions. As reflected in Nova's Section 5.15 Notices, Dow would have been retroactively displaced from acquiring ethane in the Pool Area that it could retain and use, such that it could obtain ethane only through Nova. For practical purposes, Nova would have been the sole significant purchaser of ethane in Alberta, preventing and lessening competition in the purchase of ethane in the same manner as the outright prohibition asserted by Nova pursuant to the application of subsection 5.1(a).

[1377] Even assuming that section 5.15 would not render Nova the sole major purchaser of ethane in Alberta, Drs. Waverman and Shehadeh confirmed that anticompetitive effects, including the reduction of production of ethane in the short term and the reduction in investment in production of ethane in Alberta in the longer term, would have resulted from its application as interpreted by Nova. They independently identified four anticompetitive effects in this regard, none of which was specifically challenged by Dr. Mazzarotto.

[1378] First, section 5.15 requires that Dow provide Nova with "full particulars of the ethane acquisition contracts", including price and volume terms. Had this requirement been implemented, it would have disclosed confidential, commercially sensitive information of one buyer to its only competitor, at a highly disaggregated, contract-by-contract level, in a relevant market in which those only two buyers were protected by substantial barriers to entry and expansion. This information would have given Nova a substantial informational advantage over ethane suppliers, and would have allowed Nova to exert market power against them. Moreover, Nova's ability to extract competitively sensitive information from Dow in this fashion would have discouraged Dow from bidding aggressively for ethane supply contracts. Enforcement merely of this single aspect of section 5.15 would have lowered the price and production of ethane in Alberta below competitive levels.

[1379] Second, Nova's ability to take away Dow's most favourable ethane contracts "in its sole discretion" would have resulted in Dow being disadvantaged with respect to its feedstock costs, discouraging Dow from enhancing its ethylene production capacity over the 80-year term of the claimed restrictions, and therefore, from competing strongly with Nova for ethane. With a softened competitor, Nova would have reduced the prices it paid for ethane to below previously competitive levels, with attendant anticompetitive effects on the production of ethane, and indeed, ethylene, in Alberta.

[1380] Third, Nova's access to information regarding Dow's ethane contracts, and its ability to force their disposal, would have reduced Nova's incentives to outbid Dow for ethane. Nova

would have had an incentive to let Dow acquire ethane without competition and, at least in respect of the contracts subject to this strategy, this would have eliminated competition between Dow and Nova; Dow would have become a “monopsonist by proxy on Nova’s behalf”. In a competitive market, a firm does not have the ability to review its major competitor’s supply contracts, let alone to choose which contracts to force the competitor to surrender so that the firm can take them for itself. Through the application of section 5.15 to Dow as Nova envisages it, Nova would have had that ability.

[1381] Fourth, upon receipt of a Nova demand, Dow would have had to terminate its contracts, immediately resulting in lower total ethane production, absent acceptance by Nova of an assignment of all of the contracts. Further, Dow would have had to pay its ethane suppliers’ penalties or damages for the termination of the contracts, raising Dow’s costs and discouraging Dow both from entering into ethane contracts in the future and from expanding its ethylene production capacity. As Dr. Mazzarotto acknowledged, Dow would have had to try to negotiate into all of its future ethane contracts both “terminable at [Nova’s] will” provisions and provisions entitling Dow to show all of the key contractual terms to Nova. Even if Dow were able thereafter to engage in any meaningful negotiations for ethane, ethane suppliers would naturally view Dow as a “riskier” buyer and would require a higher price, raising Dow’s costs further, and further discouraging Dow from entering into new ethane contracts or increasing its ethylene production capacity in Alberta during the 80-year term of the claimed restrictions.

[1382] In short, I accept that the application of either or both of sections 5.1(a) and 5.15 to Dow, as now envisaged by Nova, would have undermined competition between the only two purchasers of ethane in a relevant market, Alberta, leading to lower prices, less investment, and less ethane production in the short and long run, and a reduction in total welfare. These consequences are more than sufficient to conclude that the claimed restrictions would have unduly lessened or prevented competition within the meaning of section 45 of the *Competition Act* as it stood until March 2010.

[1383] In considering the likely impact of the application of the claimed restrictions on ethylene production and supply, Dr. Mazzarotto observed that the geographic market for ethylene is “unlikely to be wider than Alberta or Western Canada.” As Dr. Waverman testified, “Dr. Mazzarotto’s definition of a relevant market of ethylene necessarily implies that the restrictions on ethane would significantly lessen or prevent competition in the purchase of ethane and the supply of ethylene ... the ethane monopsony and the ethane monopoly are mutually reinforcing.” Dr. Waverman and Dr. Shehadeh both concluded that the implementation of the claimed restrictions would have controlled Dow’s, and thus the total, production and supply of ethylene in Alberta, allowing Nova to lessen that production and supply. If either or both of the claimed restrictions were implemented, Nova’s control of the upstream input (ethane) required to produce the downstream product (ethylene) would have significantly lessened or prevented competition in the relevant market for the supply of ethylene in Alberta, enabling Nova to “monopolize” the ethylene market by disincentivizing Dow to produce ethylene and to invest in maintaining or expanding its ethylene production capacity. This, too, would have unduly lessened or prevented competition for the supply of ethylene in Alberta within the meaning of section 45 of the *Competition Act* as it stood until March 2010.

[1384] From the evidence, the essential facts about the Alberta ethylene industry are uncontroversial. Ethylene plants in Alberta are not flexi-crackers, so they rely primarily on ethane to produce ethylene in relatively fixed proportions. Dow and Nova are the only producers

of ethylene in Alberta, and they compete for both feedstock supply and ethylene sales. Ethylene derivative manufacturers negotiate medium- or long-term contracts with Dow and Nova that are often renewed and amended based on the expected supply and demand conditions of the negotiating entities, and there are spot sales of ethylene by Nova and Dow not based on medium- or long-term contracts.

[1385] While both Nova and Dow produce substantial volumes of ethylene for internal consumption, Dow could, and would, divert ethylene into the marketplace in response to price changes or when it found itself with ethylene beyond its immediate needs. Nova's business records identify Dow as a potential competitor in the supply of ethylene to third party customers. Actual competition for ethylene sales occurs currently between Dow and Nova, as described by Mr. Ramachandran. Drs. Waverman and Shehadeh also confirmed, in testimony not challenged by Dr. Mazzarotto, that Dow and Nova are competitors with respect to the production and supply of ethylene.

[1386] Dow and Nova have long been aware that they are the only two significant purchasers of ethane and suppliers of ethylene in Alberta. Both knew, or ought to have known, that any agreement between them that restricted Dow's ability to acquire ethane would have the effect of controlling and/or lessening the production or supply of ethylene in Alberta. Unlike a "joint purchasing agreement" in an industry characterized by many buyers of an input and sellers of an output, Nova and Dow knew or ought to have known that the application to Dow of the claimed restrictions would have had direct, foreseeable and real effects in the downstream production and supply of ethylene in Alberta.

[1387] The competition economics experts agreed that the implementation of the claimed restrictions (although "no ethane" was the restriction Dr. Mazzarotto chose to focus on) would have controlled the production and/or supply of ethylene in Alberta. Dr. Waverman concluded that implementation of the restrictions would have controlled and allowed Nova to lessen the production and supply of ethylene in Alberta. Dr. Shehadeh concurred, and estimated that implementation of the restrictions would have "lessened the production of ethylene by at least 6 percent" and "decreased the quantity of ethylene produced by Dow at its facility" by a substantial amount. He testified that their implementation would "be expected to continued [to have effects of this magnitude] into the future".

[1388] As Drs. Waverman and Shehadeh further testified, in the short run, Nova's control over Dow's access to ethane feedstock would have allowed Nova to buy ethane in the volumes and from the sources it chose, to assign volumes to its Joffre plants and then, if there were any excess volumes, to assign those to Dow for use at LHC-1. Nova would have had an incentive to reduce Dow's ethylene production in Alberta, since such a reduction could lead to increased ethylene prices in Alberta. Even if Nova had chosen to purchase ethane in volumes beyond those necessary to meet its needs at the Joffre facilities, the effect on Dow's ethylene production would not have been completely offset. Dr. Shehadeh, the only expert to undertake such an analysis, estimated that the effects of implementing the claimed restrictions would have decreased Alberta ethylene production by at least 6 percent.

[1389] Equally, and probably more importantly in the long run, Nova's control of ethane through the application of the restrictions would also have provided Nova with an effective veto of any expansion of Dow's existing ethylene production facilities and of Dow's construction of any new facilities. This is because Dow would need to obtain any additional ethane volumes it would

require from Nova, or, according to Nova, it would risk dissolution of the Pool. Any possible expansion by Dow of its ethylene production in Alberta would clearly be affected by the fact that Nova, its only competitor, would control its access to the required feedstock.

[1390] Similarly, the claimed application of section 5.15 would have allowed Nova to lessen the production and supply of ethylene in Alberta in two ways. First, Nova's right to object to any Dow ethane contract, and to force the disposal of the contract, would have provided Nova with control over the volume of ethane fed to LHC-1 and to any additional plant Dow might wish to construct in Alberta in the future. Second, Nova's ability to demand the disposal of Dow's ethane contracts, knowing their terms, would have provided Nova with first access to low priced ethane supply sources, raising Dow's feedstock costs relative to Nova's and weakening Dow as a competitor. As a higher-cost entity, Dow would have had reduced incentives to compete aggressively to supply ethylene to third parties and, in the long run, its loss of low-cost ethane supply and uncertainty about its ability to acquire ethane would discourage Dow from maintaining or expanding ethylene production in Alberta. The evidence establishes that no new ethylene producer was or is likely to replace that loss of Alberta production in the foreseeable future.

[1391] Nova also submits that the objective fault element of the *mens rea* of the offence, that Nova and UCC knew or ought to have known that the agreement would prevent or unduly lessen competition, is not present, as Nova and UCC sought and obtained an ARC from the Competition Bureau before entering into the agreement.

[1392] As indicated previously, it is not the time during which Nova and UCC were parties to the agreement that would lead to the illegality of the covenant, but when Dow became involved and the covenant would have removed one of the two competitors from the market. It was then that Nova by its conduct indicated that it recognized the subjective and objective elements of *mens rea* by avoiding compliance with terms of section 5.1 and not requiring Dow to comply with section 5.15 until after this litigation arose.

[1393] Nova submits that this Court should show deference to the Competition Bureau's consideration of the E3 joint venture and the Dow/UCC merger, and that if I do otherwise, it is a collateral attack or abuse of process. Nova submits that I should refrain from finding the restrictions illegal or contrary to the public interest because, according to Nova, the Competition Bureau has already determined that they are fine.

[1394] The Competition Bureau is a law enforcement body that decides whether or not to investigate any matter before it, and whether or not to pursue any matter before the Competition Tribunal. It is the Competition Tribunal that decides whether a joint venture or merger contravenes the *Competition Act*, and courts may decide whether the restrictions contravene section 45 of the *Competition Act*.

[1395] It was the Competition Bureau that issued an ARC with respect to the joint venture on May 16, 1997, after two weeks of review. There is no evidence that Nova apprised the Bureau of its interpretation of the restrictions as applicable to UCC or to Dow after the merger announcement on April 4, 1999, and prior to the implementation of the joint venture on May 15, 2000. In fact, the description of the OSA to the Competition Bureau indicates that "[t]his agreement provides for Nova to purchase and pool all ethane feedstock required for the Joffre Alberta Site" [emphasis added].

[1396] There is no evidence that the Competition Bureau considered the restrictions as part of their review. Nova's submission to the FTC that complained about the merger did not mention the restriction in the OSA, or even that Dow would be precluded from or limited in acquiring ethane. Instead, Nova complained that the result would be "market power of the Dow entity in the purchase of ethane in Alberta".

[1397] In reality, the merger had no real-life effect on competition for ethane. Dow and Nova were the only two purchasers prior to the merger, and remained so after the merger. Thus, I cannot assume that ethane would be the focus of the Competition Bureau's review. With respect to the merger review, the Competition Bureau's role is not to consider the effects of the merger on another party's market power, but on the merging parties.

[1398] There is no evidence that the Competition Bureau was informed that the effect of sections 5.1(a) and 5.15 would be to limit or exclude Dow from purchasing ethane in Alberta. For example, there is no evidence that the Competition Bureau did or did not interpret the provisions in the same way that Dow submits they should be interpreted.

[1399] In summary, I agree with Dow that I cannot assume or infer that the Competition Bureau approved the restrictions in 2001. The evidence is speculative and does not establish the proposition on a balance of probabilities. At any rate, the Competition Bureau's decision, if one was made, does not usurp this Court's jurisdiction to decide the issue.

[1400] As noted in a similar situation in *Jeffrey v London Life Insurance Co*, 2011 ONCA 683 at paras 132-135, leave to appeal to SCC refused, 34599 (May 24, 2012):

132 In the circumstances of this case, there are four reasons for not according any deference to that approval. First, the trial in this case was not a judicial review of the OSFI's decision to approve the [Participating Account Transactions]. While [the Office of the Superintendent of Financial Institutions'] review may have considered many of the same issues as those before the trial judge, OSFI's decision was not being challenged in the civil case.

133 Secondly, it is not clear on the record that OSFI considered the issue that we consider to be of critical importance ...

134 Thirdly, to the extent that the resolution of the s. 462 issue depended on an interpretation of the section, the court has jurisdiction to determine questions of statutory interpretation. A court is not bound by an interpretation by a regulatory body on a question of law. This is particularly the case when the court proceeding is not reviewing the regulatory decision.

135 Finally, we observe that the trial judge and this court do not have the benefit of OSFI's reasons for approving the PATs. ...

[1401] In *Rogers Communications Inc v Shaw Communications Inc*, 2009 CarswellOnt 5489 (WL Can) (SCJ), the Court noted at para 22:

On May 12, 2000 Rogers and Shaw filed with the Competition Bureau a short form pre-notification filing required by s. 114 of the *Competition Act*. Enclosed was a draft of the Asset Exchange Agreement as well as a copy of the Swap Agreement that contained the non-competition provisions. The Competitive Impact Analysis provided with the filing did not deal with the non-competition

provisions and generally dealt only with the swap of cable operations. It discussed the clustering rationale for the swap of cable operations in the same terms as had been submitted to the CRTC and stressed the competition benefits of the transaction in enabling cable operators to compete with incumbent telephone companies and other service providers. The Competition Bureau sent a “no action” letter to the parties. To what extent the Competition Bureau considered the non-competition provisions is not known.

[1402] The issue of whether undertaking a review of the restrictions in issue would be either a collateral attack or an abuse of process can be refuted by the facts:

- a) it is not known to what extent the Competition Bureau considered the non-competition provisions;
- b) there are no decisions to indicate that the Competition Bureau reviewed the issue;
- c) this Court is not bound by an interpretation by a regulatory body on a question of law; and
- d) the Competition Bureau does not conduct an adjudicative process resulting in a decision on the merits.

[1403] Thus, a declaration that sections 5.1(a) and 5.15 are unenforceable is not an abuse of process or collateral attack on the Competition Bureau.

[1404] However, in a slightly different argument, Nova submits that the civil conspiracy provisions of the *Competition Act* clearly reserve the determination as to whether an agreement prevents or lessens competition to the Competition Tribunal. It submits that this is quite different from the criminal provision of the *Competition Act* which are within the jurisdiction of the courts and which may be privately enforced through civil action. Nova states that this Court has no jurisdiction to assess whether an agreement violates section 90.1, as only the Competition Tribunal has such jurisdiction.

[1405] No authority is cited for this submission, and it is clear that an ouster of the jurisdiction of a provincial superior court must be clear. There is nothing in section 90.1 that indicates such an ouster. The issue of whether the restriction is unenforceable as contrary to section 90.1 is incidental to this Court’s determination of a counterclaim in which the plaintiff by counterclaim has asked the Court to enforce the restriction at issue: *Canada (Attorney General) v Law Society (British Columbia)*, [1982] 2 SCR 307 at paras 40-41; *Canada (Attorney General) v TeleZone Inc.*, 2010 SCC 62 at para 43.

3. Ancillary Restraint

[1406] As noted previously, where an agreement contravenes the amended subsection 45(1) of the *Competition Act*, it may nonetheless be upheld as an ancillary restraint where the party seeking to uphold the agreement, here Nova, establishes that the restraint is directly related to and reasonably necessary for giving effect to a broader and separate agreement that is not itself contrary to the *Competition Act*.

[1407] Dow submits that no such defence is available to Nova here. It submits that neither preventing nor restricting Dow from acquiring ethane in the Pool Area could have been necessary to give effect to the E3 joint venture; to the contrary, Dow was competing, and was expected to continue to compete, with Nova throughout the term of the E3 Project Agreements.

To argue that the claimed restrictions were “ancillary restraints”, Nova would need to demonstrate both that their application to Dow’s acquisitions of ethane for purposes other than E3 was directly related to the E3 joint venture, and that alternatives less restrictive of competition “were inadequate or impractical, or would not allow the parties to achieve the objective of the [broader] agreement.” Nova did not lead such evidence. In fact, Nova itself suggested under its “surplus ethane” theory until late 2014 that Dow was required merely not to acquire ethane beyond its commercial needs, which is a manifestly less restrictive alternative.

[1408] I find from the evidence that it is clear in any event that the 80-year duration of the claimed restrictions far exceeds any period that could have been considered reasonably necessary for the protection of any Nova interest with respect to E3. Nova’s records show that it anticipated it would achieve a positive net present value from its investment in E3 after just eight years. The defence of ancillary restraint does not succeed in this case.

4. Contravention of Section 90.1

[1409] I am satisfied that the claimed restrictions would have contravened, and will contravene, section 90.1 of the *Competition Act*, if implemented by Nova and Dow. They constitute an agreement between actual and/or potential competitors which, if implemented, would have prohibited or, at minimum, severely restricted Dow from acquiring ethane in the Pool Area. The implementation of these restrictions vis-à-vis Dow would have removed one of only two major purchasers of ethane in Alberta, and would have had the effect of preventing or lessening competition significantly in the purchase of ethane in Alberta in the manner described above. Even on a standalone basis, section 5.15, if implemented, would have prevented or lessened competition to a significant extent by altering the incentives of Dow and Nova to compete for the purchase of ethane in Alberta, as described. These effects on competition are plainly substantial. Nova’s expert, Dr. Mazzarotto, did not suggest that the claimed restrictions could be saved by application of the efficiencies defence, and Nova offered no evidence quantifying the effect on any efficiencies that might have been alleged.

5. Expert Opinions

[1410] A complete analysis of the expert opinions that were offered at trial on this issue is set out in Appendix C – Competition Economics Expert Opinions. The experts on these issues included Dr. Leonard Waverman, Dr. Ramsay Shehadeh, and Dr. Nicola Mazzarotto.

a) What are the consequences of the illegality of Sections 5.1(a) and 5.15?

[1411] Dow submits that consequences of sections 5.1(a) and 5.15 being a common law restraint of trade that is illegal are that they are void *ab initio* and removed from the contract: *Globex* at paras 42-50. However, if sections 5.1(a) and 5.15 are also illegal under the *Competition Act*, as I have found them to be, a form of severance that may preserve the intentions of the parties to the extent possible is available, consistent with the intentions of the parties.

[1412] Nova submits that if sections 5.1(a) and 5.15 of the OSA are illegal or unenforceable, Nova’s covenant to provide Ethane Services under section 4.3 must also be illegal or unenforceable, and all of Article 5 must be severed, along with related provisions.

[1413] Dow submits that no such extreme result is necessary.

[1414] Section 24.5 of the OSA sets out the consequences of a finding of unenforceability:

In the event that the whole or any portion of any section of this Agreement or the application thereof to any circumstances shall be held invalid, unenforceable or superseded to any extent, the remainder of the section in question, or its application to any circumstance other than that to which it has been held invalid or unenforceable and the remainder of this Agreement shall not be affected thereby and shall be valid and enforceable to the fullest extent permitted by law.
[emphasis added]

[1415] Thus, the parties have by contract stipulated that, despite a finding that a portion of a section of the OSA is unenforceable, the remainder of the section or its application to any circumstance other than the one that leads to the unenforceability shall not be affected, and shall continue to be valid and enforceable to the fullest extent permitted by law.

[1416] Blue-pencil severance, where the offending sections would be struck out, is not appropriate in this case. On the other hand, notional severance, which does not involve deleting words, but “reading down” the illegal provisions of the contract to make them legal and enforceable, would resolve the problem.

[1417] As noted by Dow, a reading down of sections 5.1(a) and 5.15 that would have them apply merely to acquisitions of ethane for the Joffre Site would be logical, consistent with what Nova told the Competition Bureau in 1997, and what Dow submits is the correct interpretation of sections 5.1(a) and 5.15 in any event.

[1418] It would reflect how the parties have been conducting themselves from the project’s commencement through the five years prior to the litigation. This illustrates that this method of reading down the offending sections does not render the rest of Article 5 or any other part of the OSA devoid of meaning or purpose. It does not render the section 5.15 remedies superfluous, as they would still apply if Dow was to attempt to acquire ethane for the Joffre Site.

[1419] Nova submits that sections 5.1 and 5.15 set out the conditions pursuant to which Nova was willing to provide Ethane Services to UCC. It suggests that it is “plain” from the words of Article 5 and the factual matrix that Nova’s covenant to provide Ethane Services was conditional on all of the provisions of Article 5. However, the factual matrix included the circumstances that Dow was an ethane purchaser in the Pool Area, and would be continuing to purchase ethane for LHC-1, despite any agreement between Nova and UCC that would prevent a third purchaser of Nova from entering the market. Nova is no worse off in that regard post-merger than it was prior to the merger. I do not find that that the inability of Nova to enforce sections 5.1(a) and 5.15 in respect of Dow’s purchases of ethane for LHC-1 and to supply the E1 Toll is an impediment to the Operator in achieving the Co-owner’s shared objectives. The provisions continue to exist and apply to the same risk that they applied to before the merger: the risk that a third party would purchase ethane for the Joffre Site, thus undermining and duplicating Nova’s efforts to do the same.

[1420] In addition, there is no evidence that, absent a commitment from UCC or Dow to refrain from acquiring ethane in the Pool Area, Nova would have been unprepared to provide the Ethane Services. In the Nova board presentation about the E3 joint venture in 1996, the need for such a commitment was not mentioned as one of the material points of the presentation, or at all. At that period of time, there was no anticipation of an ethane shortage.

[1421] There is no identification in the agreements linking section 5.15 with the provision of Ethane Services under section 4.3(c) as a *quid pro quo*, and no other evidence to establish this.

[1422] With respect to the other provisions of Article 5, Nova, to the extent it complied with them itself, demonstrates that Article 5 can work quite well without sections 5.1(c) and 5.15 being interpreted as widely as Nova does. Thus, the severance of the illegal effect of the provisions does not give rise to an impossible economic situation.

[1423] The evidence establishes that, if the restrictions are interpreted the way that Nova submits they should be, they are both disproportionate and have as their main object the elimination of competition.

[1424] As conceded by Nova, the preferred severance technique in any circumstance is the one that “would most appropriately cure the illegality while remaining otherwise as close as possible to the intentions of the parties expressed in the agreement”: *Transport North American Express Inc v New Solutions Financial Corp*, [2004] 1 SCR 249 at para 32; *Shafron* at para 32.

[1425] Nova submits that notional severance is not available unless there is a “bright line” arising from the breach of a criminal case, but the actual limitation is that there must be a clear statutory bright line differentiating legal contractual provisions from illegal, and that is the situation in this case: *Globex* at para 46, citing *Transport* at para 34.

[1426] It is correct that the Court in *Shafron* discussed the differences between blue-pencil and notional severance, and concluded that notional severance was not available to correct a restrictive covenant in employment contracts for several reasons, one of which was that there was no bright-line test for reasonableness. However, the Court in *Shafron* also referenced *Transport* at para 38, as follows:

...In *Transport*, the evidence was that the parties did not intend to enter into an illegal contract, and what must be done to make the contract legal was quite clear. The Court inferred that the parties’ original common intention was to charge and pay the highest legal interest rate and notional severance was applied to read down the rate to the highest legal rate.

[1427] The Court in *Transport*, in discussing why blue-pencil severance was not appropriate in that case, noted that it “often fundamentally [altered] the consideration associated with the bargain and [did] violence to the intention of the parties”: at para 28. Arbour, J noted that:

If the case is an appropriate one for the court to sever only those provisions of the loan agreement that put the effective interest rate over 60 percent, and if it is conceded, as it must be, that such a rewording alters the agreement of the parties, the question becomes only a choice of the appropriate technique of severance. The preferred severance technique is one that, in light of the particular contractual context involved, would most appropriately cure the illegality while remaining otherwise as close as possible to the intentions of the parties expressed in the agreement. The blue-pencil technique may not necessarily achieve that result: at para 32.

[1428] The clear intention of the parties in this contractual context is to have the remainder of the section and the agreement unaffected and valid and enforceable to the fullest extent permitted by law.

[1429] In *Transport*, the results of a blue-pencil severance were found to be erratic and undesirable, and these negative results were avoided through the use of notional severance: at para 38. Therefore, the Court noted that the appropriate approach was to vest the greatest possible amount of remedial discretion in judges in courts of first instance in determining the proper approach: at para 40. I find that the judicial tool of notional severance is the best option to achieve the outcome the parties clearly expressed by contract.

[1430] This discretion to sever is subject to a four-part analysis in assessing whether to alter the contract:

- a) whether the purpose or policy of the statute would be subverted by severance;
- b) whether the parties entered into the agreement for an illegal purpose or with an evil intention;
- c) the relative bargaining position of the parties and their conduct in reaching the agreement; and
- d) the potential for the defendant to enjoy an unjustified windfall: *William E Thomson Associates Inc v Carpenter* (1989), 69 OR (2d) 545 (CA) at paras 27-31, leave to appeal to SCC refused, 21670 (Feb 22, 1990).

[1431] With respect to (i), the purpose or policy of the *Competition Act* provisions, as they are discussed in this decision, would not be subverted by the proposed severance, as the provisions would be read in such a way as to ensure that two buyers of ethane remain in the relevant market.

[1432] In considering (ii) to (iv), there is no suggestion that the parties entered into the agreement for an illegal purpose. They had equal bargaining positions. The severance does not provide Dow with an unjustified windfall; the parties remain in the same relative position with respect to the acquisition of ethane as when the agreements were first signed. Dow does not seek to avoid its obligation to pay for Ethane Services.

[1433] Thus, I accept that sections 5.1(a) and 5.15 can be saved from illegality by notional severance that reads them down to apply only to the acquisition of ethane for the Joffre Site.

[1434] If I am wrong about the interpretation of sections 5.1(a) and 5.15, and they are enforceable in the manner described by Nova, they are either unenforceable as being in restraint of trade, or illegal under the *Competition Act*, and should be read-down through notional severance.

XVIII. Other Claims

A. The Low Conversion Claim

[1435] Nova submits that it suffered damages by reason of having to run E3 at low conversion. It submits that, had Dow complied with section 5.15 by electing to assign its Ethane contracts to the Operator, the Operator would not have had to operate E3 at low conversion. Similarly, if Dow had terminated its Ethane contracts, there would have been Ethane available for the Operator to acquire.

[1436] This claim must fail. At all times, Nova has been in charge of running E3. As Nova concedes, there has always been enough available Pool ethane to fill E3, so at all times Nova has been free to optimize E3's Product production and not to curtail it. Had Nova done so, E3 would

have been filled with ethane and run at full rates, at design conversion. Nova's choice to instead run E3 at low conversion, and to divert ethane away to its own plants, cannot give rise to a claim for damages.

B. The LCP Services Claim

[1437] The by-products of ethylene production at E3 include what are defined in the OSA as "Co-Products". Co-Products from the Joffre Site (including E3) are stored and transported by Nova, and to the extent any of this takes place on behalf of Dow, the associated costs are billed to Dow by Nova. Nova seeks \$428,814.89 for liquid co-products (LCP) services that it claims that Dow owes and has not paid.

[1438] From the start-up of E3, Nova marketed Dow's share of the co-products pursuant to a Liquid Co-Products Management Agreement. Effective January 1, 2006, Dow terminated the agreement and began marketing its own co-products. The parties entered into a short-term letter of intent (the LOI) which, among other things, called for Dow to "reimburse Nova's costs not covered by the OSA" for services and materials in connection with the transportation of Dow's co-products. Dow also agreed to pay overhead "calculated consistent with the OSA" plus a service fee of 3% of the "foregoing items".

[1439] In January 2006, a fixed "Co-products Logistics Management Fee" (Fee) began to appear on the Net Balance Statements (NBS) that Nova, as the E3 Operator, issued to Dow each month. The new Fee was in addition to charges already levied by Nova for rail tax, brokerage costs, plant operating costs, insurance premiums and the 3% service fee. When Dow requested details of the Fee, Nova responded that it covered the "logistics (petrochemical logistics and corporate logistics) costs for management of Dow's liquid co-products" such as "co-products planning, fleet management, additional communication, development of tools, etc. to manage Dow's co-product shipments." The parties exchanged further correspondence in late 2006 and early 2007, in which Dow noted that the Fee had appeared without notice, it had never been agreed to, and it was not founded on either the OSA or the LOI. Dow submits that it sought to understand the details of any additional services that Nova claimed it was providing that were not already covered by existing fee arrangements.

[1440] The LOI expired on February 28, 2007. Dow continued to pay the Fee while it awaited the requested particulars. Nova advised that the Fee was based on an allocation of unspecified costs centre expenses from 2005, with no adjustment for actual costs in any subsequent year, but Dow says that it awaited particulars of the alleged services, of their correlation to any relevant cost centre, and of a proposed methodology for the supposed allocation. Dow repeatedly confirmed that there was no agreement about any services to that it was not already paying for and, to the extent Nova suggested that there were any such services, there was no agreement to pay any fixed fee.

[1441] Nova refused to remove the Fee from the monthly NBS, and Dow submits that it would not provide the particulars. In February 2010, Dow accordingly gave formal notice that it would no longer pay the Fee or the 3% service fee that Nova was adding to it. Dow continued to pay the other amounts charged by Nova in respect of the co-products.

[1442] At trial, Ms. Deutscher gave evidence on behalf of Nova about co-products, including about the LOI, but pursuant to the trial sequencing order she did not testify in chief about Nova's "LCP Services" counterclaim. Nova included related documents in its binder of materials for her

intended cross-examination, but then elected not to ask her about any of them. Nova called no witnesses of its own.

[1443] In the result, there is no evidence as to what services were provided; how, if at all, they are allegedly different from LCP services already paid for by Dow; what the related claimed charges are on the NBS; what costs Nova actually incurred with respect to any of them; or what value, if any, Dow allegedly received. Nova's position appears to be that because it put the Fee in the NBS, Dow must pay it.

[1444] Nova resorts finally to an unpleaded assertion that Dow should have initiated a billing arbitration. Dow submits that nothing in the OSA prevented Nova from initiating a billing arbitration; instead of doing that, however, it advanced its "LCP Services" claim in this action. However, I am in the difficult position that I have no evidence upon which I can resolve this claim, and I decline to do so. The claim may be resolved by a Billing Arbitrator, as set out in section 11.5.

C. The Water Usage and Power Billing Adjustment Claim

[1445] The Water Usage Counterclaim concerns water charges that were billed to Nova by ATCO Power and Capital Power Corporation as part of the electricity service to the Joffre Site (including E3). Metering errors that resulted in understated invoices were identified by representatives of ATCO Power and Capital Power in 2009. The related invoices were corrected to account for the under-payment, and Nova paid the corrected invoices, including Dow's share (\$334,426.52 CAD), which was then billed to Dow as an adjustment on the monthly E3 Net Balance Statement in accordance with the OSA. Dow has refused to pay Nova for these charges on the grounds that it believes the charges were statute barred and that Nova should not have paid and, therefore, not passed a share of the costs on to Dow.

[1446] In May 2009, during a block outage at the Joffre Site co-generation (electricity) facility, an inspection of a water meter used to measure water usage at a cooling tower resulted in the discovery of erroneous water readings. The error resulted in overbillings to the manufacturing units at the Joffre Site, including E3, for the period January 2006 to April 2009. Further, in June 2008, another water meter was replaced at the Joffre Site pump station. During the course of its replacement, it was also discovered that the meter had been improperly calibrated, resulting in a separate water billing error for the period April 2003 to March 2008.

[1447] In October 2010, Dow paid its portion of the adjustment for the years 2008 and 2009. However, Dow claims that the adjustments for the years 2003 to 2007 are barred under the *Limitations Act*, and, therefore argues that Nova was not obliged to pay them, and did so voluntarily and on its own account without consent by Dow. As a result, Dow states that Nova is not entitled to pass those costs on to Dow.

[1448] Section 10.1 of the OSA provides that:

The Operator shall be entitled to receive reimbursement by the Co-owners for all Plant Costs incurred by the Operator which are properly chargeable to the Co-owners pursuant to the Accounting Procedure and other provisions of this Agreement or at the direction of the Management Committee, such reimbursement by the Co-owners to be paid in accordance with this Agreement and the Accounting Procedure. [emphasis added]

[1449] As Dow notes, the only “evidence” about this claim is in documents, mostly authored by third parties. Of the many trial exhibits, only very few were entered subject to a reservation that they may not be considered evidence of the truth of their contents, but these documents are among those very few. After all of Nova’s lay witnesses had left the stand, Nova obtained Dow’s agreement for these documents to be exhibits on the express basis that they not be entered for the truth of their contents.

[1450] I must agree that, in the circumstances, Nova has not made out even the most basic elements of this counterclaim. It called no witnesses who had custody of the water or power meters, or who discovered the alleged meter errors, or who calculated how much Nova should allegedly have been paid. There is no admissible evidence of what any alleged errors were, when they were discovered, or the basis on which any resulting adjustments were made. Without any such evidence, there is no way to make constructive use, for example, of Nova’s highly technical memorandum involving the development of some kind of calculation methodology which, on its face, indicates an “overbilling” as a result of “erroneous readings”, not an underbilling.

[1451] Nova has not adduced evidence of the final amounts allegedly charged to it by ATCO Power or Capital Power Corporation for “water usage” or “power billing” adjustments. There are only two documents resembling invoices: one refers to an “agreed upon settlement” that is not in evidence, and the other gives no indication of any connection to E3 or even to Joffre. Dow submits that this matters because, whatever demands were made of Nova by third parties, and on whatever basis, it seems clear that they did not relate solely to E3, yet no one appeared at trial to offer any explanation of the exercise that Nova apparently undertook to come up with this number for E3 or Dow.

[1452] Dow points out that Nova relies on some Rules of the Alberta Utilities Commission, and the *Electricity and Gas Inspection Act*, RSC 1985, c E-4, to provide a basis for recovery, asserting that “[t]here can be no suggestion that the inspections or determinations of the Adjustment were improper as out of time”. There is no explanation, however, of an April 8, 2009 letter to FortisAlberta from a Mr. Elliott, Nova’s “Eastern Energy Manager”, asserting “Nova Chemicals’ opinion that FortisAlberta’s ability to recover for the full 5 year period is limited by the *Limitations Act*... Accordingly, it is Nova Chemicals’ position that FortisAlberta does not have the right to demand repayment for the five years over which the error occurred.” Nova called no evidence to explain who Mr. Elliott was, why Dow should pay for something handled by its “Eastern Energy Manager”, why Nova’s opinion about collectability has changed (if it has), or even how FortisAlberta, a party not mentioned in the pleadings, is said to be involved. Perhaps more fundamentally, there is no evidence to suggest that the Rules and the legislation relied on by Nova apply to the subject matter of the counterclaim at all.

[1453] With no actual evidence on this claim, and the recovery under section 10.1 of the OSA limited to costs “which are properly chargeable” to the Co-owners, I am unable to properly consider the claim, and I decline to do so.

XIX. Conclusion on the Counterclaim

[1454] Nova’s application to amend its pleadings is granted.

[1455] However, Nova’s claim for a declaration that Dow has failed to comply with section 5.15 of the OSA, and that, as a result, Nova is entitled to terminate the E3 joint venture and access the remedies contained in section 9.02 of the OSA is dismissed.

[1456] Nova's alternative application for an order for specific performance requiring Dow to comply with the procedures set out in section 5.15 and its claim for damages under section 5.15(b)(i) is also dismissed.

[1457] I dismiss the claim for damages arising from the operation of E3 at low conversion, and I also dismiss the application for a declaration that Dow is in breach of section 3.11 of the COA.

XX. Final Comments

[1458] I note that Nova requested the opportunity to address the issue of relief from forfeiture if and when it became necessary, and I will reserve on that issue. On the issue of top-up of damages, if the parties are unable to resolve the issue through the determination I made in the Dow main claim, I will hear future submissions. I will reserve on the appointment of a receiver or monitor until I hear further from the parties.

[1459] If the parties are unable to agree on costs, they may make submissions on that issue.

[1460] This decision contains confidential proprietary information that is the subject of orders at trial. As a result, it may not be published, except in redacted form, and shall be sealed in the court file.

Dated at Calgary, Alberta this 20th day of June, 2018.

B.E. Romaine
J.C.Q.B.A.

Appearances:

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APPENDIX A – FACTUAL OVERVIEW AND CHRONOLOGY

[1] This case has a complex factual background that is discussed in this Appendix A to provide a full picture of the parties' relationship and the E3 plant.

A. Description of Joffre Site and Products

1. Ethylene

[2] Ethylene is used as a feedstock for plants that make derivative products such as polyethylene and ethylene glycol. In Western Canada, ethane is commonly used to produce ethylene, although there are other feedstock materials that can also be used. Ethane is converted into ethylene through the process of thermal cracking to break down hydrocarbon molecules into smaller molecules, which is why ethylene plants are known as "crackers".

2. The Joffre Site

[3] Nova's plant site is located just east of Red Deer at Joffre. It contains three ethylene crackers: E1, E2 and E3, Nova's two polyethylene plants (PE1 and PE2), LAO (a linear alpha olefins plant), a power cogeneration plant co-owned with Atco Power, and supporting infrastructure including rail and truck on and off loading facilities, a Hydrogen Offgas unit, waste and water treatment facilities, cooling towers, and emergency services. E1 and E2 are owned by Nova, and commenced operations in 1979 and 1984, respectively. E1 has a nameplate capacity of about 1.6 billion pounds per year (BPY), while E2's nameplate capacity is approximately 1.3 BPY. E3, jointly owned with Dow, commenced operation in 2000. PE1 commenced operation in 1984, while PE2 and LAO commenced operation in 2001. PE1, PE2 and LAO all consume ethylene in their operations.

[4] The Joffre site has three pipelines connecting it to petrochemical infrastructure in Alberta. First, the Alberta Ethane Gathering System (AEGS) is a 1300 km pipeline which carries ethane produced at 12 extraction plants to Alberta. Second, the Ethylene Delivery System (EDS) is 170 km in length and carries ethylene produced at the Joffre Site to others in the petrochemical industry, including Nova's polyethylene facilities. Finally, the Joffre Feedstock Pipeline (JFP) carries natural gas liquid feedstocks, such as propane, from Fort Saskatchewan to the ethylene facilities at Joffre.

3. E3

[5] E3 was developed as a joint venture between Nova and UCC which would be able to take advantage of the low cost ethane feedstock then available in Alberta, the economies of scale associated with a world scale plant, and the use of the existing infrastructure at Joffre, including maintenance personnel.

[6] E3, as built, was designed to produce 2.81 BPY of polymer grade ethylene at an hourly rate of 151.74 metric tons. In terms of plant availability, E3 was designed to operate on a four year average of 8,400 operating hours a year.

[7] E3 has seven furnaces, each with 32 radiant coils with heat coming from 64 burners placed at set points in the floor of the furnace. The furnaces were designed with a run length of 42 days at 65% conversion and a decoke time of 36 hours. "Furnace run length" refers to the

amount of time a furnace is cracking ethane between decokes on furnaces without sacrificing production.

B. Ethane processing at E3

[8] Liquid feed ethane comes into the Feed Vaporization System in the plant, where it is vaporized and superheated in preparation for going to the furnaces. There are a couple of heat exchangers that use different sources of heat. Vaporized feed is supplied to the cracking furnaces. From the feed vaporization, acid gases (CO₂ and H₂S) are removed in the Amine System to purify the ethane for feed to the furnaces. The ethane then travels to the cracking furnaces. E3 has seven ultra-selective cracking, balanced-draft furnaces that heat the treated ethane feed, cracking it into ethylene and other co-products.

[9] Next, the cracked gas flows to the Quench Water/Dilution Steam System, where it is cooled in a quench water unit. The Cracked Gas Compression System then provides the pressure to move the cracked gas through the Dryers, Deethanizers, Reactors and Chilling Train and into the Deethanizer / Turbos System. The gas is condensed downstream in the chilling train and distillation units. There are four stages of compression, following which the crack gas is dried using the Dryer System and deethanized in a dual-tower Deethanizer System. Co-product components are removed and sent on for further processing.

[10] Next, acetylene reactors in the Acetylene Reaction System hydrogenate acetylene (C₂H₂) into ethylene (C₂H₄). Following that, the gas streams are progressively cooled in the Chilling Train, which liquefies the C₂s and much of the methane by condensing it out in the Deethanizing System. From the chilling tray and deethanization, the ethylene is separated from the mixed C₂ product in a C₂ Splitter into an ethylene product stream and an ethane recycle stream. From there, the ethylene is sent to product storage and sales. The ethane is recycled back to the cracking furnaces.

C. Summary of pre-E3 site agreements

[11] Nova operates other facilities at its Joffre site, including E1 and E2; the two Joffre Site polyethylene facilities, one of which is owned by a Nova subsidiary; and the Joffre Site infrastructure.

1. Ethylene Sales Agreement

[12] Before the E3 joint venture was entered into in 1997, Dow Chemical of Canada, Limited and The Alberta Gas Ethylene Company Ltd. (a subsidiary of Nova) entered into an Ethylene Sales Agreement. At the time, E1 was operating and Alberta Gas proposed to construct, own and operate E2. This Agreement, dated March 2, 1981, addressed conditions for Alberta Gas to sell ethylene to Dow, and for Dow to purchase ethylene from Alberta Gas in the amount of 272,000,000 kilograms per contract year of the Agreement. Alberta Gas was permitted to vary the daily production of ethylene to conform with its plant capabilities, but would make best efforts to produce ethylene in a range of 90% to 125% of the daily contracted amount.

[13] The Agreement referred to Alberta Gas' present and future plants, and to Dow's present and future facilities that use ethylene feedstock. The parties agreed that "the successful investment of significant amounts of money by each party in its respective plant or plants is dependent upon the carrying out by the other party of its obligations" under the Agreement. Both parties agreed to "proceed diligently" to construct their respective plants, and to keep each other informed about the progress of the construction.

[14] There were also terms dealing with the sale of any surplus ethylene (Alberta Gas will use best efforts to assist Dow in the economic disposal of the surplus) and any liquid by-products (Alberta Gas may sell them and is entitled to a marketing fee).

[15] The Agreement dealt with the sale and delivery of ethylene, as well as cost, billing and payment procedures. The cost of ethylene included fixed and variable expenses that were comprised of various costs and expenses, such as a portion of deferred start-up costs (as defined in the agreement) that included items such as capital expenditures, a portion of income taxes, and a portion of the gain / loss from foreign exchange, among other things.

[16] Pursuant to the Agreement, Alberta Gas agreed not to sell ethylene produced at the Plant to any other buyer on more favourable terms and conditions than it was sold to Dow, unless Dow consented.

[17] The Agreement set out a process for disputing a bill, and for taking inventory and performing an audit. The method of quality control for the ethylene product and how the ethylene would be measured were also detailed.

[18] A Buyers' Committee was established, with a representative of each buyer who purchased ethylene from Alberta Gas. The Buyers' Committee was to meet with representatives of Alberta Gas at regular monthly intervals to review matters of interest, including operating costs, feedstock commitments, technical reports, insurance requirements and the budget.

[19] The Ethylene Sales Agreement was effective to June 30, 2004.

2. Post 1998 Ethylene 2 Customers Agreement

[20] This Agreement, dated January 10, 1996, was between Nova, Novacor Chemicals Ltd., Union Carbide Ethylene Oxide / Glycol Company, Shell Canada Chemical Company and Dow. It addressed how various cost and allocation issues were to be handled between E1 and E2, insofar as it affected E2 customers. It also addressed the accounting treatment of new capital expended on E1 and E2, as well as setting out an agreement on Industrial Development Permits in respect of existing ethylene and ethylene derivative facilities in Alberta. It provided that E2's customers were to pay a charge for common facilities provided by E1 and used by E2, and provided particulars on ethylene transportation.

3. Ethane to Ethylene Tolling Agreement

[21] This agreement, dated May 10, 1996 between Nova and Dow, addressed a long term process tolling of Dow's ethane through E1. It also addressed transportation of the ethylene so produced. Pursuant to this agreement, Dow was required to provide annual and monthly ethylene nominations. It could revise its nominations once in each contract year in accordance with the agreement.

[22] Dow was to provide a monthly Toll quantity of ethane to Nova for conversion to ethylene for Dow. A notice provision was included for ethane shortages, and Nova and Dow agreed to work together to develop appropriate notification procedures relating to ethane delivery schedules and shortfalls.

[23] Each month, Nova was then required to deliver to Dow a quantity of ethylene equal to the quantity of 100% pure ethane delivered by Dow.

[24] Terms in the agreement addressed measuring, sampling and analysis of ethane, tolling fees, and billing and payment.

[25] The term of the agreement was from January 1, 1999 to December 31, 2008, subject to a renewal clause.

D. History of E3 Development

[26] Plans for the construction of E3 began in the 1990s when Nova Chemicals and Union Carbide began discussions for the construction of the E3 joint venture. E3 was to be part of what Nova referred to as the J2000 project, being the development and construction of E3 and four new ethylene derivative plants at the Joffre Site.

[27] In July 1997, Nova and UCC entered into the joint venture agreements that govern the E3 project.

[28] Prior to 1998, Nova had entered into cost of service agreements with respect to the ethylene produced by E1, but they expired in 1998. After this, Nova entered into Ethane to Ethylene Tolling Agreement dated May 10, 1996 with Dow, whereby Dow had the option of purchasing 600 million pounds of E1's production of ethylene, or about 37.5% of E1's capacity (the E1Toll). In months when Dow did not exercise the E1 Toll, but paid a take-or-pay fee, E1 might operate at 62.5% of capacity.

[29] At the end of 1998, about 2/3 of Nova's contracts for ethane supply were expiring. However, effective January 1, 1999, Nova reduced the volume of ethane supply it had under contract. Ethane was not a constraint for Joffre Site operations at the time. E2 was running full out but E1 was operating at 72.6% of nameplate capacity.

[30] As noted above, during 1998 and 1999, Nova had cost of service contracts with Shell, Dow and UCC relating to E2. The Post 1998 E2 Customers Agreement among these parties set out how various cost and allocation issues were to be handled between E1 and E2. Nova also had internal demand for ethylene.

[31] Allan Broenink is an engineer who has worked for Nova since 1996. In 1998, Mr. Broenink became Nova's Business Integration Manager, Ethylene, a new role in the company. His initial responsibility was as a business operations coordinator, but his role expanded as time went by. He was responsible for Nova's merchant ethylene arrangements and for managing Nova's ethylene supply/demand balance for its western and eastern assets, including at the Joffre Site.

[32] Mr. Broenink was a key witness in this litigation. He became Manager, LPG Supply and Trading in 2004, Director, Ethane and LPG Feedstock in 2006, Director, Olefins Business Development in 2009 and the Vice President, Western Feedstock from 2015 to present.

[33] Mr. Broenink's role as Business Integration Manager, Ethylene was created because production planning was becoming more complicated at the end of 1998 with the expiry of existing E1 cost-of-service arrangements. Mr. Broenink created a new form of spreadsheet to help with Nova's production balance; a spreadsheet that looked at supply and demand for the coming year, on a monthly basis and on a daily basis.

[34] From the spreadsheets, it is apparent that, in 1999, E1 and E2 had unused capacity measured against the nameplate capacity of E1 and E2. If E1 and E2's actual productive capacity had been used in the calculation, the unused capacity number would have been larger. The

spreadsheets forecast unused capacity for E1 and E2 of 350 million pounds in 2000, using actual figures for part of the year and projected figures for the rest. In 1999 and 2000, there was no suggestion within Nova of an ethane shortfall.

[35] At about the same time, the ethylene business team (EBT) was formed within Nova.

[36] The primary responsibility of the EBT was to manage Nova's commercial arrangements and its ethylene supply/demand balance. Its members during the relevant time between 1995 and 2012 included Mr. Broenink, Cameron Clark (an Ethylene Planner and after 2001, an Ethylene Business Operations Specialist), Joyce Choma (an Executive Secretary, Sales & Marketing and Human Resources and after 2000, the Ethylene Contracts Administrator), George Pan (Contracts Manager, Ethylene between 2001 and 2003, Director, Ethylene Business between 2001 and 2003 and after 2003, Director, Ethylene and Petrochemicals) and Max Wong (Business Analyst and after 2001, Senior Business Advisor). Graeme Flint (Director of Fuels, Feedstock & Ethylene 1995-1997 and a Vice President of several divisions relating to Olefins, feedstock and business development between 1999 and 2012) was an early "sponsor" of the EBT, providing guidance, approving its mandate and reviewing materials. That role switched to Rick Henson in 2002-2004 and then back to Mr. Flint in 2004 until 2008.

[37] Cameron Clark, a member of the EBT who worked at the Joffre Site, was responsible for inputting preliminary planning data into the spreadsheet format. His planning scenarios were reviewed with Mr. Broenink and together they would set a final production plan. Spreadsheets were "live" documents in that, as actual data became available, the forecast data would be replaced with actual data. Joyce Choma also added data as it became available. Mr. Broenink was in touch with the plant engineers on a weekly basis to understand any operational constraints that would limit the ability of the facilities to run at full rate.

[38] In his role, Mr. Broenink had regular contact with Nova's feedstock group.

[39] The Post 1998 E2 Customers Agreement with Dow, UCC, Shell and a Nova affiliate, effective October 26, 1999, was originally negotiated with a 14 month term, but was renewed until the expiry of the E2 cost-of-service agreement in June, 2004. This allowed Nova to balance production between E1 and E2 by "unitizing them, settling a rate at which E2 would be deemed to operate, and thus allowing ethylene produced from either cracker to be delivered to the cost-of-service customers". It was clear from the April 17, 2000 spreadsheet information that Nova could now make, without restriction, its own decisions on how hard it wanted to run E1 versus E2.

[40] David Tulk, who was the Ethylene Business Development Leader for the J2000 Project from 1995 to 1998 and who became the manager of Nova's western feedstock business in the fall of 1998, conceded that in the years from 1990 to 1998, Nova was negotiating ethane supply contracts with the objective of reducing prices paid for ethane and achieving a reduction in take-or-pay fees. These efforts were successful in reducing the ethane premium paid to suppliers over energy value from about \$3.25 a barrel to less than \$2.00 a barrel. However in the course of these negotiations, Nova relinquished some of its ethane supply contracts, and in September, 2000, in a presentation made to Nova's executive leadership team, Mr. Tulk advised that Nova was at risk of an ethane shortfall, although he characterized it as "manageable in the near term."

[41] In 2000 and 2001, the J2000 project was brought online, consisting of E3 and four new derivative consumers in the province: the Shell glycol facility in Scotford (MEG facility), Nova's

polyethylene facility (PE2); the linear alpha olefins facility (LAO) at Joffre owned at the time by Amoco; and UCC's LP7 polyethylene facility at Prentiss.

[42] Mr. Broenink confirmed that Nova's plan was for E3 to come online at the same time as Nova's new derivative plants, PE2 and LAO and Shell's MEG facility commenced operations. Chris Foy, an Energy Commodities Analyst, joined the EBT with the responsibility of managing the E3 and the LAO facility on the Joffre site. He also became the resident expert on the E3 joint venture agreements.

[43] Mr. Broenink testified that in September, 2000, when E3 started up, ethane supply began to tighten due to the start-up of the Alliance pipeline, which resulted in gas by-passing ethane-extracting facilities in Alberta; high natural gas and electricity prices, which led suppliers of natural gas wanting to bypass extraction facilities for economic reasons; and increased CO₂ content on the gas entering the Empress straddle facilities, leading to lower ethane recovery. At the same time, one of Nova's key sources of ethane was encountering some mechanical difficulties.

[44] The members of the EBT, according to Mr. Broenink, thought that these were not long-term issues.

E. E3 Agreements

[45] The E3 joint venture is governed by 11 project agreements, all dated July 11, 1997. The original signatories are NOVA Chemicals Ltd later known as NOVA (Nova), and Union Carbide Canada Inc (UCC). All of the contracts concern E3; matters relating to E1 and E2 and site optimization are not included in the contracts except in a limited way.

[46] There are two agreements that are most relevant to this action:

- a) The Plant Co-Owners Agreement (the COA) sets out the rights and obligations of the E3 Co-owners with respect to the ownership, use and management of E3. E3 was to be held by Nova and UCC as tenants in common, each as to an undivided interest of 50%

Under the COA, each Co-owner owns the "Products"; being the ethylene and other products produced by E3, in quantities pro rata to its respective ownership proportion. This is defined in another agreement as its "Ethylene Production Proportion" (EPP).

The COA provides for the establishment of an E3 Management Committee to "oversee, supervise and direct, on behalf of the Co-owners, the ownership, management and use of E3". The E3 Management Committee consists of two representatives of each of the Co-owners, and its decisions require the "unanimous consent of the Co-owners at any meeting or by way of a resolution in writing". Another agreement provides that, among other things, unanimous consent of the E3 Management Committee is required before there may be any curtailment of E3's production.

- b) The second important agreement is the Operating and Services Agreement (OSA). This agreement has three contracting parties: UCC in its capacity as Co-owner; Nova, in its capacity as Co-owner; and Nova, in its capacity as Operator. Provisions in other

project agreements also refer to the distinct capacities of the contracting parties under the OSA.

[47] Section 4.1 of the OSA provides for the appointment of Nova as Operator with full power and authority to act as the sole and exclusive agent of the Co-owners “for the purposes necessary to carry out its duties and obligations under this Agreement ... in accordance with, and subject to, the provisions of this Agreement” and the direction of the E3 Management Committee.

[48] The Operator is “that Person appointed as such... in its capacity as operator of the plant and not in any other capacity”.

[49] Section 1.6 stipulates that , “(e)xcept as expressly provided [in the OSA] in respect of the Operator”, the OSA “shall not be considered to have created an agency relationship between any of the Parties”. It also provides that “[n]othing at law or in equity and nothing contained in this Agreement shall be construed to create or impose fiduciary obligations between the Parties or on the Operator to the Co-owners.”

[50] The OSA contains an “entire agreement” clause.

[51] Section 4.3 of the OSA sets out the Operator’s duties, subject to the terms of the agreement and, specifically, the direction of the E3 Management Committee and the actions requiring E3 Management Committee approval. These duties of the Operator include:

- a) conducting the “Operations”, meaning the activities performed in respect of E3, including the production of ethylene produced at E3 and other products produced at E3 “with the objective that [E3], subject to the direction of the Management Committee, will optimize Product production and achieve first decile performance when compared to other ethylene plants in North America”, and
- b) subject to sections 4.5 and 4.6, provide the “Services”, being all services and utilities required to be supplied to E3 to permit the Operator to conduct the Operations including “Ethane Services”, defined as a portion of the Services to be provided by the Operator including the acquisition of ethane.

[52] Thus, one of Nova’s duties as Operator under the OSA is to acquire ethane feedstock with the objective of optimizing the production of ethylene and other products from E3.

[53] The OSA provides for the creation of a “Pool” of contractual rights to purchase ethane from third parties.

[54] The Pool is defined as “the aggregate of all Ethane...arrangements” existing at any particular “time which have been entered into or obtained by the Operator in providing the Ethane Services”. Thus, the terms “Operator”, “Ethane Services” and “Pool” all refer, directly or indirectly to E3. However, the Co-owners may request ethane from the Pool for three other uses: use at another facility at the Joffre Site; use as an ethylene buffer for the Cochin Pipeline; and use as “Proprietary Ethane”. Proprietary Ethane was never requested by either Co-owner.

[55] The OSA authorizes Nova to acquire unlimited volumes of Pool ethane without the other Co-owner’s consent. It was free to acquire more ethane than necessary to fill E3, at whatever price it chose to pay, subject to certain controls. The average Pool price paid by UCC or Dow may increase if Nova chooses to purchase more ethane.

[56] The Ethane Fixed Costs, defined in the OSA, are invoiced to and paid by the Operator, who then allocates them to Pool Users in accordance with their respective Feedstock Fractions. In Article 5 on Ethane Pooling, the OSA defines “Feedstock Fraction” for each of the Co-owners as follows:

- a) for Nova, it is the resulting fraction when the total Nova Pool Ethane is divided by the sum of the Pool Ethane for both Nova and UCC, to five decimal places; and
- b) for UCC, it is the resulting fraction when the Nova Feedstock Fraction is subtracted from 1.00000.

[57] There are provisions in Article 5 for a Co-owner’s Feedstock Fraction to be increased or decreased, depending on the circumstances. This would, in turn, increase or decrease their respective share of the Ethane Fixed Costs.

[58] The OSA provides that monthly, each Co-owner is required to provide a “nomination” of its estimated requirements for ethylene production in the coming month. In Section 7.1, the Co-owners are required to provide a one-month estimate, a three-month estimate and a quarterly estimate and the Operator is to provide a forecast of its ability to produce ethylene during the various periods. Subject to section 7.2, each Co-owner is obligated to take delivery of the quantity of ethylene so nominated and produced for the month. Section 7.2 allows a Co-owner to change its nomination up to the day the month begins. The Operator is required to use reasonable efforts to meet such nomination. There is no nomination procedure for E1 or E2.

[59] Although each Co-owner was also required by the agreement to provide estimates of their ethylene requirements for the subsequent two months and the four quarters thereafter and the Operator was required to notify them of its forecast of its ability to produce ethylene from E3 during the forecast period, the longer term estimates were shortly abandoned by both Co-owners.

[60] The OSA provides that it is the intent and objective of the Co-owners that E3 continually operate (subject to scheduled turnaround) at not less than the “Ethylene Nameplate Capacity” of E3 and that “each Co-owner continually take 100% of its Ethylene Production Proportion of Product produced at [E3]”.

[61] Subject to certain exceptions, each Co-owner has the right to take in kind “a proportion of the Products produced at [E3] equal to its respective Ethylene Production Proportion”. The Operator, also subject to certain exceptions, has the duty to deliver to each Co-owner “a proportion equal to its Ethylene Production Properties” of ethylene and other products produced at E3.

[62] Under the OSA, an Ethylene Production Proportion (EPP) is defined as a Party’s proportionate entitlement to ethylene production from E3 at a specific time. The definition provides that:

A Party’s Ethylene Production Proportion shall at the commencement of Initial Operations be that proportion of Ethylene production from the initial Capacity of the Plant to which such Party is entitled and thereafter, upon any expansion of the Plant, shall be adjusted to include a proportion of the incremental Capacity of such expansion equivalent to the proportion to which such Party has participated in the construction of such expansion.

[63] Schedule G of the OSA set out a sample determination of the EPPs for the initial capacity of E3. It provides that “[t]he starting point in the calculation for [EPP] is the Base Plant and each Co-owner’s right with respect to such Plant”. The initial EPPs are calculated to be 44.48% of production for UCC and 55.52% for Nova, increasing to 50/50 if, as it did, Dow elected to buy into the seventh furnace.

[64] In addition to the Operator’s designation as the agent of the Co-owners and the provisions noted previously, the project agreements contain additional provisions relating to the duties of the Operator in running E3:

- a) Section 4.3 of the OSA imposes on Nova as Operator a duty to conduct the Operations with the object that E3, subject to the direction of the E3 Management Committee, will optimize Product production and achieve first decile performance when compared to other ethylene plants in North America. “Operations” are defined as the work and activities performed by the Operator in respect of E3. Thus, it is the production of products at E3 that is to be optimized.
- b) Section 7.3 of the OSA provides that E3’s product production is to be maintained at its productive capability. “It is the intent and objective of the Co-owners that the Plant continually operate (subject to scheduled turnarounds) at not less than Ethylene Nameplate Capacity of the Plant and that each Co-owner continually take 100% of its Ethylene Production Proportion of Product produced at the Plant”. Ethylene Nameplate Capacity means “the capacity of an ethylene plant to produce ethylene in a year as determined by the Operator in the manner provided for in Schedule E”. In other words, Nameplate Capacity is the estimated actual capacity of a plant to produce ethylene in a year taking into account certain deductions.
- c) As previously noted, the services required to be provided by the Operator include “Ethylene Services”, a subset of Services generally. This includes acquiring the ethane required to fill E3 and conduct Operations. The OSA acknowledges that Nova will be providing “services in the nature of Services” to E1 and E2 as “operator of the balance of the [Joffre site]” consistent with the right of Nova to acquire ethane in excess of the requirements of E3.
- d) Nova as Operator must conduct E3’s Operations “in accordance with, and subject to the provisions of the [OSA] and the direction of the Management Committee”. Section 4.2 of the OSA provides that, subject to any limitation imposed by the E3 Management Committee, “the Operator shall conduct the Operations in accordance with this Agreement and shall perform the duties provided for in Section 4.3 in a manner as would a prudent operator of a like petrochemical production facility”. The duties set out in Section 4.3 include the provision of Ethane Services. Section 4.3(c) clearly includes Ethane Services, which include the acquisition of ethane for E3 in the duties of the Operator, and in performing these duties, the Operator is acting as agent for the Co-owners, as set out in Section 4.1. Section 4.3 does not purport to list all of the duties of the Operator: it specifically is subject to the “terms of this Agreement”, some of which set out additional duties.

[65] The *force majeure* provision of the OSA provides that a party’s contractual obligations may be suspended by reason of, among other things, a “shortage of ...feedstock.”

F. The Dow/UCC Merger

[66] The Dow/UCC merger was publicly announced in August, 1999. Mr. Flint, who at the time was Vice President, Western Olefins, responsible for Nova's feedstock and western ethylene business, and Mr. Tulk, who was then the Manager of the Western Feedstock Business reporting to Mr. Flint, both testified about Nova's concerns about the merger and about discussions that occurred within Nova after the announcement. At that time, Mr. Tulk was responsible for the day-to-day activity of getting feedstock to the Joffre Site, as well as developing new feedstock projects. In response to the announcement, Nova formed a small working group that included Mr. Broenink, Mr. Tulk, Mr. Flint, Mr. Pan and Nova's in-house counsel, Ron Kemle.

[67] Mr. Flint and Mr. Tulk testified that Nova was concerned about having to share ethane contract information as required by the E3 joint venture agreements with the only other major purchaser of ethane in Alberta, and its major competitor. From the time of the announcement of the merger, Mr. Tulk explicitly directed staff that information with respect to contracts for ethane supply that had been made available to UCC, including information as to contract volume, price and term, was not to be made available to Dow. He requested UCC not to share existing information of that kind with Dow. Nova also made submissions to the US Federal Trade Commission (FTC) and the Canadian Competition Bureau objecting to the merger, and arguing that, as a condition of the merger approval, Dow should be required to divest its interest in E3.

[68] Mr. Flint asked Mr. Pan, then the head of Nova's EBT, for his thoughts on the merger. Mr. Pan noted in an email of May 11, 2000 to Mr. Flint that, without the merger, Dow had access to about 40% of ethylene supply in Alberta, Nova had about 30% and UCC had about 30%. With the merger, the ratio became Dow 70% and Nova 30%. Mr. Pan suggested that Dow should be required to divest its ownership in E3 in order to reduce its potentially dominant control of ethylene supply in Alberta. Mr. Pan was also concerned with Dow's access to Nova's cost data. Mr. Flint agreed with these concerns, and in a May 11, 2000 email, raised them with Dan Boivin, a senior vice president of Nova. These concerns were carried through in the submissions to the FTC and the Competition Bureau, but no divestiture orders were made.

[69] Mr. Tulk testified that he was concerned that if Nova did not do something to address the flow of information under the E3 contracts, Dow would have access to the costs of making ethylene at all four ethylene crackers in Alberta through their cost-of-service agreements at E2 and the E3 contracts. On his copy of a May 11, 2000 email circulated among members of the working group, he noted a "wish list" as follows:

- a) No option on further volume from E3, i.e. capped at 1250 mmlbs;
- b) No option on UCC 500 mmlbs bridging option – UCC sales from E2 on other terms;
- c) No option on increasing toll by 400 mmlbs mid 2004;
- d) Access to storage caverns in Sarnia;
- e) Dow supplies their E3 share of feedstock – Nova assignment of a contract.

[70] These goals could have been achieved through the competition authorities, or, as Mr. Tulk conceded, through negotiations with Dow, including changes in the joint venture agreements.

[71] On February 14, 2001, Mr. Tulk met with Mr. Flint and Mr. Pan to discuss Nova's strategy about the merger. The notes from that meeting are marked "Original document dated approximately May 10, 2000", but Mr. Tulk explained the discrepancy in the date, and I am satisfied the notes reflect the February 14, 2001 meeting.

[72] The notes reflect discussions about feedstock supply to E3. They note the options of buying Dow out of E3 and using the E1 Toll and the LP7 ethylene supply as "potential deals". Under the heading "Dow Issues/Interfaces", the notes reflect outstanding issues with the E1 and E2 tolls. Under "E3", the notes reference "supply of feedstock to E3 – conflict, independence". Under the heading "Nova's Wish List", the notes include "Minimize ethylene to Dow" and "Back Dow out of E3". Under the heading "Dow out of ethane pool", the notes reference "2 separate buyers", "Dow help out Nova ethane shortage", and "increases Nova autonomy in managing pool".

[73] Mr. Flint conceded that, in the wake of the merger, Nova came to the view that it could not interact with Dow as it had with UCC. For example, as previously noted, it could not, and did not, provide Dow with the contract synopses that were required by the OSA feedstock provisions and it did not provide Dow with any particulars with respect to ethane contracts. This was a deliberate decision that came into effect even before the implementation of the merger. Nova also terminated the feedstock subcommittee meetings that were required by the OSA and that had been held with UCC. Mr. Flint testified on cross-examination that these meetings stopped due to competition law concerns shared by both parties.

G. Development of the Concept of Ethane Allocation

[74] Mr. Broenink testified that ethane supply was sufficient from the start-up of E3 in 2000 until the end of the second quarter of 2001. Mr. Broenink had some commercial tools available to balance supply and demand. He could sell ethylene on a spot basis if supply exceeded demand, or purchase it on a spot basis if he was short. He could also arrange a time swap of ethylene.

[75] Mr. Broenink testified that, after April 1, 2001, Nova's ethane supply levels were relatively low and it was quickly drawing down on inventory. E1 was on a scheduled turnaround and not operating, but even so, ethane inventory was dropping. Mr. Broenink testified that he became concerned about ethane supply if inventory dropped below 300,000 barrels. That was the level that would enable the Joffre Site facilities to operate for a period of time in the event of a major supply upset.

[76] Mr. Pan, Mr. Broenink, Mr. Wong, Mr. Tulk, Mr. Clark, Mr. Flint and Mr. Kemle had meetings on how to resolve the problem in late 2000 or early 2001. Mr. Broenink was the originator of the concept of "ethane allocation" as a solution.

[77] Mr. Broenink testified that he was aware of how Joffre had operated as a "unitized" site before E3 had been built. He looked at the Post 1998 E2 Customers Agreement that had been negotiated in 1999 after at the expiry of the E1 cost-of-service agreements.

[78] That agreement, which deals with production from E2 and was negotiated prior to the completion of E3, provides that Nova can pool ethane supplies and, in the event of an ethane shortage, Nova can allocate such supplies on a pro-rata basis based on the nameplate ethane consumption capacity of each of the ethylene plants (present and future) at the Joffre Site. It also provides for the pooling of ethane fixed costs and the pro-rating of such costs among the

ethylene plants (present and future) at the site based on nameplate ethane consumption capacity of each plant.

[79] Mr. Broenink testified that this agreement provided him with guidance on how to handle the ethane shortage that faced Nova in 2001. He decided that ethane supply from the Pool described in the E3 joint venture agreements should be allocated among E1, E2 and E3 based on the ethane nameplate capacity of the three crackers. He brought this provision to the attention of the other members of the EBT.

[80] Mr. Broenink testified during examination-in-chief that he also looked at section 4.6 of the OSA. He stated that, in his view, that section deals with optimization at the Joffre Site, in his words “without regard to ownership”. He said that he noted how, under the OSA, ethane fixed costs between the Co-owners were allocated based on feedstock fractions. He testified that, as feedstock fractions were determined based on ethane nameplate capacity, this “provided me with a direct parallel with the direction in the Post 1998 Agreement.” However, this evidence is not credible, given Mr. Broenink’s evidence on cross-examination.

[81] On cross-examination, Mr. Broenink conceded that the EBT group had first checked the E3 joint venture project agreements to see if there was any provision regarding the distribution of ethane in periods of perceived shortfall, and finding nothing there, turned to the Post 1998 E2 Customers Agreement and similar agreements. He conceded that in 1996, when the Post 1998 E2 Customers Agreement was entered into, E3 did not exist as a jointly-owned facility, and that he knew that when reviewing the agreement. He conceded that, in formulating the concept of ethane allocation, it was his responsibility to produce the best commercial result possible for Nova. He acknowledged that he was aware of the *force majeure* provision of the OSA, which includes shortage of feedstock as a specific *force majeure* event. He had no explanation for why Nova did not refer Dow to section 4.6 of the OSA as a rationale for ethane allocation prior to the summer of 2004. Given this evidence, I find that Nova’s reliance on section 4.6 of the OSA as a rationale for ethane allocation is something that did not arise until 2004.

[82] Mr. Broenink acknowledged that there was a direction from Nova senior management not to declare shortage of feedstock as an event of *force majeure*, given that this would have to be disclosed to the public investment markets.

[83] Mr. Tulk also testified that the EBT reviewed the E3 joint venture contracts to see if they contemplated any sort of allocation procedure in the eventuality of a shortage of feedstock. He conceded that the EBT did not find such a clause, but testified to his view that, as Operator of E3, Nova had discretion under section 4.6 to deal with ethane services. He agreed that the EBT looked to the pooling language in the Post 1998 E2 Customers Agreement and other agreements that had language that allowed Nova to pool ethane supplies at the Joffre Site, and that such language was the model the EBT chose. He conceded that it was the EBT, specifically Mr. Broenink and Mr. Pan, who really designed ethane allocation.

[84] Mr. Tulk acknowledged that the EBT had concerns about advising Dow about the introduction of ethane allocation, although he testified that he had no part in the EBT’s discussions about ethane allocation and did not recall the particulars of the discussion.

[85] Mr. Tulk agreed that the decision about whether or not to impose ethane allocation each month was made by the EBT, specifically Mr. Broenink and his successor, David Baker, and later with some involvement of the Joffre production planning team (JPPT), which was chaired

by a member of the EBT. While Mr. Tulk did not attend those meetings, a member of his staff did, and he received the minutes of the meetings, together with the production plans developed by the EBT.

[86] Mr. Flint characterized the development of ethane allocation as a matter of safety and reliability. However, he acknowledged that an ethylene cracker is able to run perfectly safely at false load, and that it was the potential of false load that he was referring to when he referred to safety concerns. He testified that allocation is an approach that the pipeline industry uses when it has too much volume to move and too little capacity, to ensure that all customers are treated equitably. He testified that ethane allocation was a way to fairly and equitably share the pain associated with an ethane supply shortfall. Mr. Flint conceded that he, too, had attempted to find something in the E3 joint venture project agreements and found nothing specific on the issue of inadequate feedstock. I do not find Mr. Flint's evidence about safety concerns leading to the development of ethane allocation to be credible.

[87] Mr. Flint acknowledged that the E3 Management Committee had never approved ethane allocation and that, apart from certain short-term agreements described later, there has never been any written agreement relating to ethane allocation between Dow and Nova.

[88] It is noteworthy that Mr. Foy, the Nova internal expert on the E3 agreements, urged Nova to obtain Dow's written agreement to ethane allocation from time to time, and that Nova tried to do so. These attempts failed, as Dow refused to agree to the concept.

[89] On April 23, 2001, Mr. Broenink made a presentation to the EBT, entitled "Alberta / Sarnia Ethylene Supply/Demand Growth Forecast, 2002-2008." The presentation notes that Nova would likely be "net ethylene long" (would have made more ethylene than it needed to sell) until the end of 2001.

[90] On cross-examination, Mr. Broenink confirmed that the presentation envisaged that Dow would be entitled to █████ billion pounds or 44.484% of E3's production, its "Ethylene Production Proportion" (EPP) at the time. The EPP is a party's contractual proportionate entitlement to ethylene production from E3 under the OSA. At the time, E3's production was envisaged to be █████ billion pounds of ethylene per year. Mr. Broenink's presentation also noted that Dow would be entitled to █████ billion pounds of ethylene from E3 when its EPP changed to 50% of E3's production in 2004. Thus, in April 2001, Nova expected that the actual productive capacity of E3 would be █████ billion pounds per year, greater than its original design nameplate capacity of 2.8 billion pounds.

[91] Three days later, Mr. Broenink and Mr. Wong made an internal presentation to the Nova Chain Optimization Team, which had as its goal the maximization of profit through the petrochemical chain of production from feedstock to derivatives. The presentation referred to Nova's decision to cancel certain ethane shipments to Ontario "in order to facilitate negotiations with potential suppliers," which, it noted, "positioned Nova to implement ethane allocation in Joffre with Dow E3 and external customers".

[92] Mr. Wong and Mr. Broenink recommended implementing "Dow E3 ethane supply allocation immediately upon reaching ethane constraint". By that, Mr. Broenink meant a deficiency arising from current ethane supply compared with the combined nameplate capacity of the three Joffre crackers, excluding the E1 Toll, even though he had recognized that E3 could operate at a higher capacity than nameplate in his presentation three days earlier.

[93] E3 was tested against its performance guarantees from May 7 to May 10, 2001. The tests indicated that E3 met or exceeded the performance guarantees.

[94] Mr. Broenink was directed at trial to the May 14, 2001 E3 Status Update. This showed E3 running at slightly above nameplate capacity of 2.81 billion pounds per year, and noted as a current “Constraint” the “Production plan”. Mr. Broenink conceded that this meant that the E3 operational people were of the view that E3 could be producing at an even higher rate, if not for the EBT’s direction with respect to a production plan. He suggested that sometimes, the plant people would put “production plan” as a constraint when they meant to say “ethane constraint.”

[95] At an internal EBT meeting on May 31, 2001, Mr. Wong and Mr. Broenink presented a May 31, 2001 update of the April 26, 2001 presentation. This presentation indicated higher ethylene production than previously predicted, exceeding Nova’s demands for at least the next three months, with no negative numbers in inventory until October 2001. The presentation indicated that “ethylene” gross system shortfall had improved significantly” since the May 17 update. However, Mr. Broenink testified that Nova’s ethane inventories had fallen to 300,000 barrels by the end of May 2001, which he considered to be the maximum level needed to prevent a plant upset if an ethane supply became disrupted. Despite the improved forecast, the recommendation was to implement ethane allocation in early June.

H. First Involvement of Dow

[96] Prior to completion of the Dow/UCC merger, Dow owned a major ethylene plant in Fort Saskatchewan, LHC-1, and had negotiated feedstock arrangements to operate that plant. Dow also had the E1 Toll with Nova, a long term contract for ethylene with Nova, an ethanizer project at Fort Saskatchewan which was a joint venture with other parties, an ethylene storage joint venture with Nova, miscellaneous small projects in Alberta and hydrocarbon interests in Sarnia, Ontario.

[97] Hugh Fergusson was the Vice President, Hydrocarbons and Energy for Dow in Canada between January 1, 2001 and May 2004. He was a long-time Dow employee who had been involved in the negotiation of the 20-year E2 cost-of-service contract between Dow and Nova and had administrative responsibility for the feedstock side of the E1 Toll. He moved to Calgary in January, 2001 in contemplation of the completion of the UCC/Dow merger, to be the manager of Dow’s Canadian assets and contracts. In February, 2001, Mr. Fergusson and Dennis Bisson, a plant manufacturing leader for one of the Dow facilities in Alberta, joined the E3 Management Committee.

[98] The Canadian aspects of the merger were not finalized until October, 2001. However, from the beginning of February, the transition of the Canadian assets from UCC to Dow was underway, and Mr. Fergusson was attempting to get up to speed on the details of all of UCC’s Canadian facilities. Between February and October 2001, Mr. Fergusson was on the Boards of both UCC and Dow, and receiving certain reporting materials from Nova on E3.

[99] Mr. Fergusson received a request from Nova for payment for the ethylene produced at E3 almost immediately upon arriving in Canada. The cheques for payment had to come from Dow Europe, and Mr. Fergusson had initial meetings with Nova on how to transition the payments from Europe.

[100] Mr. Fergusson described receiving a massive number of documents about the Dow and UCC relationship and the E3 arrangements within a day or two of February 1, 2001. His first

meeting with the E3 Management Committee was on March 18, 2001. He also described receiving a large amount of reporting and invoicing from Nova every month, numbering in the hundreds of pages. Dow had already been receiving large amounts of reporting and invoicing documents from Nova on the E2 cost-of-service arrangements, but Mr. Fergusson testified that the E3 arrangement increased the load of documentation dramatically. Mr. Fergusson did not review the reporting and invoicing documentation himself, although he says he may have referred to it from time to time to check comparative ethane costs. He conceded that he expected that someone at Dow would have determined in each month the percentage of E3's total production received by Dow, and would report to him if they found a discrepancy between what was being received and what Dow was entitled to. Read-in evidence from an accountant who worked for Dow between 1998 and 2004 indicated that, although she didn't know "whether it was entitled to or it was a result of ethane allocation", she was aware that Dow Europe usually received less ethylene from E3 when ethane allocation was in effect.

[101] Mr. Fergusson testified that the main focus of the E3 Management Committee's activity in the spring of 2001 was to get E3 up and running and achieving commercial operation.

[102] On May 16, 2001, Mr. Flint sent Mr. Fergusson and Steve Williams, who was then Dow's second representative on the E3 Management Committee, an email Mr. Flint had authored with input from Mr. Pan and Mr. Tulk. The email began by stating that, pursuant to the OSA, "Nova's and Dow's pro-rata share of the supply of ethane from the Ethane Pool for the Joffre site is 77.7% and 22.3%, respectively, net of Dow's E1 Toll." Mr. Flint explained that these percentages were representative of the "feedstock fractions" that were calculated based on the ethane nameplate capacity of each of E1, E2 and E3 after subtracting the E1 Toll. The email referred to an impending shortfall in ethane supply, and stated that "(e)thane Pool allocation could start as early as June".

[103] The email suggested steps that could mitigate the situation, including Dow providing additional ethane supply to Nova, Nova deferring the start-up of E1, which was on a planned shutdown at the time, and short-term ethylene swaps. After discussing the existing fixed costs regime, the email stated:

NOVA is not prepared to extend the E1 shutdown beyond the planned May 31st completion date without consideration of the fact that E1 continues to be allocated a nameplate share of ethane fixed costs while all available scarce supplies of ethane are consumed by E2 and E3.

[104] The email then called for co-operation from Dow.

[105] Mr. Flint conceded that there was no suggestion in this statement of allocating ethane. He acknowledged that he knew that E3 was part-way through a performance test to confirm its design nameplate capacity, and that it would need to run at full rates for the test to be valid. He acknowledged that Dow agreed to provide, and did provide, ethane in the volumes suggested by the email and that the start-up of E1 was deferred. He conceded that there were no safety issues. Mr. Flint also conceded, contrary to the suggestion in the email that ethane allocation could start as early as June once ethane inventories were depleted to their minimum operating level, that over the June to August 2001 period, ethane inventories actually increased, although he quibbled over the fact that he did not have specific daily data.

[106] A few hours before Mr. Flint sent this email to Dow, he received an email from Mr. Pan commenting that Dow was holding significant quantities of ethylene in inventory, and suggesting that it was time “to play hard ball”.

[107] According to an internal email dated June 11, 2001, Mr. Tulk, in describing initiatives underway to increase ethane supplies, indicated that “[p]resently there is enough ethane/ethylene available to meet our internal needs”.

[108] Mr. Tulk met with Mr. Williams on May 29, 2001 to discuss the E3 Feedstock Subcommittee and issues with Dow’s involvement in this subcommittee. His notes indicated that “Steve neutral on most issues - hasn’t been war gamed by Dow – seems to have limited authority”. Mr. Tulk conceded that he recognized that Mr. Williams, and others at Dow, did not seem up to speed yet about E3.

[109] The EBT decided to propose to Dow that E1 should remain offline after it completed its turnaround, and that available ethane would be allocated between Dow and Nova, the pool users, based on their feedstock fractions, and processed at E2 and E3. The ethylene produced from these two facilities would be pooled and then split based on the feedstock fractions. Although there was an E3 Management Committee meeting on June 1, 2001, ethane allocation was not on the agenda. Instead, on June 1 or 2, 2001, Mr. Pan and Mr. Broenink met with Mr. Fergusson and Mr. Williams in a separate meeting.

[110] Mr. Broenink testified that, at the meeting, he described events that had led to the curtailment of ethane supply to the Joffre Ethane Pool over the previous few months and the steps Nova was taking to alleviate the problem, indicating that improvement in supply was not anticipated until later that year. Mr. Broenink indicated to Mr. Fergusson and Mr. Williams that ethane supply had been less than Joffre demand for several months, meaning actual demand. However, on cross-examination, Mr. Broenink conceded that the day before the meeting, internal presentations were indicating that Nova’s share of the ethylene from Joffre was higher than its expected demand.

[111] Mr. Broenink’s presentation at the meeting also indicated that “[u]nder ethane allocation, Dow E3 will have a pro rata share of ethane/ethylene from Joffre equivalent to 22.8%” and that if E1 started up on June 1, “Joffre would be on immediate ethane allocation”. The presentation indicated that:

Nova is proposing to defer the E1 start-up and deem ethane allocation (and hence ethylene) on the basis as if E1 had started up on June 1 (i.e.: NOVA: 77.2%; Dow E3 22.8%).

[112] The percentages referred to correspond to the feedstock fractions used with respect to the allocation of fixed costs at the time.

[113] Mr. Broenink testified that the proposal made to Mr. Fergusson and Mr. Williams was that this arrangement would be in place for the duration of the E1 outage, which he expected would extend into the third quarter of the year. Mr. Broenink conceded that he did not believe he had Dow’s agreement to continue with ethane allocation after E1 came back on line, and that the discussion was that, when it did, ethane allocation would end. He testified that Mr. Fergusson and Mr. Williams agreed to the proposal.

[114] On cross-examination, Mr. Broenink conceded that, while he had a general recollection of the meeting, he did not recall anyone’s specific words. The meeting had no formal agenda, but

Mr. Broenink confirmed that its purpose, from Nova's perspective, was to communicate that E1 had been in turnaround and that Nova proposed that it would not be restarted in light of available ethane supply. This meant that Dow would not be able to use the E1 Toll, but Nova would be able to save costs.

[115] He also conceded that, while the presentation referred to ethane inventory being depleted by early June, Dow sold ethane to Nova between June and August 2001, with the result that ethane supply exceeded Joffre demand and ethane inventory increased.

[116] Mr. Broenink also confirmed on cross-examination that, at this time, E3 was part-way through a performance test, and that, in general, both parties would be aware that anything that would reduce E3's operating rate during the test was to be avoided.

[117] Mr. Fergusson did not recall the June 1, 2001 meeting. He was aware of Nova experiencing an ethane shortage, guessing that he first became aware of that in the summer of 2001 following E3's rate trial. He recalled being told by Nova that it was a temporary situation. He understood that each cracker would share in the pain and that there was a protocol that was being proposed, notably to be applied to each cracker. He understood that this would have some impact on the amount of ethylene Dow would receive, that it would lose ethylene pounds from E2 and E3, but that there would be no economic consequences for Dow at E1.

[118] Mr. Fergusson denied that he or anyone else at Dow to his knowledge had ever agreed that Nova was entitled to impose ethane allocation. Mr. Flint conceded that ethane allocation has never been approved by the E3 Management Committee. Evidence from Dow read-in by Nova establishes that Dow did not agree to "allocation", but only that, for a brief time in 2001 while E1 was offline, Dow accepted Nova's proposal as presented at the meeting.

[119] In a Nova internal newsletter for the week beginning June 4, 2001, Mr Broenink reported that Nova had initiated ethane allocation with Dow, and that this allowed Nova "to capture about 30,000,000 pounds of ethylene previously assumed in June", meaning a reduction of that amount in the amount of ethylene delivered to Dow as a result of deemed ethane allocation. Mr. Broenink sought to rationalize this by saying that it was a "repatriation because without ethane allocation, Nova would be absorbing a hundred percent of that shortfall".

[120] By shortfall, Mr. Broenink meant the shortfall against nameplate capacity, which he acknowledged that Nova was not using, or against "the ethane nameplate, the pool users' total demand from the pool". Mr. Broenink acknowledged that, at the then-existing profit margin, the 30,000,000 pounds captured by Nova as a result of ethane allocation was worth about \$6 million.

[121] He conceded that there was no disclosure during the meeting with Mr. Fergusson and Mr. Williams of the economic impact of deemed ethane allocation on Nova as opposed to Dow. He acknowledged that he was not aware of any occasion when Nova disclosed to Dow that under ethane allocation Dow was receiving a different percentage of its demand for ethylene than was Nova, or when Nova disclosed the extent to which its internal or external demands were being met during periods of ethane allocation.

[122] His report in the newsletter also referred to lower operating rates for the week as a result of reducing how much ethylene Dow recovered and Nova's lower demand in June due to outages at the Joffre polyethylene plant. He acknowledged that he did not advise Dow that his earlier statements about supply and demand were inaccurate, as Nova's demand for ethylene had gone down.

I. Nomination Process

[123] The contractual nomination procedure for E3 provides that each of the Co-owners nominate their ethylene requirements on a monthly basis. Typically, Dow nominates first and Nova responds with its nomination. Margaret Eastman, who was Mr. Broenink's counterpart at Dow, would forward Dow's nomination, which was almost always for 100% of Dow's contractual entitlement, and a request for any ethylene that Nova declined to take in the forecast period. Mr. Broenink was responsible for Nova's nomination, and Nova also typically nominated its full contractual entitlement.

[124] On cross-examination, Mr. Broenink testified that, prior to the Dow/UCC merger, he provided the UCC individual who provided UCC's E3 nomination with turndown volume elections and forecast E3 operating rate information. Initially, he provided Ms. Eastman with that information, but when Nova placed Dow on ethane allocation, Nova stopped disclosing what E3's estimated production rate would be.

[125] In August 2001, for example, instead of telling Ms. Eastman what E3's estimated production rate was, Mr. Broenink told her what portion of Dow's usual share it was going to get, being 92% of the maximum. However, hours later, he advised the plant operations person that the plan called for E3 to operate at 100% rates in August.

[126] Mr. Broenink testified that, as part of Nova's production planning process, Nova would nominate its full entitlement to E3 ethylene first, and then fill the remainder of its demand through E2 and then E1, subject to the plants operating at a safe minimum level, referred to as being above false load. False load, according to Nova, was operating at about 60 to 65% of capacity, although that gave a healthy margin above what could be considered unsafe.

[127] Mr. Broenink testified that he talked to Ms. Eastman on almost a daily basis, including about operations. Ms. Eastman was a Dow supply chain planner, whose primary role was to review the amount of ethylene being produced, and to match it up with demand from customer orders. If the numbers did not match, Mr. Eastman would report that Dow needed to acquire ethylene to meet the demand, or to manage excess supply. Her role was to make sure all derivative needs were satisfied.

[128] Mr. Broenink confirmed that he knew that Ms. Eastman's priority was to match up the volumes of ethylene she was going to receive from various sources with the volume of ethylene Dow was expecting to receive to meet its demands, and that he knew she was doing this, not just for E3 but for Dow Canada as a whole.

[129] On June 4, 2001, Mr. Broenink sent Ms. Eastman a copy of the presentation he had made to Mr. Fergusson and Mr. Williams. On June 28, 2001, Mr. Broenink advised Ms. Eastman that "as discussed on the phone, the ethane allocation procedure which was put in place in June will need to continue through the month of July".

J. Extension of Ethane Allocation

[130] On June 28, 2001, Mr. Fergusson confirmed to Mr. Flint and Harry Van Zeist, who were the Nova representatives on the E3 Management Committee at the time, that Dow had elected to buy into the ethylene production resulting from the installation of a seventh furnace at E3. This was further to an option in the joint venture agreements that would increase Dow's EPP to 50% to be effective July 1, 2004.

[131] On July 31, 2001, Mr. Broenink stated to Ms. Eastman when advising her of Nova's nomination that:

... as discussed on the phone, the ethane allocation procedure will need to remain in place for the month of August ... Dow E3 production will be limited to [about] 92% of maximum ...

[132] Mr. Broenink said he was providing Ms. Eastman with an estimate of how much ethylene Dow could expect from Joffre if E3 operated at 92% of nameplate, although he does not recall the specifics of the conversation.

[133] An internal presentation dated August 22, 2001 projected that Nova had enough ethane from the period of June to August, 2001 to meet its internal demands and to build up inventory, despite E1 being out of service.

[134] Despite this projection, on August 31, 2001, Mr. Broenink advised Ms. Eastman that ethane allocation would need to continue in September, and that based on forecasted ethane supply, "Dow's E3 ethylene take will be reduced to approximately 84% of its E3 share".

[135] Documentation establishes that, despite projections, the actual ethane supply from September to November 2001 was an average of 127,700 barrels a day, and that by the end of November, inventory was zero.

[136] In a later internal presentation, Mr. Flint attributed this to low gas flows through the pipelines and the fact that the ethane composition of natural gas had declined significantly due to the operation of the Alliance pipeline. The presentation also recognized that Dow had been successful in expanding the capacity of its LHC-1 plant in 1998 such that it did not need to use the E1 Toll. Therefore the incremental supply of ethane that would otherwise be available to Nova from that Toll was no longer available. A fire in a storage facility also contributed to the shortage.

[137] E1 went back on line on September 10, 2001, but Nova continued to impose a form of ethane allocation. Mr. Broenink testified that the E1 start-up "would have been part of [his] regular conversations" with Ms. Eastman. Mr. Broenink could not recall any concerns expressed by Ms. Eastman. Mr. Broenink conceded that neither he nor Mr. Pan sought agreement from Mr. Fergusson or Mr. Williams to continue ethane allocation.

[138] With E1 back on line, this was no longer "deemed" allocation, but ethane allocation with all three crackers in operation. Under this new form of ethane allocation, Nova was purporting to allocate ethane to each plant. This new form of ethane allocation was imposed from mid September 2001 until the end of January 2002.

[139] On September 17, 2001, Mr. Flint, Mr. Pan and Mr. Tulk from Nova and Mr. Fergusson, Mr. Williams and Pat Hawes, a Dow hydrocarbon economics employee, met in Lake Louise, Alberta to review Nova's ethane supply portfolio, and the challenges surrounding that issue. Mr. Flint testified that Nova recognized that the Dow/UCC merger "created some problems with respect to how it was expected that Nova would continue to supply ethane to Dow whilst competing against Dow". He noted that both parties recognized that they were capable of acquiring ethane in the Pool area to meet their own requirements, and that this "might include, for Dow, supplying ethane for their E1 Toll, their LHC-1 plant, as well as their share of E3, whilst Nova is concentrating on acquiring ethane to support its assets at E1, E2 and its share of E3".

[140] Mr. Tulk said that the participants discussed and recognized the reality of Dow already buying ethane in the Pool area, and how that could be sorted out.

[141] Mr. Flint testified that he did not recall any discussion about ethane allocation at this meeting. Both he and Mr. Tulk recalled that the parties discussed scenarios under which Nova could consider Dow playing a larger role in supplying ethane to E3. The options included selling or assigning some of Nova's ethane supply contracts to Dow. Mr. Tulk recalled that the discussion on breaking up the feedstock Pool involved using the feedstock fractions as the basis for dividing the ethane obligations when disentangling the Pool. Mr. Flint said that the outcome of the meeting was an agreement that the parties would attempt to transition the E3 joint venture into a manufacturing joint venture, with Nova no longer acting as feedstock supplier to Dow at E3, and Dow being responsible for bringing its own ethane to E3. The parties set a future meeting date to discuss this issue. Mr. Flint said that Nova asked Dow to provide a legal opinion on how the parties would be able to move forward, but that the issue was never resolved.

[142] On September 28, 2001, Mr. Fergusson and Mr. Williams received an email from Mr. Dawes setting out his notes of the September 17 meeting with Nova. After discussion of ethane feedstock arrangements, the email notes that "[c]urrently Dow's (share of E3?) is 22.7% of the Pool (supply to E1 is outside the pool)". Mr. Dawes noted that question mark in his notes indicates uncertainty with the accuracy of the information.

[143] On November 1, 2001, Mr. Foy of Nova made a presentation internally about E3's ethylene nameplate capacity. At this point, Nova had imposed ethane allocation for several months, and would continue to do so. The presentation noted that, if the nameplate capacity of E3 increased and the parties' feedstock fractions were adjusted accordingly, Nova would get less ethylene under ethane allocation. Worse for Nova, if the ethylene nameplate capacity of E3 increased, Nova's ability to recover both ethane fixed costs and ethylene fixed costs from an unrelated third party under a contract to supply ethylene would be reduced. Mr. Foy attempted to quantify how much a change in the E3 nameplate capacity would negatively impact Nova.

[144] Shortly after this, Mr. Flint was assigned elsewhere in the Nova organization and Rick Henson, the Vice President of Petrochemicals, took over Mr. Flint's responsibilities with respect to the E3 joint venture. Dale Spiess, a Senior Vice President and US President, Olefins and Polyolefins, replaced Mr. Boivin as leader of OPOL.

[145] On December 18, 2001, Mr. Fergusson responded to an E3 Daily Status Update of that date sent to him by a Nova E3 Technical Team Leader. The update indicated that ethylene production for that day was at 81.4% of capacity, and "Current Constraints" were described as "Business Plan". Mr. Fergusson's email in response noted that Dow and Nova had nominated 100% for the month, and that reduced operating rates might more properly be described as a result of a lack of ethane supply. Later the same day, Mr. Fergusson noted in an email:

[146] Currently E-3 is running in the neighborhood of [REDACTED] million pounds per year below capability - unless I misunderstand the situation this shortfall is entirely the result of a shortage of ethane. If this is the case I think we ought flag it in the daily report and be sure not to infer it is either the result of unsatisfactory operations or a "business plan". Thoughts/comments?

[147] Mr. Fergusson's query was referred by Mr. Henson to Mr. Pan, who advised Mr. Henson that "we don't want to imply that the constraint is anything operational or nomination based, and

not overly advertise the ethane shortfall, Eric [Wade, a senior Project Manager] and I will work on a better description of the constraint for the daily report”.

[148] The next day, Mr. Pan advised Mr. Fergusson that he agreed that “business plan” was too broad a description to explain E3’s operating rate as opposed to capability, and that it would be changed to “ethane supply”.

[149] Mr. Fergusson noted that it was Dow’s business plan to run E3 at capacity, and he wanted to put Mr. Henson and Mr. Pan on notice of that.

[150] On January 31, 2002, Mr. Clark sent Mr. Broenink an email setting out certain scenarios involving ethane allocation in February, and indicating how hard E2 might be run. He noted that “[a]s you can see, reducing rates in E2 will have a bearing on Dow’s ethylene entitlement under ethane allocation. How can we justify Dow ethane allocation for the whole month when not running E2 at full capacity ... while holding ethane in inventory.” He also noted that by keeping Dow on ethane allocation, we are essentially saying “thanks for bringing ethane to the pool for the E3 performance test but NOVA is only allocating you 22.8% of E3’s ethylene production vs 44.5%. I struggle with this one.”

[151] On February 4, 2002, Mr. Clark advised Ms. Easton that, under ethane allocation, each of Nova and Dow’s share of E3 will be limited to 95%. In reply, Ms. Easton requested clarification with respect to what the 95% referred to, and on how they could be on allocation when Dow had sold Nova a “bazillion” pounds of ethane that month.

[152] Mr. Clark advised Mr. Broenink in an email that Joffre “demand” excluding the E1 Toll was about 175 kbbl/day. Neither the reference to “demand” or the figure of 175 kbbl/day was accurate.

[153] In early 2002, a two-part furnace high rate trial was commenced, and carried out throughout the early months of the year.

[154] In a February 7, 2002 email, Mr. Broenink advised internally that Dow had been advised that ethane allocation would be removed for February.

[155] On March 6, 2002, Mr. Broenink sent an email to Ms. Eastman, indicating that, in order to “conserve ethane, maximize ethylene yield and ... smooth out unit operations”, Nova was recommending that production at E3 be reduced to 90 to 95% of nameplate after the end of the performance test. He noted that “we would need to put Dow E3 back on ethane allocation”, meaning that Dow would receive about 22.8% of total Joffre Site ethylene production, which he characterized as “Dow E3 pro rata share of the Joffre ethane pool”. He could not recall if he got a response from Ms. Eastman. Nova imposed ethane allocation from March 1, 2002 until the end of June, 2002.

[156] Mr. Broenink testified that it was his responsibility to decide whether or not to impose ethane allocation on a monthly basis, with the assistance of Mr. Clark and Ms. Choma. Every month, Ms. Choma ran a calculation on available ethane inventory. Mr. Broenink testified that he made the call on whether to impose ethane allocation based on Nova’s internal forecast ethylene supply/demand balances and its internal ethylene inventory planning. However, if ethane supply was less than 165,000 barrels a day, ethane allocation would be imposed.

[157] Mr. Broenink explained that 165,000 barrels a day was “essentially Joffre ethane demand” being the ethane nameplate of three crackers, exclusive of the E1 Toll.

[158] Mr. Broenink's rationalization of ethane allocation was that, without allocation, one of the two Pool users, Nova, would have to absorb 100% of an ethane shortfall "simply by its ownership in E1 and E2". He testified that ethane allocation was "an "equitable sharing of the shortfall", that it "simply came down to Nova needed its share of the ... available ethane in order to balance its ethylene supply and demand". However, Mr. Broenink conceded that, during his time on the EBT, Nova did not need all three crackers running at nameplate to meet its demand, and his evidence on the perceived fairness of ethane allocation is not credible.

[159] Although the process as described envisaged that available ethane would be allocated among the Pool users, the EBT directed the plants to maximize ethylene production from the facility that could produce ethylene at the lowest cost. The ethylene produced from the site as a whole was then pooled, and Pool users received their feedstock fraction of available ethylene. As a matter of practice, this meant E3 would be loaded first, given its lower variable conversion cost, subject to false load at E2 and E3, and subject to operational constraints. Further, the plants would be operated at low conversion to increase yield of ethylene per barrel of ethane.

[160] Mr. Tulk also acknowledged that, to his knowledge, it was the EBT's responsibility to set conversion and production rates. He was aware that on a number of occasions, Nova ran E3 at higher than an annualized rate of 2.81 billion pounds, its design nameplate. He acknowledged that he understand that, during these months, E3 would receive more ethane than the 85,013 barrels a day number that he used on his feedstock fraction calculations page of the feedstock cost statement, although he denied knowing when that would occur.

[161] Mr. Tulk acknowledged that, from the start-up of E3 until he left Nova in 2009, Nova had obtained sufficient ethane, more than 85,000 barrels a day, to operate E3 at its designated name plate capacity of 2.81 billion pounds per year. He also confirmed that, after a planned capacity optimization project (COP) conducted in 2002 and 2003, Nova had acquired sufficient ethane for E3 to operate at the higher capacity level of [REDACTED] or [REDACTED] billion pounds per year.

[162] Mr. Tulk acknowledged that, in months when Nova did not impose ethane allocation, Nova gave Dow its EPP share of ethylene produced at E3, but when ethane allocation was imposed, Nova gave Dow ethylene based on the lower feedstock fractions.

[163] Mr. Broenink testified that Nova did not consider giving Dow its EPP of E3 actual production during ethane allocation because "that would defeat the purpose of" ethane allocation, which he described as sharing the pain of the ethane shortfall.

[164] On March 14, 2002, Mr. Tulk advised Mr. Henson and Mr. Pan by email, with copies to Mr. Broenink, Mr. Foy and Mr. Flint, that:

After our meeting last week with Hugh I am very worried that Dow is going to be aggressively pushing to break-up the pool and supply their own ethane to E3 as soon as possible. Their approach being that they have ethane and will put it behind their assets and the ethane shortage is Nova's problem. I also see them blocking any costs associated with propane cracking. George Pan called a meeting for tomorrow (Friday) afternoon in preparation for the E3 JV meeting on Monday and we would like to spend some time to wargame through the various scenarios and to emerge with a strategy on how to deal with Dow.

[165] Mr. Tulk suggested, unpersuasively, that the strategy exercise he referred to may have been for the benefit of all parties and not just Nova.

[166] On March 18, 2002, Mr. Tulk made a presentation to the E3 Management Committee on Joffre short-term feedstock supply, authorized by himself and Mr. Foy. The presentation notes that, over the following 12-18 months, “forecasted ethane supply in Alberta was estimated to be less than forecasted demand” and could continue to constrain ethylene production. Nova was thus evaluating propane cracking. Under the heading “E3 impacts” of the presentation is the note that:

...all feedstock supply to Joffre (excluding tolls) is pooled and each plant receives prorata share of supply based on ethane name plate. Nova and Dow have been on ethane allocation since June 2001. E3 share of the Joffre ethane pool is [about] 51.2 percent. E1 17.2 percent. E2 31.6 percent. Dow’s share of the ethane pool is [about] 22.8 percent... Amendment to [OSA] not anticipated to be required.

[167] On cross-examination, it was suggested to Mr. Tulk that what he meant to advise the E3 Management Committee was that when Nova imposed ethane allocation, E3 received 51.2% of the feedstock supply at Joffre. After an initial denial, he agreed that what the presentation indicated was that, whether ethane allocation was imposed or not, E3 received 51.2% of the available ethane. Eventually, Mr. Tulk conceded that he knew that the crackers were not receiving the amount of ethane indicated in the presentation, and that most of the time under ethane allocation, E3 was receiving more than that.

[168] Mr. Tulk admitted that he never told Dow what amounts of ethane Nova fed to each of the three crackers. He said that this was the EBT’s responsibility. He confirmed that he had never been present at an E3 Management Committee or other meeting when anyone from Nova told Dow about this, or told Dow that, when Nova imposed ethane allocation, each plant did not in fact receive its pro rata share of ethane based on nameplate.

[169] On the same day, March 18, 2002, Mr. Tulk made a similar presentation to the E2 cost-of-service customers at which he advised in a slide that:

All feedstock supply Joffre (excluding tolls) is pooled and each plant received prorata share of supply based on ethane nameplate as per the Post ‘98 Ethylene 2 Customers Agreement dated January 10, 1996.

-E2 share of the Joffre Ethane pool is ~31.6% (E1: 17.%;E3: 51.2%) (emphasis added)]

[170] Mr. Tulk testified that the reason the reference to the Post 1998 Ethylene 2 Customers Agreement was not made in the presentation to the E3 Management Committee was that it “wasn’t relevant”.

[171] On March 28, 2002 Ms. Choma advised Ms. Eastman that “[w]ith the current forecasted ethane supply to Joffre, each of Nova and Dow’s share will be limited to ~93%.” Mr. Broenink conceded that this inaccurate advice was a “looseness of language.”

[172] On the same date, a Nova engineer, John Wilson, notified a group within Nova, including Mr. Broenink, Mr. Clark and Mr. Wade, that there would be a rate increase for April based on ethane availability, and the plan was to run the Joffre site at 85% “to meet the business needs for ethylene.” The email states that “the desired rate for E3 will be set ... based on E1 and E2 rates. The expected rate is in the low 90’s.”

[173] On May 27, 2002, a group from Nova met with a group at Dow to discuss the idea of propane cracking, among other topics. Mr. Foy prepared notes of the meeting. The notes indicate that Dow was of the view that Nova should bear the capital cost of propane cracking since Nova had not contracted for enough ethane to fill E3. Nova indicated that ethane supply is pooled for all three crackers. Amid the discussion of who should bear the costs and the risks and advantages of propane cracking, Mr. Fergusson is noted as saying that he was motivated to get E3's capacity as fully utilized as possible.

[174] The notes disclose that Mr. Fergusson made much the same comments at the May 28, 2002 E3 Management Committee meeting.

[175] The presentation made by Nova includes the following statements:

If [Dow] on ethane allocation, would continue to receive [about] 22.8% of total Joffre ethylene ... If not ... would receive nominated share of E3 production... all feedstock supply to Joffre (excluding tolls) is pooled and each plant receives pro rata share of supply based on ethane nameplate ... E3 share of the Joffre ethane pool is [about] 51.2%.

[176] In mid-2002, Nova formed a new team called the "Joffre Production Planning Team" (JPPT) to formalize the existing production planning process. Members of the team included Mr. Broenink, Mr. Wade as E3 Plant Manager, Al Poole the E1/E2 Plant Manager, Mr. Pan, the E3 engineer, and Mr. Clark. The purpose of the JPPT was to review a production plant at the Joffre Site and develop "an optimized operating plan in order to maximize Joffre's profitability." The team met every two weeks. Mr. Clark would prepare a preliminary production plan to be reviewed at the meeting. Mr. Broenink would have made a decision on whether to impose ethane allocation prior to the meeting.

[177] Ethane allocation was not imposed from June to the end of September, 2002.

[178] On July 11, 2002, Mr. Fergusson received a package of materials from Nova in anticipation of a meeting, including information on propane cracking. The propane cracking document included a page entitled "Joffre Ethane Allocation", with the following notation:

Dow E3 pro rata share of Feedstock Pool: [about] 22.8%

Under Ethane Allocation Provisions:

Dow E3 Ethylene Supply reduced to: [about] 1030 vs [about] 1250 Mlbs

[179] In August, 2002, Mr. Fergusson received from Mr. Pan a draft of what was called the "Joffre Site Optimization Agreement" and a draft amendment to the then existing E2 Optimization Agreement. These documents were prepared by Mr. Broenink.

[180] The proposed Joffre Site Optimization Agreement involved Dow, Shell, Nova Chemicals and a Nova numbered company, 7602271 Alberta Ltd., and provided that:

- a) all feedstock acquired for the Joffre site would be pooled and each cracker would be allocated a proportion of the pool based on its ethane nameplate, defined as "Feedstock Fractions", being
 - (i) E1: 17.24%
 - (ii) E2: 31.60%

- (iii) E3: 51.16%;
- b) all ethylene and co-products produced at the Joffre site would be pooled and allocated among the three crackers based on the Feedstock Fractions;
- c) all ethylene and co-products produced at the Joffre site would be further allocated among the parties to the agreement based on contractual entitlement as an owner or as an E2 cost-of-service customer.

[181] The draft agreement also included a commitment to participation in Nova's propane cracking initiative.

[182] The draft amendment to the E2 Optimization Agreement also referenced the idea of "site optimization". Mr. Fergusson said he told Mr. Pan and Mr. Flint that this proposal was not something Dow would do or even entertain, that it was a "non-starter" for Dow. He testified that he did not understand that Nova was already implementing "site optimization" through ethane allocation.

[183] Mr. Ferguson testified that he had not understood, before or after this site optimization initiative by Nova, that Nova was already implementing this whenever it imposed ethane allocation. He indicated that "we were talking about sharing the pain, that each plant would get its pro rata reduction according to whatever the nameplate capacity had been agreed to in the [joint venture agreements]".

[184] Mr. Broenink testified that Nova went ahead with propane cracking "and continued to allocate the available ethane in the manner established prior to this proposal", meaning ethane allocation.

[185] The E3 Management Committee minutes of September 12, 2002, which Mr. Fergusson attended, make reference to "Propane Cracking/Site Optimization". Under this heading, it was noted that Dow did not want to participate in Nova's propane cracking project and that Nova would keep propane costs outside of Dow costs.

[186] Mr. Fergusson testified that, from time to time, Nova would talk about optimizing the Joffre Site, the theory being that, regardless of ownership, Nova would manage the three crackers as one, however it saw fit, and that E3 would be part of the Joffre Site as a whole. He said that, whenever this was brought up by Nova, he "pushed back as hard as [he] could". Dow's view was that E3 was a stand alone plant. It made no sense to combine the operations of E3, the "world's greatest, newest ethane cracker" with E1, a plant that was 30 years old.

[187] Mr. Fergusson thought that there was an "elegant solution" to this issue. The pooling arrangement could be wound up and the arrangement could be turned into a joint venture in which each of the parties would provide their own feedstock. However, this was never done.

[188] On September 25, 2002, Mr. Fergusson queried the E3 Daily Status Report for that day, which showed ethylene production at 82.6% capacity and "Constraints" as "Production Plan". Mr. Fergusson noted in an email to Mr. Wade, copied to Mr. Henson, that "I assume that if there is a shortage of ethane that this would be an event of *force majeure*". Mr. Fergusson explained that it was his view that a lack of feedstock would be an event of *force majeure* under the E3 joint venture agreements, that the contracts contained a commitment to run at capacity and that he did not see that E3 was permitted to run at less than capacity, other than pursuant to an event

of *force majeure*. He was attempting to press the point that Dow wanted E3 to run at capacity. Mr. Henson asked Mr. Pan to work with Mr. Wade on this.

[189] The next day, Mr. Clark of Nova sent an email to Mr. Pan and Mr. Foy commenting that:

My take on Hugh's comment is he may be unaware that with the start-up of E2 (Sept 17), ethane allocation resumed for Dow on E3. During the E2 [turnaround], Dow E3 was not on ethane allocation and the plant operated at ~100% to ~[REDACTED]% of nameplate. Dow received its full contractual (~45%) pro-rata share of this ethylene. This was documented with Margaret Eastman as part of the nomination process. I can confirm that the whole issue of ethane allocation since June 2001 has been documented with Dow. (emphasis added)

[190] Mr. Pan responded that Mr. Wade would send a brief response to Mr. Fergusson.

[191] Mr. Fergusson was not copied on these emails, but he confirmed that it was his understanding that Dow would always receive its ownership interest (which at that time was 44.84 %) of whatever was produced at E3. He assumed that if E3 operated at [REDACTED]% of nameplate, Dow would be entitled to its ownership percentage of [REDACTED]% of production.

[192] On September 30, 2002, Ms. Choma advised Ms. Eastman that Nova would be nominating 100% of its share of E3 production for October 2002 and "during the forecast period", but that, based on ethane supply forecasts, ethane allocation at Joffre would need to continue in October. Ms. Eastman replied, asking what Ms. Choma guessed would be Dow's share, and Ms. Choma replied that Dow's share of E3 production would be a specific number. She copied this answer to Mr. Clark.

[193] Mr. Broenink testified that he was involved with any information sent to Ms. Eastman regarding nominations. He said that he did not recall Dow expressing a disagreement with allocations between 2001 and 2003, although "they weren't happy with the overall ethane shortfall situation". Given the documented history, this evidence is not credible.

[194] On October 1, 2002, Mr. Fergusson sent an email to Mr. Henson, then Nova's Vice President, Petrochemicals, noting that he had left voice-mail messages for both Mr. Henson and Mr. Pan, and that this was his follow-up message. It states:

By letter dated September 30th Cameron Clark advised Margaret Eastman that Nova would not supply Dow its nominated volume of ethylene under the E2 Contract in October because it was proposing to crack propane and Dow had elected not to participate in the propane cracking "programme".

Specifically he stated, "in months where Nova cracks alternative feedstocks Dow's E2 nominated supply will be reduced ...". From reviewing Mr. Clark's letter it appears that the decision of how much propane to crack (and the extent to which Nova believes it can reduce Dow's ethylene nomination) is a matter that Nova feels is fully within its control and is independent of ethane availability. We disagree.

For good order's sake I want to be clear that we believe that the approach suggested by Mr. Clark does not reflect the terms of our contract and represents a breach by Nova of its contractual obligations to supply. The discussions which we have had relating to propane cracking all revolved around Nova's inability to

secure ethane. My recollection is that the E2 Contracts specifically note ethane as the ethylene feedstock to be supplied – we understand from past conversations that Nova believes that it will from time to time be unable to supply contracted ethylene because of events beyond its control (Force Majeure) related to ethane supply – in these situations Nova is proposing to crack propane – and for a variety of reasons, essentially related to cost Dow did not agree to participate in the capital – to be clear, in no way have we agreed to amend the terms of the E2 Contract and amend Nova’s obligations to supply.

It seems to me that if Nova finds itself short of feedstock such that it cannot supply its customers’ nominated ethylene requirements that it need declare an event of Force Majeure as required under the contract. We do not accept the assertion by Colin [sic] Clark that our supply of ethylene can be reduced in a unilateral fashion by Nova as it sees fit.

...

I believe that this issue re-enforces the need to accelerate implementation of the proposed changes in the structure of E-3 and the supply of feedstock to our respective shares.

[195] Mr. Ferguson testified that if the message had been about E3, his response would have been stronger.

[196] On October 10, 2002, Mr. Clark made an internal presentation to the EBT describing ethane allocation. It described “Tier 1” allocation to the “Owners of the Pool”, and “Tier 2” allocation to merchant customers. Nova never actually curtailed supply to its merchant customers. The description of Tier 1 allocation stated that available ethane was allocated pro rata to each of E1, E2 and E3 based on individual plant ethane nameplate, exclusive of the E1 Toll. Dow was not shown this presentation.

[197] On October 15, 2002, Mr. Ferguson sent Mr. Henson a letter with a note that summarized his view of discussions at a recent meeting regarding future supply of ethane to E3. He referred to this summary as a draft, and invited suggestions or changes. He stated his plan was to use the document to seek legal advice. His letter notes that all of the E3 foundation agreements would likely require at least some modification if the parties migrated to a manufacturing joint venture. He suggested a meeting.

[198] The text of the memo is as follows:

Discussions Relating To The Supply of Ethane Feedstock To The Dow/NOVA E-3 Joint Venture

BACKGROUND

- Dow and NOVA are equal owners in [E3].
- Under the terms of the [OSA] NOVA is the sole supplier of ethane feedstock to E-3.
- Ethane feedstock supplied to E-3 is provided on a pro-rata basis from NOVA’s overall ethane pool.

- NOVA and Dow recognize and agree that on a long term basis E-3 ought to become a manufacturing Joint Venture wherein each owner brings its pro-rata share of feedstock.
- Dow and NOVA have been discussing how best to separate the Ethane Pool (as defined in the [OSA]) in a way that will facilitate the transformation of E-3 into a manufacturing joint venture in a manner that will preserve the interests of all of NOVA/Dow/the current suppliers to the Ethane Pool.
- As a result of upcoming feedstock supply renewals, NOVA has suggested as an alternative to the methodology described in section 5.17 of the [OSA] (“Unwinding the Pool ...”) the proposal described below.

PROPOSAL (Terms used are as defined in the [OSA])

- E-3 will migrate as quickly as possible to a manufacturing joint venture under which each of NOVA and Dow will be responsible for supplying their pro-rata share of ethane feedstock.
- Until a transfer (either directly by novation or a severance and negotiation) to Dow of its full feedstock fraction of the ethane pool by NOVA, NOVA will retain its supply obligations in respect of E-3.
- The ethane pool will be dissolved as soon as practical – for planning purposes June 30, 2004 will be considered as the target end point for termination of the pool.
- NOVA will provide Dow with the Feedstock Fraction Dow is entitled to from the Ethane Pool (and any pro-rata share and obligation to storage and transportation associated with such volume). Dow’s entitlement will be either through a novation into existing arrangements or the severing of an existing contract and the successful negotiation by Dow of a satisfactory supply arrangement.
- As Dow secures an interest in supply arrangements from the Ethane Pool, NOVA’s supply obligations will be proportionately reduced.
- Dow and NOVA are agreed that the aggregate unit price Dow will be entitled to will be the average unit Pool cost.
- Dow will not be entitled to receive a share in any ownership interest that NOVA has in ethane extraction, production, transportation or storage facilities.
- To the extent that NOVA is for any reason unable to transfer to Dow its Feedstock Fraction, NOVA’s obligation to supply E-3 on Dow’s behalf up to the Dow Feedstock fraction will continue.

[199] By letter dated November 8, 2002, Mr. Henson indicated to Mr. Fergusson that there were a number of differences between Mr. Fergusson’s understanding of what had been discussed at the meeting and Nova’s understanding. Mr. Henson attached the following in that regard:

At our meeting of September 27th, 2002, NOVA presented a concept that we felt could work to meet Dow's objectives re: ethane supply. The key features of that concept are as follows:

- a) Ethane pooling would cease on June 30th, 2004 coincident with the end of the E2 cost of service agreements
- b) Dow would be responsible for supplying its ethane feedstock requirements for E3 at that time
- c) NOVA would sell to Dow a volume of ethane equal to Dow's ethane fraction share (as of June 30th, 2004) of NOVA's available ethane each month at NOVA's actual average cost of acquisition until December 31st, 2008 at which time its obligation would reduce by X thousand barrels per day (to be defined)
- d) NOVA would provide Dow with its pro-rata share and obligation to storage and transportation associated with such volume
- e) NOVA would retain its supply obligations in respect to E-3 until the earlier of:
 - December 31st, 2012; or
 - Until a transfer either through novations into existing arrangements or the severing of an existing contract and the successful negotiation of Dow of a satisfactory supply arrangement to Dow of its full feedstock fraction share of the ethane pool by NOVA
- f) As Dow secures an interest in supply arrangements from the Ethane Pool, NOVA's supply obligations would be proportionately reduced
- g) Dow would not be entitled to receive a share in any ownership interest that NOVA has in ethane extraction, production, transportation or storage facilities.

[200] He also noted in the letter that:

We also agree with your view that "competition" issues (especially re: feedstock supply) are likely to be significant, and so an important first step is for your internal counsel (Mark Bradley) and our internal counsel (Ron Kemle) to convene a meeting of our appropriate representatives (including external legal counsel as desired) to review our objectives and proposed approach and to provide us guidance and advise on how we can accomplish our objectives while ensuring our compliance with competition law and any other relevant law. We anticipate this may include the development of a written protocol for discussions between our business representatives. Ron will work with Mark on this.

[201] Mr. Fergusson recalled that in January, 2003, he had been advised that Dow had offered feedstock ethane to Nova and that Nova had declined it on the basis that it didn't need it. He was then informed by Ms. Eastman that E3 was not running at full capacity, but that there was a minor mechanical issue. Mr. Fergusson and Mr. Henson spent some time discussing the issue. On January 8, 2003, Mr. Henson sent Mr. Fergusson an email, suggesting a meeting with himself and Mr. Pan, and commenting "[o]ur goal is to create value for yourselves and ourselves, while also meeting our other customer obligations".

[202] Mr. Fergusson replied:

Rick – it may be early but I do not understand your note at all.

I think that your obligations to maximize production to meet demand at E-3 is completely clear – what the other obligations you may or may not have are really not our concern (we do not have particulars).

If you cannot supply the requested ethylene from E-3 because for any reason then you are open to declare an event of Force Majeure – what is not acceptable is that on one hand we are informed that you have sufficient ethane to operate your facilities and on the other that we are being restricted on volume from E-3, if the foregoing is in fact what has happened you are in fundamental breach of your E-3 obligations.

[203] Mr. Fergusson testified that there was never any suggestion made at the E3 Management Committee meetings or elsewhere that Nova should curtail ethylene production at E3.

[204] In December 2002, an internal Nova analysis of E3's base capacity indicated that E3's four year average capacity, before the COP was completed, would be █████ billion pounds per year, or █████ billion pounds per year, over three non-turn around years.

[205] On January 9, 2002, Mr. Fergusson emailed Ms. Henson as follows:

Rick – I have spoken internally and what I think that I have heard is that Nova's ethane supply during January is not meeting it's customer's ethylene demand. As you know we have offered to supply Nova additional ethane and been told that it is not needed. We have an alternative ethane market that wants to purchase the barrels, before finalizing this sale I would like personally to hear the Nova does not require additional ethane barrels in Alberta. The foregoing to course will of necessity mean that Dow will receive both its full allocation of E-2 and that E-3 will operate at full capacity. In fairness to the 3rd party involved we ought have a response by week's end.

[206] Mr. Henson referred the email to Mr. Pan, commenting that Mr. Fergusson "still talks as if he is being shorted ethylene". Mr. Pan suggested evaluating Dow's offer, and leaving the communication between Dow and Nova on this to "Bev" and "Greg". On the same day, Mr. Ferguson sent Mr. Henson an email as follows:

George-Greg is trying to contact Bev. She did leave a message this morning indicating that Nova did not need ethane in January, but might need some in February. As E-3 is not operating at capacity, apparently because of feedstock constraints, I do not understand the January approach to supply.

Margaret has previously indicated that we want our full pro-rata share of ethylene from E-3 if this means that there is additional capacity available as I recall the arrangement we ought to be entitled to the opportunity of purchasing such volume.

George, as I understand it, because we are in a position to sell ethane to Nova (either into the "pool" or dedicated to E-3) there should be no issue of limiting capacity of E-3 because of feedstock supply.

I think we both want to take advantage of E-3's very favourable economics and I am somewhat at a loss to understand the current situation. It would probably be useful to review this in person sooner than later and to discuss the Nova approach to ethane allocation amongst its plants in Alberta.

[207] On January 29, 2003 Mr. Broenink estimated in an internal email that Nova would have 164 bpd of ethane in February. However, Ms. Choma advised Ms. Easton that ethane allocation would continue in February, 2003.

[208] In 2002 and 2003, the Co-owners of E3 undertook a Capacity Optimization Project (COP) to improve E3's performance. On February 1, 2003, the final copy of the Owners Project Objectives (OPO) for the COP were issued.

[209] The OPO indicates that the results of a short term high-rate trial in February and March of 2002 indicated that E3 "could operate instantaneously at █% of the original design hourly rate." To operate at a sustained high rate, some modifications to E3 were necessary, and would invoke some plant shut-down. The first opportunity for this would be the scheduled maintenance turn-around of June, 2003, at which "any modifications, or the tie-ins for them" would be performed. The OPO indicated that the exception was furnace modifications, which could be completed during individual furnace turnarounds. Final completion of all construction was anticipated to be September 26, 2004. The OPO indicated that a capacity of █% of the original design hourly rate was the target.

[210] E3's new nameplate capacity would be █ billion pounds a year.

[211] Nova internally reported that the estimated current capability of E3 was in the region of █ BPY, with a "sustainable (5 year) average annual nameplate for E3 "as-is" of █ BPY "not the 2.81 original design." " Mr. Gent, the Nova technical advisor who prepared the analysis, indicated the following:

The operating year basis is 8,500 hours (averaged over 5 years). When considered with the assumptions that have been made about Furnace availability, the resulting annual nameplate capacity is █ BPY. While this looks close to █% of the original 2.81 BPY [conservative being █%] nameplate (and, of course, numerically it is), it does represent a de-rate due to Furnace capability. This is because it is based on 8,500 hours versus 8,400 hours for the original nameplate. Hence, without the de-rate, the capacity would be █% of nameplate. This is due to the extra 1.2 % hours operating ... Given that we are saying that E3 can currently achieve █% of original design nameplate and, given that E3 COP is expected to be █% of original design nameplate, the percent increase that you would calculate over current capability is █ = █% ...

Just as a word of caution, we have never portrayed to the Owners that E3 can achieve █% without COP. Obviously they know that it can do something more than 100%. There was a provision in the original contracts to establish a new nameplate based on actual plant performance, Neither Owner saw a need to enact the process that is described in the agreement in order to arrive at that nameplate definition. Hence it is my understanding that both Owners consider the current nameplate to be the 2.81 BPY number that the plant was designed to and this is what we are reporting against on daily and monthly reports. Both Owners have

seen numbers greater than 100% reflected in various annual budgeting documents.

During the early days of E3 COP, we agreed with Chris Foy that all of this was fairly moot as long as both Owners participate 50/50 in whatever the E3 capacity is. However, should this not occur, then it could become important to establish a pre-E3 COP number and presumably to demonstrate the increment.

[212] On January 22, 2003, Mr. Tulk and others made an internal presentation at Nova entitled “Western Feedstock-Strategy-OPOL Review”. The presentation referred to the nameplate capability of each cracker at Joffre, and the state at which the plants could run on a sustained basis for several weeks at a time. E3’s estimated capability was said to be [REDACTED] % of nameplate capacity, or [REDACTED] kbpd.

[213] Ethane allocation was imposed in January and February 2003.

[214] On March 3, 2003, Cecil Miller, a Dow employee at the Fort Saskatchewan plant and the “go-to” Dow technical employee in Canada, sent an email to Mr. Wade, noting that plant rates at E3 were up around 100%, and wondering if the ethane supply situation had changed. Mr. Wade replied that E3 was operating at 65% conversion due to high natural gas costs. Mr. Wade’s email noted that:

Operating at the higher conversion allows us to transfer ethane feed from E1/E2 to reduce site energy requirements by making use of E-3’s lower specific energy requirement. Ethane supply forecast is not looking any better.

[215] Mr. Miller responded that he assumed that this meant that Dow’s production pounds of ethylene would go up a bit as a result of the increase in capacity. Mr. Wade advised that “the site” was still on ethane allocation “which provides Dow the same production split regardless of which plant the ethylene is being produced in”. He noted that, as such, Dow’s production would actually be lower, with each plant operating at 65% conversion.

[216] Mr. Miller sent the email chain on the same day to Mr. Fergusson, with the following remarks:

Basically the answer is yes we get more out of E3 but less from E2 as they have shifted some of our pounds of ethane from E2 to E3 to save energy costs and since both units are running higher conversion (saves energy) the ethylene yield drops. So for the same lbs of allocated ethane we net slightly less ethylene when you sum the two plants up.

From my limited understanding of the commercial agreements this would seem like a good deal to me since E3 costs per lb of ethylene are lower than E2’s and the “optimization agreement” fixes E2’s cost at maximum production (and efficiency) no matter what rate it runs. (emphasis added)

[217] Mr. Fergusson testified that this did not trigger any questions on his part.

[218] On April 7, 2003, Mr. Tulk attended what he called a “Dow Feedstock Meeting” with Mr. Flint, Mr. Pan and Mr. Henson who was on the E3 Management Committee at the time. His notes of the meeting indicate that, at that point, the COP project had been approved, but that Mr. Pan indicated that he thought he could get Dow’s agreement not to change the feedstock fractions. Mr. Tulk’s notes and his testimony indicated that it was his opinion that the joint

venture agreements dictated an increase in feedstock fractions if the capacity at E3 increased, and that Dow would get 2% more of the Pool. The notes indicate that this would result in a loss of 112 mmlbs per year to Nova and that Dow would likely use the E1 Toll less, eroding the amount of ethane for the Pool. Mr. Tulk's calculation was that this would give rise to a 112 mmlbs loss of ethylene, or about \$22 million US. These calculations were based on the assumption of ethane allocation. Conversely, Dow would gain that amount. Mr. Tulk's notes included the phrase "no loss of ethylene to Nova".

[219] The day after being cross-examined on these notes at trial, Mr. Tulk testified that the 2% in his notes was not a calculation of what the change in the feedstock fraction would be with the completion of the COP, and that the effect of the COP on Dow's feedstock fraction would be less than that. He also testified that his opinion in his notes about what Article 5 of the OSA required was wrong, and there would not be a shift in the feedstock fractions unless the parties went through the mechanism outlined in the contract. He also testified that a change in the feedstock fractions would not happen until Nova had the feedstock available for it. I am satisfied that these views are after-the-fact changes in opinion, and that the notes reflect Mr. Tulk's view at the time they were made.

[220] On May 22, 2003, Dow and Nova entered into an agreement under which Dow agreed to supply up to 300 kbbl of its own proprietary ethane feedstock to E3 for toll processing into Dow proprietary ethylene. In return, Dow agreed to transfer to Nova the right to a quantity of its share of ethane in the Pool for Nova's own use, subject to certain conditions.

[221] This one month streaming agreement included a reference to E3 being on ethane allocation during May, "meaning that ... Dow E3 is entitled to a 22.75% of the total ethylene produced at Joffre Site Ethane".

[222] On June 2, 2003, Mr. Fergusson sent Christopher Gann, his supervisor at Dow, an email summarizing current activities between Dow and Nova. The email notes:

The key issue that we have with Nova relates to E-3 and the failure of Nova's Feedstock people to secure sufficient ethane to operate the facilities at capacity. I want to be clear – with proper planning ethane supply should not have been a problem – but that planning was not done – and to date there has been little meaningful progress.

E-3 is structured such that Nova is responsible for the supply of feedstock – as Dow we do not even have the ability to supplement our E-3 capacity when Nova is unable to meet its obligations – and in fact we have been a large supplier of feedstock to Nova over the past year (using volume that we secured in the late 1990's to meet our E-1 Toll that has not been operated).

...

NOVA MESSAGES

1. we are very unhappy at Nova's failure to meet its feedstock supply obligations for E-3. We feel that immediately an arrangement should be established whereby if they are unable to meet our ethylene nominations because they are feedstock limited that as Dow we be allowed to toll ethane into ethylene using our unutilized capacity (and payment of all appropriate costs).

2. longer term we feel that it would be best for both organizations to convert E-3 into a manufacturing Joint Venture – a key to this would be to “break up” the ethane pool into each of our Feedstock Fractions. As Carbide and Dow we have paid for our interest in the Ethane Pool and for Nova not to work with us to reach resolution on this issue in in the interest of neither organization.

[223] This email was copied to Mr. Henson, who responded that Nova had a different perspective on the situation.

[224] Ethane allocation was imposed in July 2003.

[225] Mr. Henson sent the email to Mr. Spiess, with the comment that he found it inaccurate in some respects and unfair to Mr. Flint and his team. Mr. Henson also sent to Mr. Spiess Mr. Fergusson’s October 15, 2002 letter, which he characterized as inaccurate.

[226] Mr. Spiess sent the emails to Mr. Flint, asking for his comments on two questions:

- a) does Dow have a contractual right to move to a manufacturing joint venture, and if not, why would Nova discuss it; and
- b) does Nova have any obligation to supply any volume of ethylene they nominate beyond their share of the pool?

[227] Mr. Flint was, naturally, offended by Mr. Fergusson’s comments and suggested that Dow had been “completely absent with respect to proposing any method to break up the pool” with something that was workable for both parties. He did not agree with Mr. Fergusson’s suggestion that Dow had “paid for” its interest in the ethane Pool. He agreed with the concept of breaking up the Pool into feedstock fractions, but thought Dow wanted to “cherry-pick” the contracts.

[228] Mr. Fergusson followed up with an email dated June 7, 2003 to his Dow supervisor, discussing Nova’s unwillingness to move to a manufacturing joint venture at E-3. The email also included the following comments:

Alberta is structurally short of ethane, and it will only be with a combination of the installation of new extraction facilities, higher gas flows or utilization of alternative feedstocks that sufficient material will become available to operate the installed facilities at capacity. As Dow we have structured our activities to meet our requirements – including the modest expansion at LHC-1 (some new supply arrangements are required but are known).

...

To date, since purchasing Carbide we have not had a shortfall in ethylene supply – however by mid-2004 when we shed E-2 volumes, absent alternative arrangements we will be potentially short of ethylene as our ethylene supply position from E-3 will be dependent upon Nova’s feedstock supply arrangements.

[229] Mr. Fergusson testified that what he meant by “Alberta is structurally short” was that Alberta was missing some fractionation facilities, but that it had ample ethane to fill all the crackers “and then some”. He meant that Nova was short on ethane because it had not done what Dow felt it should have done.

[230] On October 10, 2003 Mr. Fergusson sent an email to Mr. Flint, responding to the E3 daily status report of that date, which stated that E3 had operated at 96.4% of capacity and listed as a

constraint “ethane availability”. Mr. Fergusson stated in his email that he “still [did] not understand why the rates at E3 [were] constrained by ethane availability”, and asked for a meeting. Mr. Flint testified that he was disappointed as:

...We’d spent a fair bit of time with representatives of the Dow organization explaining that when feedstock supply is not sufficient to meet the nameplate capacity of the ethylene assets at Joffre, subtracting its E1 toll, that ethane would be allocated between the Co-owners according to feedstock fractions ...

[231] He thought, but could not recall, that he discussed the email with Mr. Fergusson.

[232] On November 27, 2003, Mr. Flint made a presentation to the E3 Management Committee on ethane supply that noted that forecasted ethane supply remained below Joffre nameplate capacity, “hence allocation would continue” (although ethane allocation was not imposed until July, of 2004).

[233] On December 9, 2003, in an email chain among Mr. Broenink, Mr. Flint and Mr. Spiess with respect to the status of year-end inventory of ethane, Mr. Spiess indicated that, while he thought they were worried about the prospect of “ethane reinjection” if Nova had accumulated too much ethane, he was concerned about “cash flow cycle time”, or having lower working capital on the financial statements, and avoiding being off-side on financial covenants.

[234] On the same day, Mr. Flint and Mr. Tulk made a presentation to Nova’s leadership team, which included Mr. Mirosh, the president of the Olefins and Polyolefins division, Mr. Spiess and Mr. McDonald, Nova’s CFO. In that presentation, E3’s nameplate capacity was shown to be 2800 million pounds per year, but with an asterisk clarifying that this did not include the expanded capacity from the COP. The maximum capacity of E3 was indicated to be █████% of 2.8 million, or █████ million pounds a year, the rate the plant was capable of running at over a five-year turnaround cycle.

[235] In early 2004, a performance test verified E3’s productive capability to be in excess of █████ BPY. In the second quarter of 2004, Nova ran E3 at an annualized rate of █████ BPY. Ethane allocation was not imposed in these quarters, but was imposed in July and August, 2004.

[236] In March, 2004, Mr. Broenink made a presentation to Nova’s OPOL committee on ethylene balance. The presentation indicated that, even with E3 at a capacity of █████ BPY, if Dow obtained half of E3’s production, and if the E1 Toll was fully exercised, Dow had greater demand for ethylene, while Nova had a surplus. It also indicated that, for 2005, it was forecast that Nova would be balanced for demand with a small amount of propane cracking, assuming that ethane allocation was imposed on Dow.

[237] By email dated April 12, 2004, Mr. Broenink copied Mr. Spiess, Mr. Mirosh, Mr. Flint, Ms. Apuzzo, Mr. Tulk, Mr. Foy and others with a draft presentation that outlined alternative strategies for discussions with Dow that were to be held at a meeting of Dow and Nova personnel in Pittsburgh. The key considerations discussed were the Casper ethane supply project, the Joffre ethane Pool, a dispute between Nova and Dow with respect to electricity and the expiry of the E1 Toll. The presentation noted that Alberta was forecast to be short of ethane supply to meet installed ethylene production if the Casper project was excluded, but that Casper would provide about 13% of demand capacity.

[238] The presentation indicated that Nova knew that Dow required the full utilization of the E1 Toll and E3 capacity, including as increased by the COP, to balance supply with its derivative

demand, and that it would still be short. It showed E3's capacity to be [REDACTED] million pounds a year, and Dow's "proprietary supply" at [REDACTED] million pounds a year. It indicated that Nova would have a net surplus of ethylene, leading to net surplus ethylene capacity in Alberta "assuming no feedstock constraints". The presentation indicated that provisions in the E3 joint venture agreement "have [Nova] responsible for providing 100% of E3 ethane requirements".

[239] Nova's strategy was to require Dow's agreement to participate in the Casper ethane supply project prior to any agreement allowing Dow to bring ethane to E3. The proposal was that Dow would have to take 50% of Casper ethane on the same terms and conditions as Nova if the project proceeded. The draft also proposed that Nova would have control of the Casper project negotiations.

[240] Mr. Tulk concluded that the result would be that Dow would be "long" on ethane, while Nova would not be.

[241] At the April 20, 2004 Pittsburgh meeting of senior executives of Dow and Nova, Mr. Broenink made a presentation, entitled "Alberta Olefins Business Overview". The presentation provided a pictorial overview of ethane allocation on the basis of E3 operating at 2.81 billion pounds of capacity, and not its COP level. The presentation included references to "[the] Joffre Pool developed to ensure equitable sharing between Nova and UCC of ethane supply risk/cost" and stated that currently, there was no Pool supply of ethane available for E3's COP capacity; and, later, there would be no Pool ethane supply sufficient to meet E3's capability as enhanced by the COP until "Base Ethane supply" had been filled. An earlier slide in the presentation indicated that E3's capacity was [REDACTED] million pounds.

[242] Mr. Flint acknowledged that it was clear from the presentation that Dow would be short of ethylene in 2004 and would need all the low cost E3 ethylene it could get, and that Dow wanted its full share of ethylene generated at the full capability of the E3 plant. The presentation noted that Dow would be short of ethylene even with full E3 capacity operation and the full use of the E1 Toll.

[243] With respect to the statement that there would be no Pool ethane supplied to meet E3's expanded capacity until "Base Ethane" had been filled, Nova's position was that any incremental ethane demand required by the three crackers at Joffre would require the owner of those assets to request the Operator to supply the ethane required to fill that increased capacity, and no request had been made. This position was based on a recommendation from the EBT, even though both Dow and Nova continued to nominate their full entitlements.

[244] The presentation indicates that "Base" ethane supply would be allocated among E1, E2 and E3. It does not disclose that Nova was not actually doing this, or that Dow was not being allocated half of what E3 was producing. It also did not disclose that Nova was using E3's increased capacity from the COP to make ethylene during ethane allocation, and then taking more of that additional ethylene than it gave to Dow.

[245] The presentation indicated that Dow would get ethylene from two places: the E1 Toll up to 600 million pounds a year, and E3, being its share of the 51.2 % of ethane that E3 received from the Pool. At the time of the meeting, Nova had not yet imposed ethane allocation on Dow in 2004.

[246] Mr. Fergusson also made a presentation at the meeting in which he suggested that E3 arrangements could be changed to be a joint venture where each of Dow and Nova would provide their own feedstock and take their respective shares of production.

[247] Mr. Tulk was referred on cross-examination to a number of presentations he made between 2004 and 2006 about the proposed Casper project. He conceded that he had repeatedly advised Nova's OPOL team that the Casper project presented a solution to the ethane shortage and Nova's conflict with Dow. He prepared a presentation for the Board in June, 2005 that indicated that the Casper project would provide the feedstock stability that was required to avoid future escalating conflicts with Dow.

[248] A Nova internal presentation dated May, 2004 to the EBT, entitled "NCX Ethylene Supply/Demand Balances: 2004-2009," forecasts E3 capacity from ■■■ - ■■■% from 2004 to 2008.

K. The Ramachandran Years

[249] Mr. Ramachandran became president of Dow Canada and head of hydrocarbons in May or June, 2004 upon Mr. Fergusson's retirement. Initially, he commuted from Houston before moving to Calgary in September, 2004. Mr. Ramachandran took on two roles: the head of hydrocarbons role previously held by Mr. Fergusson, and the president's role, previously held by a Dow employee located in Fort Saskatchewan. Mr. Ramachandran reported to senior Dow management on June 16, 2004 that there were a number of issues outstanding between Dow and Nova, naming a few. On June 21, 2004, he sent another email setting out particular difficulties that had developed, and commenting that some were escalating rapidly. They included:

- a) a dispute about overbilling for electricity that was on the road to arbitration;
- b) a dispute about the ethane Pool;
- c) billing issues relating to Nova billing Dow for work it was doing for itself;
- d) audit issues;
- e) issues over what Dow owed to Nova for the installation of the seventh furnace at E3;
- f) a threat by Nova to cut off ethylene supply to Prentiss; and
- g) a dispute involving Nova's refusal to supply ethylene for Dow's ethylene toll with Shell.

[250] Mr. Ramachandran reported that he would be meeting with senior Nova people about these issues.

[251] Mr. Fergusson, Mr. Ramachandran, Mr. Mirosh and Mr. Flint met on June 28, 2004. According to Mr. Fergusson's notes summarizing the meeting, Mr. Speiss of Nova had promised that Nova would make a proposal with respect to resolution of outstanding issues between Nova and Dow. The meeting was held to review the status of outstanding mutual concerns. Mr. Fergusson explained that the E2 cost-of-service agreement was coming to an end at about this time, that the buy-in of the seventh furnace at E3 was about to happen, with the result that ownership of E3 would become 50/50, and that continued complaints from Nova about an ethane shortage were of concern to Dow.

[252] According to Mr. Fergusson's memorandum, Mr. Mirosh tabled a number of items for review:

- a) the seventh furnace buyback;
- b) the electricity arbitration;
- c) E3 ethane supply outside the Pool;
- d) contracting;
- e) the Casper project;
- f) the existing Pool; and
- g) the ethylene delivery system.

[253] Mr. Ramachandran commented at the meeting that he viewed the E1 Toll agreement as unfair, requiring immediate redress. He testified that the price structure of the E1 Toll was not at all reflective of the market and that Dow could easily buy cheaper ethylene.

[254] With respect to the E3 ethane supply, Mr. Fergusson's notes state that Mr. Flint indicated that Nova would not have enough ethane to operate E3 at capacity. Nova was prepared to allow Dow to top-up its E3 capacity at E3 when Nova could not supply sufficient ethane. However, later in the meeting, it was made clear that this option was available to Dow only when it was fully utilizing the E1 Toll and after the electricity arbitration had been resolved.

Mr. Ramachandran testified that what initially had appeared fair quickly degenerated to the E1 Toll being used as a precondition to Dow being allowed to fill up E3 to its capacity with ethane.

[255] Mr. Flint indicated that Nova felt that it would only be able to operate E3 at 88% (meaning Dow would have 6% of its E3 capacity entitlement idle).

[256] With respect to the Pool, according to Mr. Fergusson's notes, Mr. Mirosh said that Nova was willing to work with Dow in any manner that would preserve Nova's interests. He stated that this could mean breaking up the Pool or becoming more involved with each other. He also stated that Nova viewed this as a long term issue – something that ought to be resolved by year end 2008.

[257] Mr. Ramachandran asked whether the problem was that Nova was a "cracker long", that it did not have enough demand for ethylene. In response, while Mr. Flint acknowledged that Nova was "long" on ethylene production, he indicated that Nova was not considering any shut-down of capacity.

[258] Mr. Ramachandran commented that Dow felt comfortable regarding its rights, and that he was not sure of the value of the proposals Nova was making. He says he indicated to Nova that, if forced, Dow would exercise its right to ensure that E3 ran at the appropriate rates.

[259] Mr. Ramachandran testified that the Dow business strategy in Alberta was very simple: run the ethylene crackers as hard as possible, especially LHC-1 and E3 because they produced the lowest cost ethylene in Dow's portfolio. Dow wanted to obtain as much ethylene as possible. The goal was to satisfy Dow's internal customers, to ensure that the Dow's derivative plants obtained ethane on time, that it was always available and at the lowest possible cost. He described how it would be a "career-ending move" to short the Dow derivative plants. Mr.

Ramachandran was clear that using the E1 Toll was the least attractive option because it was “ridiculously expensive”.

[260] Mr. Ramachandran said that his expectation when he became president of Dow Canada was that E3’s capacity was ■■■ to ■■■ billion pounds, with Dow entitled to half the ethylene output. Dow nearly always nominated 100% of its share of the output. He became concerned when he found out that E3 was not producing as much ethylene as was expected. He first inquired internally at Dow and then raised the issue with Nova, asking Mr. Mirosh and others on the Nova management team.

[261] He testified that he was given many reasons why E3 was not running as hard as it should, but the predominant one was that Nova did not have enough ethane to run through E3. Mr. Ramachandran was referred to a Nova nomination email dated June 30, 2004 directed to Ms. Eastman. It confirmed that Nova was nominating 100% of its share of E3 production for July, 2004. It also noted that “[b]ased on ethane supply forecasts, ethane allocation will be in effect in July, 2004”.

[262] As of June 30, 2004, Nova had lost or shed more than 800 million pounds per year of ethylene cost-of-service contracts, such that its demand for ethylene was greatly reduced. However, Nova imposed ethane allocation for July and August, of 2004.

[263] Mr. Ramachandran testified that this was the first time that he was exposed to the term “ethane allocation”. He began to investigate what it meant.

[264] He said that everyone at Dow seemed a little confused by the term, but he was advised that it was probably related to the fact that Nova did not have enough ethane to run E3 at its full rate, so there must be some sort of allocation. Mr. Ramachandran testified that different people were telling him different things, and he did not understand the rationale.

[265] On July 7, 2004, Mr. Ramachandran received an email from Greg Howard of Dow. Mr. Howard noted, among other comments, the following:

It needs to be clear with Nova that if Dow brings ethane supply to E3, that Dow does not give up any rights to its prorata share to the Ethane Pool.

[266] At a July 14, 2004 E3 Management Committee meeting, the Dow representatives indicated that they wanted to investigate the option of further E3 expansion, but Nova indicated it did not have resources necessary to do further investigation at the time. Mr. Flint later confirmed that Nova saw no justification for further E3 expansion at the time.

[267] At the same meeting, it was indicated that there were still commercial issues between Dow and Nova about the seventh furnace buyback at E3.

[268] The Solomon study was discussed. Solomon Associates is a consulting group to the petrochemical industry, involved in benchmarking the efficiencies of various plants. It sends out a detailed questionnaire to participating plants, analyzes and co-ordinates the results, and ranks projects against their peers on a variety of different operational issues. Participants who subscribe to the study are entitled to the results vis-à-vis their plant as against other anonymous plants. Participants only see their own data; competitive detail is taken out. The process involves a group from Solomon spending three to five days at a plant to gather data. Although the process is expensive, most industry leaders participate.

[269] During the July 14, 2004 meeting, it was decided that, while all three crackers would be included in the Solomon report, the E3 data would be broken out and made available to Dow.

[270] The COP was also referenced in these minutes. Dow requested that, as the project was essentially complete, E3's nameplate capacity should be adjusted to show current capacity and fuel production rate, in accordance with what Dow felt was common practice.

[271] Schedule E of the OSA provides a process for calculating a new nameplate capacity number for E3. Mr. Miller from Dow and Mr. Wade, Nova's Leader of Olefins Manufacturing, were to review the process and bring the issue forward to the next management committee meeting.

[272] On July 16, 2004 Mr. Ramachandran sent an email to Mr. Bradley, Dow's in-house counsel and to Mr. Fergusson, asking the following questions:

- a) What is Dow's allocation of E3 output of ethylene in an ethane-constrained or non-constrained environment?
- b) As Dow has exercised the option to purchase the 7th furnace of the E3 cracker, are there any feedstock allocation issues that will prevent Dow from getting its quota of ethylene after this purchase and if so what are they?
- c) How is the ethane pool managed between E1, E2 and E3 and what are the requirements at each cracker for ethylene output at maximum rates?
- d) If Nova requires a finite amount of ethylene to meet their obligations, for example, 500 Million pounds a month, how does it determine which cracker to run and which to cut back if there is not enough feedstock?
- e) How are by-product credits calculated in E3 –for example, if hydrogen can be sold or fueled, how are the revenues allocated?
- f) If there are any volume discounts on purchases that include E1, E2 and E3 components, is E3 getting a discounted price or the price of the highest part?
- g) Which is the lowest cost cracker in Nova's fleet?
- h) Does Nova have contractual obligations that required operating all three crackers at maximum rates throughout the year?

[273] On the same day, Mr. Ramachandran received an email from Tom Humble, a Dow process engineer in Louisiana, on the subject of changing E3's nameplate capacity designation. That lengthy email included the following statement:

From commencement of Commercial Operations through 2003, E3 has operated mostly under feedstock allocation. The 2004 Plan shows E3 operating at █% of (original) design capacity for 10 months, █% of design capacity for two months. E3 has operated above plan for most of the year to date. Operation below plan has generally been the result of equipment constraints.

[274] On July 21, 2004, Mr. Ramachandran emailed a list of issues and questions to Mr. Mirosh for the purpose of developing a position paper. The questions were as follows:

- a) What are the ethane consumption requirements of each of E1, E2 and E3 when running at capacity?

- b) Which of E1, E2 or E3 has (i) the most efficient ethane conversion ratio and (ii) the lowest variable cost (other than ethane cost) to produce?
- c) During periods when the Pool does not have sufficient ethane to supply capacity requirements for each of E1, E2 and E3, on what basis is the available ethane allocated among those three plants? What other factors (other than scheduled shutdowns for maintenance and other work), including contractual provisions that bind Nova, affect decisions about the rates at which to operate manufacturing units?
- d) Having exercised the option on the 7th furnace, Dow's Ethylene Production Proportion (being its entitlement to a share of all products at E3) is now 50%. Are there other factors that Nova believes affect Dow's entitlement to E3 outputs (ethylene and other products)? If so, what are they and pursuant to what provision of what agreement or instrument binding on Dow do they operate?
- e) If a co-product such as hydrogen could be sold to one or more third parties or utilized in operations at the Site (whether for E3 or otherwise), (i) how is the decision made to use or sell, and (ii) if it is used, how is the credit therefor determined and allocated to Dow and Nova as Co-owners?
- f) Is E3 being credited a proportionate part of all credits, rebates or allowances (volume-based or otherwise) on goods and services purchased for the Site? If so, how is this proportionate part determined? If not, why not?
- g) In the case of 3, 5 and 6, are the applicable decisions sanctioned pursuant to a provision of an agreement to which Dow or Union Carbide is a party or some other instrument that is binding on Dow? If so, please describe the provision or instrument in your reply.

[275] Mr. Ramachandran testified that he was trying to find out what was really going on at the Joffre Site, trying to figure out whether Dow was getting what it was entitled to, and, if not, what was the logic. Mr. Mirosh did not respond.

[276] On July 22, 2004, Ms. Eastman sent Dow's nomination for August, 2004. It read: that "Dow is nominating the greater of its 50% share of E3 nameplate capacity or its 50% share of E3 actual production". This email was copied widely to Dow management and to Mr. Broenink, Mr. Clark and Mr. Wade.

[277] In response, Ms. Eastman received a different kind of Nova nomination on July 28, 2004 that included a letter from Mr. Broenink. The letter states that Nova is also nominating its full share of ethylene from E3, and that:

E3's production capacity in August is estimated at [about] 90% based on furnace availability.

As previously discussed, there is currently insufficient ethane feedstock in the Pool to meet Site demands. As such, ethane allocation from the Pool remains in effect for the Site in August. Our current estimate for ethane supply from the Pool is sufficient to meet approximately 90% of Site demand. Dow will receive the equivalent volume of ethylene derived from its 25.578% share of the available ethane in the Pool as per the draft letter agreement dated July 16, 2004.

NOVA Chemicals intends to continue operating E3 and the Site, consistent with the E3 agreements, with the objective of maximizing efficient, flexible, and safe operation of the Site as a whole to achieve overall lower costs. This may result in a higher or lower utilization of E3 than the Co-owners' allotted share of ethane supply from the available Pool supply. NOVA Chemicals believes this methodology, which we have discussed with you in the past, to be to the benefit of both Dow and NOVA Chemicals.

[278] Mr. Broenink testified that, given the wording of Ms. Eastman's nomination letter and his understanding "that Ramesh was asking a lot of questions regarding allocation procedures", he thought it was appropriate to provide a more formal response to the Dow nomination. He says that what he meant by the reference to "currently insufficient ethane feedstock in the Pool to meet Site demands" was that there was less ethane available in the Pool to meet a demand of 165,000 barrels a day. This is not credible.

[279] Mr. Ramachandran referred to Mr. Broenink's letter as "legal mumbo-jumbo stuff" that set off red flags for him. He decided he really needed to find out what was going on, as this made no sense to him.

[280] On July 30, 2004, Mr. Flint sent an email to Mr. Mirosh, copied to Ms. Apuzzo (Nova's then-Director, Ethylene Business), Mr. Foy, Mr. Tulk and Mr. Broenink, about Mr. Ramachandran's list of questions.

[281] The email includes the following comments:

It seems apparent that Ramesh is taking the attitude that the E3 [OSA] requires NOVA to provide Services, including Ethane Services, in order to achieve the objective of operating E3 at capacity such that Dow receives 50% of the productive capability of E3. However, NOVA's obligations in section 4.6 are to provide Services to **all facilities on the Site, including Ethane Services to Pool Users**, with the objectives of maximizing efficient, flexible and safe operation of the Site as a whole without discrimination on the basis of ownership of any particular manufacturing unit at the Site and achieving overall lower costs for such services. (emphasis in original)

As far as I see it the fundamental issue is that with the current ethane feedstock constraints faced by the Ethane Pool, Dow is not able to count on full utilization of Dow's share of E3 productive capacity. In an unconstrained feedstock environment NOVA would want to see E3 operated at its full capability, since this is the plant with the lowest conversion costs at Joffre. However, operating E3 at full capability during periods of insufficient feedstock supply would result in a disproportionate sharing of ethylene production, since Dow's share of total Joffre site ethylene nameplate capacity is ~25% whereas any incremental production from E3 is shared 50:50 between NOVA and Dow.

[282] Mr. Flint conceded at trial that he understood that the OSA required Nova to provide ethane in order to achieve the objective of operating E3 such that Dow received 50% of E3's productive capacity and that he also understood that this was what the Co-owners' nominations said every month. However, he testified that what he really meant was that he believed that Mr. Ramachandran took the attitude that E3 should be loaded with ethane supply first in preference

to the need for ethane at E1 and E2, and that this was not the approach Nova had been taking. In reality, this was what Nova was doing.

[283] He also conceded that by “periods of insufficient feedstock supply”, he meant insufficient feedstock to fill all three crackers to their so-called nameplate capacities, minus the E1 Toll, and that this had nothing to do with actual demand. At this point in time, Nova’s actual ethylene demand was less than the amount of ethane required to fill up the three crackers, and Nova knew that Dow was short of ethylene.

[284] Mr. Flint conceded that when ethane allocation was in force, Dow obtained 25 per cent of the ethylene manufactured at the Joffre Site as a whole, which most of the time was less than 50% of the actual production of ethylene at E3.

[285] Mr. Ramachandran, Mr. Fergusson and Nova personnel including Mr. Flint met on August 11, 2004 to discuss these issues, and Mr. Flint sent Mr. Ramachandran and Mr. Fergusson an email dated August 12, 2004 which, he testified, attempted to explain how ethane allocation worked:

Ramesh and Hugh, further to our discussion yesterday, please find attached a spreadsheet showing how ethane supply is currently allocated using the Feedstock Fraction during periods of ethane supply shortfalls as well as the impact of two alternate scenarios if E3 capacity were to be filled in priority to the requirements of E1 and E2 at Joffre.

[286] Mr. Flint testified that, by requirements at E1 and E2, he did not mean Nova’s actual requirements, but hypothetical requirements if Nova filled E1 and E2 up to nameplate, deducting the E1 Toll.

The Feedstock Fractions for each of E1, E2 and E3 were established at E3 start up based upon the nameplate capacities of each of E1, E2 and E3, after deducting the ethylene capacity associated with any ethane to ethylene tolling arrangement. The fixed costs of ethane supply are allocated amongst the three ethylene plants using these Feedstock Fractions.

[287] Mr. Flint conceded that he knew that, other than when Nova imposed ethane allocation, Dow’s take of ethylene from E3 was based on EPPs, not feedstock fractions.

As you will see E3’s Feedstock Fraction is 51.16% of the total Ethylene Pool. NOVA has been using the same Feedstock Fractions to allocate ethane between E1, E2 and E3 during periods when ethane supply is not sufficient to meet the demands for ethylene production at E1, E2 and E3.

[288] Mr. Flint conceded that he was not really talking about demands for ethylene production; he was talking about capacity. He continued in the email:

This has been the mode of operation prior to and after the termination of the E2 cost of service contracts.

The Ethane Pool supply needs to be at or above 173.4 kbpd [based on a 365 day year] to allow all of the ethylene plants at Joffre to operate at nameplate capacity, an increment of ██████% above this level would be required to operate the plants at their full capability. In the attached spreadsheet we have shown various Ethane Pool supply scenarios from 130 kbpd through 170 kbpd. In 2003, and as currently

anticipated for the remainder of 2004, Ethane Pool Supply is in the 140 to 150 kbpd range.

The current Ethane Pool Allocation methodology ensures that each of the ethylene plants receives the same percentage of available ethane as they have paid fixed costs for that supply, namely the Feedstock Fraction percentage.

[289] Mr. Flint conceded that this was not accurate, that Nova was actually taking ethane from E1 and E2 and using it in E3 to lower the cost of production at the Joffre Site. He acknowledged that there was no disclosure of this to Dow. The email continues:

If, as you suggest, the allocation methodology were to be modified to preferentially allocate ethane to E3, Dow would receive a higher percentage of Ethane Pool supply than it is allocated fixed costs for that supply. In addition the volume of ethane available to supply E1 and E2 declines. Since Dow is not a party to ethylene supply from E1 & E2, other than the E1 Toll, we can understand why Dow is not concerned about the impact of such a change in allocation methodology on E1 and E2 ethylene production. However, as the spreadsheet shows, NOVA's ability to produce ethylene would be severely constrained below its already constrained level. At nameplate capacity utilization, the ethane shortfall ranges from 0.9 to 8.5 kbpd.

In an alternate scenario of preferentially allocating available ethane to E3 when it is operating at [REDACTED] % of current nameplate, Dow would be receiving between 30 to 36.4% of the available ethane whilst paying only 25.6% of the ethane fixed costs. NOVA's share of the ethane pool reduces from the current 74.4% to between 63.6 to 70%, whilst paying 74.4% of the ethane fixed costs.

[290] Mr. Flint testified that this was meant to show that if E3 was preferentially loaded up to either its nameplate or its capability, Dow would get the benefit but Nova would suffer the pain of less supply.

These types of inequities are the fundamental reason why the Ethane Pool was established as laid out in the E3 agreements.

I trust that the above explanation and attached spreadsheet will contribute to an improvement in understanding of how NOVA has operated the Ethane Pool during times of constrained ethane supply.

[291] Mr. Ramachandran testified that after receiving this, he was in a state of suspended disbelief. He completely disagreed with the approach, unable to understand why E3 would not get its full amount of ethane so that Dow would get 50% of the ethylene output. He realized that something strange was going on in the Nova portfolio of ethane allocation. He wanted to know who had made this up, who had come up with these rules. He was focused on E3 and did not understand the arbitrary mechanism Mr. Flint was using to distribute ethane among the three crackers. He responded the next day, indicating he understood Nova's position, but asking:

Is it Nova's position that the only reason Dow is not getting a higher ethylene output from E-3 is because of the disproportionate ethane fixed cost allocation? Does that mean that if we agree to pay the higher fixed cost percentage according to ethane intake, we can get more ethylene out of E-3?

[292] Mr. Ramachandran then raised the fact that Nova's ethylene demand had just dropped by 800 million pounds as a result of the expiration of the Dow E2 cost-of-service contract, and asked:

Is the additional 800 Million still available at a price and if so at what price and duration? If this volume is not available, is this sudden demand that occurred in the province between your internal consumption and new customers? This is the part that I discussed when we met where the numbers do not add up for us. If there was enough ethane available during the first part of this year to run E-2 and our potential E-1 toll, why is it that when the E-2 volume is no longer needed, the ethane cannot be routed to E-3?

[293] Mr. Ramachandran's testimony was that his objective was that Dow and Nova may be able to find a way to have Dow pay a fair share of fixed costs, if it was only a fixed cost issue, and run E3 at full rates, since both would benefit. With respect to his second comment, his logic was that Nova was a cracker "long". Since Dow had cut back its demand from E1 and E2, this would free ethane that could be used at E3.

[294] Mr. Flint responded as follows:

Ramesh, unfortunately the ethane supply scenarios I provided in the spreadsheet are not hypothetical. Ethane Pool supply is currently running in the 140 to 145,000 barrels per day range.

Ethane supply is being allocated to each of the Joffre assets in accordance with the Operator's obligations to provide services to all facilities on the Joffre site, including E1 & E2, without discrimination on the basis of ownership of any one particular manufacturing unit at the site.

I have attempted to point out that allocating ethane, in times of shortage, on a preferential basis to E3 results in the other plants at Joffre being short of ethane supply to meet their ethane demands. NOVA as Operator takes into account the ethylene demands placed upon the Ethane Pool by all Users and when supply is not sufficient to meet this demand, ethane is allocated between the plants based upon the Feedstock Fraction. As I have shown in the spreadsheet, allocating ethane preferentially to E3 results in E3 receiving a higher percentage of pool supply than E3 pays in fixed costs, but more importantly there is a significant shift in ethane supply amongst the ethylene plants at Joffre. Preferentially supplying ethane to E3 would breach the Operator's obligation to not discriminate on the basis of ownership but more importantly effect NOVA's ability to supply its third party and internal ethylene supply commitments. (emphasis added)

[295] Mr. Flint conceded that his reference in the second paragraph was to section 4.6 of the OSA, and that this was the first time that Nova had communicated this as a reason for ethane allocation.

[296] He also conceded that his reference in the third paragraph that "a preferential basis to E3 results in the other plants at Joffre being short of ethane supply to meet their ethane demand" was not quite true, as this was a reference to nameplate capacity. Dow would not know what Nova's ethylene demands were as they related to E1 and E2. He acknowledged that he did not

disclose to Mr. Ramachandran that Nova was not supplying ethane to each plant according to feedstock fraction but instead supplying more ethane to E3 at the time.

[297] Mr. Flint also acknowledged that, despite the reference in the third paragraph to “[p]referentially supplying ethane to E3 ...”, that is precisely what Nova had been doing. He conceded that, at time of ethane allocation, Nova considered itself free to supply ethane to any of the three crackers, and generally decided to put more into E3. Thus, Nova was receiving the benefit of a greater portion of E3’s ethylene than its contractual EPP and more than it had nominated most of the time, and Dow was receiving less than its EPP and less than it had nominated most of the time.

[298] On cross-examination, Mr. Flint agreed that, with the last sentence, he was trying to persuade Mr. Ramachandran that this was not a hypothetical shortage of ethane, and that Nova was actually sharing some of the pain with Dow.

[299] He was referred to a March 2004 presentation by Mr. Broenink that showed Nova’s 2005 ethylene balance assuming that Dow was put on ethane allocation. He conceded that, according to the presentation, Nova would not be suffering any “pain”, except the need to use propane. Despite being referred to other internal documents that indicated that, when ethane allocation was imposed, Nova met its internal and external demands and only Dow was short, Mr. Flint refused to accept that characterization because, he said, Nova had been obliged to use propane as a feedstock.

[300] Mr. Ramachandran testified that, to him, Mr. Flint’s response meant that Nova had not done a good job of getting sufficient ethane to run E3 at full rates, and that it was now applying warped logic to allocate ethane among the crackers.

[301] On August 17, 2004, Mr. Ramachandran responded to Mr. Flint, asking “if Dow took its full share from max E-3 productions, how many pounds should we cut back on E1, so that you could have your needs satisfied?” He says he was still trying to find a solution that did not hurt Nova the way that Mr. Flint had described if E3 was run at full rates.

[302] Ms. Appuzo circulated an email internally on August 30, 2004 that indicated that Nova’s current optimized mode, while on ethane allocation, was to operate E3 at available capacity and cut E1 and E2 back. She estimated that maximizing E3 production and providing Dow with 50% of E3’s production 25.6% of total Joffre would result in a \$10 million “penalty” to Nova due to increased propane cracking requirements.

[303] On September 1, 2004, Mr. Ramachandran reported internally about a meeting he had had with Nova the day before as follows:

Nova’s latest offer is after we max E-1, they will “allow” us to top off E-3 if we give them ethane that’s 20% over and above our requirements!! So, just to get our additional 200 MM lbs from E-3, we should give them about 40 MM lbs of ethane. It makes no sense to us to consider this seriously, and I am not sure we even have the ethane to consider this.

[304] Ms. Eastman responded to Mr. Ramachandran in an attempt to explain Nova’s position on the issue.

[305] On September 2, 2004, Mr. Mirosh sent Mr. Ramachandran a form of streaming proposal to consider. The first part of the proposal was that Dow would be able to stream a volume of

ethane feedstock directly to the Joffre Site to fill out the portion of E3 capacity that could not be supplied by the Pool. But in order to do this, Dow would have to provide 20% of the streamed ethane to Nova for its own use; it would have to use all of the E1 Toll, it would have to pay 50% of the engineering costs of the Casper project, and it would have to drop the arbitration commenced with respect to electricity costs at E3.

[306] Due to what Mr. Ramachandran characterized as the “ransom” demands that accompanied the offer to allow streaming of ethane to E3, Dow did not accept the proposal. Mr. Fergusson provided Mr. Ramachandran and senior Dow management with a lengthy criticism of the offer. He commented:

Perhaps the strongest argument we have is non-performance under the E-3 operating agreement which will take a long time to litigate. Time is not on our side at this point. Not a great position overall.

[307] Mr. Ramachandran shared that view. In his opinion, it was a good time to make money on Alberta ethylene, and the parties had the world’s best cracker, which from Dow’s point of view was being starved of ethane.

[308] In September, 2004, Mr. Ramachandran and his supervisors in ethylene and feedstocks discussed Nova’s requirement that Dow participate in the amount of about \$2 million in the development of the Casper project. They recognized that Dow did not need the extra ethane, but considered that forced participation was part of the “ransom” Nova was attempting to extract to allow streaming of more ethane to E3.

[309] On October 1, 2004, Mr. Ramachandran reported internally that he thought he was making progress with Mr. Mirosh, and that he had asked Mr. Mirosh to consider breaking up the Pool in some acceptable format so that E3 would become a pure production joint venture.

[310] Meanwhile, on October 26, 2004, Ms. Eastman sent an email to Mr. Miller, copied to Mr. Ramachandran. It included some comments from a conversation with Mr. Broenink about a number in the 2005 budget, and also noted:

Also on the E3 daily report it’s important to remember too that while Nova is ethane short we will not see the low conversion come off – which limits rates – and that while we are on ethane allocation we get 25% of the ethylene produced from the pool at Joffre so that we are also getting ethylene from E1 and E2. The report doesn’t show the entire picture.

[311] Mr. Ramachandran said that this was new information to him; that Dow could be getting ethylene from plants other than E3. He asked Ms. Eastman how Dow could monitor the Nova statement that it was optimizing across the site by doing this. Mr. Miller also had a number of questions about this and suggested putting it on the next E3 Management Committee meeting agenda.

[312] On October 28, 2004, Mr. Ramachandran sent the following draft without prejudice proposal to Mr. Mirosh:

I think we are in agreement that the value generation for both companies is being able to use Nova’s excess capacity to produce ethylene, Dow’s ability to use this ethylene and convert that to a “win win”. If Nova has 500 MM lbs of excess capacity and receives a toll of 4 cents per pound for using that capacity, this will

be worth \$20MM per year to Nova. Dow will obtain the feedstock for these pounds at a sufficient premium within Canada and use it with its derivatives. Instead of negotiating payments associated with litigation, we will be focused on increased revenues to both sides, which will make this a good deal for both parties. We also seem to be in agreement to try and reduce this to a firm commitment within the next two weeks. My proposal with this background is –

For the period January 1, 2005 through December 31, 2006:

Dow will commit to max E-1 volumes of 600 MM lbs per the Ethylene Tolling Agreement

Nova will commit to running E-3 at no less than max rates defined by Nova of [REDACTED] per year.

In addition to the two aforementioned commitments:

- (i) where Dow has excess ethane, NOVA will allow Dow to Toll additional ethane through the Joffre complex. Dow will nominate such volumes on a monthly basis and will do so at least 5 days before the end of the previous month. For further clarity, the ethylene from this new ethane toll will be in addition to the E1 volume and the E3 volume. The minimum annual ethylene toll supply commitment from NOVA will be 300 MM lbs of ethylene. This ethylene could be an ethane or a propane toll, at Dow's option. If propane is used, Nova will nominate a propane formula that may be used in this transaction. Dow and Nova will discuss the propane formula before any commitment is made. Dow will nominate the ethylene pounds in 5 MM lbs increments of ethylene, each month.
- (iv) Dow will pay to Nova a toll fee of 4 cents Canadian per pound for each pound of ethylene produced and delivered to Dow pursuant to this tolling arrangement. The ethane toll ratio shall be 0.422 gallons of ethane per pound of ethylene i.e. Dow will supply 0.422 gallons of ethane per pound of ethylene requested.

[313] Mr. Ramachandran noted that this proposal showed a willingness to pay part of the “ransom” Nova was attempting to obtain because it continued a form of E1 Toll commitment.

[314] On November 2, 2004, Mr. Ramachandran sent an email to Mr. Miller and Ms. Eastman concerning the November 1, 2004 E3 weekend status update, asking “How can this be? Why aren't they running above nameplate capacity at max rates? Where is the ethane going?”

[315] Mr. Miller noted that the daily report listed E3 as “ethane constrained”, and that one of the furnaces was down for repairs. He talked to an operations contact and to Mr. Broenink, who, he said, advised him that:

E3 is currently running 6 furnaces (one down for repairs). They are running max feed to the 6 furnaces but at reduced conversion to maximize ethane to ethylene yields. E1 & E2 are doing the same as the site is ethane constrained. They operate in this mode when they are ethane constrained in order to “optimize” ethylene production (maximum pounds) for the site.

So when Dow introduced more ethane this month and last, rather than take this solely to E3 and have to raise conversions, lower yield but increase capacity of E3 they take it in whatever unit has some capacity left (E1 or E2). So on a daily basis when looking at the E3 report we see no change. However at the end of the month we do get the extra ethylene pounds as if E3 was running higher rates. In effect instead of getting 50% of E3's output we get a higher share. For example in October we got the equivalent of 54% of E3 output. For November it is forecasted to be 52% or equivalent to 104% of our normal take.

[316] Mr. Ramachandran commented:

I don't see where in the contract they have the right to do this – if they are ethane constrained because they screwed up, they cannot arbitrarily decide how to run the site and give us ethylene “as though” E-3 produced it.

[317] He testified that he was shocked by this revelation and felt that Dow should have something to say about how E3 was run. He noted that:

.... we realized we really had even a bigger problem than not just having enough ethane to ... it was bad enough that there was not enough ethane to fill E3 up. Now we realized that ... we were not even getting half of E3, and there was this extraordinary degree of arbitrariness in saying, I will pretend that something is coming through E3, and as long as you're getting it at a particular price at a certain quantity, you shouldn't worry about it. I mean, ... you can't do that.

[318] On November 11, 2004, Mr. Ramachandran reported the outcome of several meetings with Nova to his team and Dow senior management:

Nova's view of allocation in an ethane short environment is – Nova will take the ethane available and allow Dow to consume the ethylene equivalent of 25.66%. It does not matter where this ethylene is made amongst E-1, E-2 and E-3. I informed them that we disagreed with this view. Nova further argues that even if there is more ethylene made in E-3, Dow was not entitled to 50% of the E-3 output but only to 25.66% of the ethylene produced from the system. I discovered yesterday that there have been at least three months this year where E-3 has produced pounds but Dow has not received 50% of the production. I made it clear to them that while there appeared to be a “method to this madness”, Nova could not make this decision without Dow's permission. They claimed Hugh had given them this permission. I told them that the only way they could continue in this mode was if they were flexible in their fee structure to allow Dow to stream our ethane through the excess capacity. Bottom line – it's bad enough we cannot get our ethane through the idle capacity in E-3, but we don't even get 50% of the output from the cracker because the allocation is based on feedstock rationing by Nova.

Nova will reduce the toll fee that they were attempting to charge for November-December based on these discussions and discoveries. The current offer was for equivalent of 33 cents per lb US – we will get an offer on Monday and will hopefully improve on that offer. We will accept any offer that comes our way on Monday considering US prices at 40 – 41 cents.

None of the above issues are related to the [electricity] litigation.

In return for dismissing all current litigation, the following offer was made [A discussion of the offer followed.]

This will enable Dow to completely fill out E-3 next year and will be a remarkable achievement if we can pull it off. Greg, Rog and I have met last night to explore this option. Since we have cancelled the IOL ethane obligation for next year, I think we are almost there!...

[319] Mr. Ramachandran testified that Dow made it clear that it disagreed totally with what Nova had been doing, and the business solution was to bring more ethane into the system. One of the offers Nova was making was to see if Dow could work with it on the Casper Project, and that there could be negotiations to stream ethane through E3.

[320] In an internal email dated November 13, 2004, Mr. Ramachandran indicated:

Since the Province is ethane constrained, it is possible to run the Nova AND Dow crackers in a manner that will result in higher yield, lower intensity and more ethylene production. This will require the Fort to run for max yield, free up some ethane and run that ethane through E-3 and get even more ethylene. Net-net Dow will come out ahead based on striking a good deal with Nova.

[321] Mr. Ramachandran was still hopeful that through the use of streaming and other mechanisms, litigation could be avoided. The streaming option seemed to make business sense, as it had no negative effect on Nova. He testified that Dow senior management were very concerned to discover that Dow was not even getting half of the ethylene produced at E3, let alone E3 not running at capacity, and Mr. Ramachandran was working hard with Mr. Mirosh to work out a mechanism to resolve the issues. The end result was a streaming agreement.

[322] On November 22, 2004, Mr. Flint sent Mr. Ramachandran a draft non-binding letter of intent with respect to addressing the supply issue. The letter included the following provision:

1. Ethane allocation protocol. In the event there is an insufficient supply of Ethane feedstock from the Pool to meet Pool User demand at the Joffre Site ("Ethane Allocation"), the parties formally adopt the Ethane allocation protocol that has been in place at the Joffre Site (attached as Schedule A) as the means of allocating ethylene production.

[323] Mr. Flint conceded that what he meant in using the words "Pool User demand" was nameplate capacity.

[324] In Mr. Ramachandran's view, this had no place in the streaming agreement and nothing to do with what had been agreed with Mr. Mirosh. He called Mr. Mirosh and told him that it was silly to try to back-door something into an agreement on an issue on which they had such a fundamental difference of opinion.

[325] At the November 23, 2004 E3 Management Committee meeting, Mr. Flint made a presentation entitled "2005 Ethane Supply Outlook". One of the slides noted that "Joffre ethane pool supply is less than demand". Mr. Flint conceded that this was not quite accurate, and that the presentation should have said that Pool supply was less than the total nameplate capacity number that Nova had been using. Part of the presentation was a slide entitled "[Nova] Proposal Dow Ethane Streaming to E3". In summary, the proposal was that if Dow streamed ethane to E3, it would receive 50% of the available ethylene made from the streamed ethane. However, Nova

was suggesting that it would have the option of streaming its 50% share of ethylene to Dow at cash cost plus eight cents a pound.

[326] On November 30, 2004, a new accountant at Dow questioned a Nova accountant about why the percentages set out in the invoices from Nova did not match up to the EPPs. The Nova accountant referred this to Mr. Foy, copied to Mr. Broenink, indicating that Mr. Foy would have to help him “in providing acceptable response from a commercial perspective”.

[327] Mr. Broenink’s comment was “[h]ere we go again ... it appears that the Dow organization does not talk to each other. This is all due to ethylene allocation”.

[328] Mr. Clark’s draft response was as follows:

For the period in question (Jul – Oct ‘04), there was insufficient ethane supply in the pool to meet site ethylene demand. Ethane allocation was in place whereby the ethane pool Co-owners received their *pro rata* share of site ethylene production equivalent to their feedstock fraction. Dow received its ~25.6% share of site ethylene production versus its ~50% ethylene production proportion of E3 actual production.

[329] This draft was changed before it was sent to read:

For the period January – June 2004, ethane available in the pool was sufficient to meet 100% of Joffre site ethylene demand. Therefore, E3 was not on ethane allocation and each co-owner received their respective Ethylene Production Proportion. During April and May, minor adjustments to ethylene entitlement for all Customers was required due to physical delivery constraints on the AEGS pipeline.

For the period July – October 2004, available ethane in the pool was only sufficient to meet ~85% to 90% of site ethylene demand. Joffre ethane allocation was in place whereby the ethane Pool Users (Dow and NOVA) received their *pro rata* share of site ethylene production equivalent to their respective Feedstock Fractions. Under our ethane allocation procedure, Dow received its ~25.6% *pro rata* share of the total site ethylene production produced from the ethane Pool supply as if it was produced at E3.

[330] No record of what was actually sent to the Dow accountant was produced.

[331] In December, 2004, Mr. Broenink was replaced on the EBT by David Baker, the Business Integration Manager, Ethylene, who took over the decision on whether ethane allocation would be imposed. Mr. Broenink’s new responsibilities initially had little to do with the Joffre Site.

[332] A final short-term streaming agreement was signed on December 3, 2004. It did not include the ethane allocation protocol paragraph, and it was only to be in force for two months, December, 2004 and January, 2005. It did, however, provide that Nova could deliver streamed ethane to any ethylene production facility at the Joffre Site. There were other draft agreements before the final short term streaming agreement was reached.

[333] Nova’s internal presentation on December 8, 2004 to an OPOL meeting entitled “Feedstocks and Petrochemicals Business Strategic Considerations 2005-2015 “stated that 2005

ethane shortfall was being mitigated through E2 ethane allocation”, and that Nova’s merchant demand was satisfied.

[334] At a December 9, 2004 Nova PEBT meeting, Ms. Apuzzo and Mr. Broenink made a presentation indicating that Nova knew that Dow was short of ethylene in Alberta, that Nova had sufficient ethylene to meet internal demands but that Dow remained on ethane allocation, and that E3’s capacity was █████% of nameplate, or █████ million pounds. The presentation again indicated that the 2005 forecast shortfall of ethane was “being mitigated” by:

- a) lower merchant demand;
- b) lower internal demand;
- c) propane cracking;
- d) low conversion operation; and
- e) E3 ethane allocation: “Dow short about 5 kbd”.

[335] At the end of 2004, Mr. Broenink, Ms. Appuzo and Mr. Flint met with Mr. Ramachandran and Ms. Eastman. The Dow people requested that E3 have priority access to ethane and sought Dow’s EPP share of E3 production. Nova refused this.

[336] At a February 3, 2005 E3 Management Committee meeting, Mr. Ramachandran complimented E3 as operator for meeting or exceeding 2004 meters. Mr. Ramachandran testified that Dow had no issues from the operational and mechanical safety side about the plant, but did not agree that Nova operated the plant to maximize production.

[337] In February, 2005, the parties exchanged drafts of a further streaming agreement. Dow was prepared to agree to the use of ethane allocation during the term of the agreement.

[338] Mr. Ramachandran commented that Nova’s agreement to allow Dow to stream ethane to E3 and the Joffre Site was accompanied by the “ransom element” that the E1 Toll had to be fully used by Dow.

[339] There were further drafts back and forth, and negotiations almost came to a halt in mid-March. A March 31 draft sent by Nova to Dow included the ethane allocation protocol language that had previously been rejected by Dow. On April 3, 2005, Mr. Ramachandran made it clear that Dow agreeing to Nova’s protocol of ethane allocation was a deal breaker. Dow’s next draft repeated the limited agreement to ethane allocation during the term of the streaming agreement. Again, Nova submitted a draft that would suggest that Dow had agreed to the earlier use of ethane allocation. Mr. Ramachandran testified that he reacted against this in the same way, noting:

... here we have something where we fundamentally disagree from the Dow side that this was something that Nova could do, to stream in that way, and we had essentially made it very clear they could not ... use this allocation protocol, and Dow was being conned by it and here it was showing up once again in a streaming agreement as a means to say that this was okay ...

[340] The final streaming agreement signed by Mr. Ramachandran on May 1, 2005 included the following:

2. Ethane Allocation Protocol. During periods within the Term in which there is insufficient supply of Ethane feedstock from the Pool to meet Pool User demand at the Joffre Site (“Ethane Allocation”), the parties agree to use the Ethane allocation protocol attached as Schedule A (the “Ethane Allocation Protocol”) as means of allocating ethylene production at the Joffre Site. (emphasis added)

[341] Mr. Flint conceded that, as it had done before, Nova actually imposed ethane allocation during the term of the streaming agreement if available ethane supply was less than the combined nameplate capacities of the three crackers less the E1 Toll, and that the actual demands of the Pool Users were inconsequential to the triggering of ethane allocation.

[342] The streaming agreement imposed another pre-condition to streaming. Before Dow became entitled to stream at E3, it would have to use 90% of the E1 Toll for the month.

[343] The agreement was to terminate on October 31, 2006. It also provided for the re-establishment of a feedstock subcommittee in accordance with the OSA.

[344] In April, 2005, Ms. Apuzzo and Mr. Tulk made a presentation to OPL entitled “Western Feedstock Strategic Initiatives”. The presentation was for the purpose of considering the development of another polyethylene plant on the Joffre Site. It acknowledged E3’s capacity at [REDACTED] billion pounds per year, and listed Dow as a “merchant” entitled to half of that. It indicated that Joffre had 600 million pounds per year of uncommitted ethylene capacity. The presentation recognized that Dow was unhappy with the situation at E3, indicating that “Dow E3” was short, and there was a likelihood of continued conflict.

[345] In an internal email dated May 10, 2005 describing the May ethane streaming agreement Ms. Apuzzo noted that ethane allocation was only ratified for the term of the agreement, that past practice was not ratified.

[346] Mr. Tulk was referred to an internal Nova presentation that he and Mr. Grasdal had made on May 10, 2005, entitled “Joffre Ethane Supply Forecast”. On a slide entitled “Joffre 2005 Feedstock Demand”, feedstock “shortfall” is shown in a chart as 24 kbpd, however, the chart also indicated that Nova had 19 kbpd of “uncommitted ethylene demand”, meaning excess capacity for which there was no committed demand. In the next slide, suggestions are made as to how Nova could make up the 24 kbpd shortfall by low conversion cracking (which Dow submits occurred primarily during ethane allocation), and “Dow E3 shortfall” (which Mr. Tulk conceded would “in general” mean imposed ethane allocation) which were shown as reducing the shortfall by 20.5 kbpd. The slide indicated that propane cracking was reducing the shortfall by 3.5 kbpd.

[347] On May 31, 2005, Mr. Ramachandran emailed Mr. Flint indicating that he had heard from Ms. Eastman that Nova would not allow Dow to stream ethane to E3 in June, and wanted to know what had changed in one month. He asked “[i]s the pool full to run the entire site at its capacity ... The note from Dale mentioned that there is sufficient ethane to meet site demand. That is not my question because Dow can use more ethylene from E3. Is the pool full to meet site capacity to produce ethylene?”

[348] Mr. Flint responded that ethylene demand had changed, and that, with lower ethylene demand, there was no requirement to allocate ethane. In other words, Nova was deciding whether or not to impose ethane allocation on its own demands for ethylene, despite knowing that Dow needed and wanted the ethylene.

[349] Mr. Ramachandran was cross-examined on an internal email exchange among Dow personnel between July 14 and July 18, 2005. A Dow employee at the Light Hydrocarbons Technology Centre, Thomas Humble, reported to Mr. Ramachandran and others that:

- a) MAC (a Dow concept that means that a plant would be run as hard as possible over a 30 day period with the result multiplied by 12 to produce a yearly capacity number) was established for E3 between May 1 and May 30, 2004 at ██████% of original design capacity;
- b) during the period, five new daily production records were set, there were 22 consecutive days of operation above ██████% of original design capacity and nine of ten consecutive days above ██████%;
- c) the 30-day period began at the end of the furnace decoke cycle, with only six of the furnaces available;
- d) after the decoke, production was ramped up with the maximum one-day production being ██████% of original design capacity;
- e) during the 22 days of production above ██████%, certain daily constraints were logged (including technical issues that Mr. Humble believed had since been eliminated);
- f) there were five days when furnaces were logged as a constraint even though seven furnaces were operating;
- g) E3 has not operated above ██████% original design capacity since June, 2004; and
- h) if it was not for the raw material situation, E3 would be a furnace-limited plant.

[350] Mr. Humble noted that planned furnace tube replacement and burner retrofit projects would help balance furnace production with finishing capacity, which he noted to be in excess of ██████ Mg/day. He stated that “[i]f E3 continues to operate near original design rates, there is easily ██████ Mg/day of capacity that is not being utilized, more like ██████ Mg/day with the furnace improvements.”

[351] Mr. Ramachandran asked for advice from several Dow people on whether he should send this information to Nova. Mr. Miller recommended against it since, in his view, the information was proprietary. In a follow-up email, Mr. Humble noted that he thought that Nova did not have anything like MAC to support the existence of a continuous improvement effort. He commented that “[t]he obvious reason we aren’t making ethylene is that ethane is not available, I’m not sure how sharing our MAC technology is going to improve that.”

[352] Mr. Humble, in his July 18, 2005 follow-up email, noted that he thought the E3 staff had done a good job of maximizing ethylene from the ethane available to E3, and that, since four furnaces had been retubed since the second quarter of 2004, “there should be no question that we could continue to do these production rates [██████% of original design capacity] if raw material available”.

[353] Mr. Ramachandran confirmed that E3 ran well, and that, in his view, the issue was ethane supply.

[354] In a review of emails dated July 19 and July 29, 2005, Mr. Tulk confirmed internally that, without the Casper project, Dow would be short about 350 million pounds of ethylene a year, which would result in increased conflict with Nova. He noted that the economics of the Casper

project for Nova did not likely support the project, and the question was how much value Nova put “in avoiding war with Dow”.

[355] In a September 28, 2005 email to Mr. Flint and Mr. Mirosh, Mr. Ramachandran complimented Nova on its presentation about the Joffre crackers at an investors’ conference, and noted that:

It further underscored the issue for Dow because of not receiving 50 percent of E3’s output during the time it has operated. We would like to jointly, (with Nova), estimate the pounds of ethylene that have not been produced by the JV due to ethane constraint during 2004 and 2005. The Dow estimate is that this is around 600 MM pounds. This will probably be brought up by Andrew [Liveris, the CEO, Chairman and CEO of Dow Chemical Company], because it has had a severe negative effect on both our earnings.

[356] At an October 13, 2005 meeting of senior representatives of Dow and Nova in Chicago, Dow again informed Nova that the allocation protocol was not in accordance with the E3 joint venture agreements and not in the best interest of Dow. Dow reiterated that 50% of any ethylene and co-products produced in E3 during these periods belonged to Dow and could not be used by Nova. Nova, on the other hand, indicated that it believed that there was language in the E3 joint venture agreements and past conduct that allowed Nova to allocate ethylene produced at E3 in this manner. Nova and Dow agreed that this was a fundamental disagreement between the parties. Dow representatives stated that Dow believed that the issue was important enough to require an expeditious resolution. On a related issue, Dow informed Nova that if Nova was unable to fulfill its obligation to fill the Pool, Nova should allow Dow to bring its own ethane, thereby providing full access to its ownership share in E3. The parties agreed finally that Dow would take the lead in designing a mechanism by which Dow would be able to stream additional ethane to E3 in a manner that did not reduce the ethane available to Nova for supply of its derivative plants and external customers.

[357] Mr. Spiess raised the possibility of Dow acquiring a share of E1, which confirmed Mr. Ramachandran’s theory that Nova was three-quarters to a full cracker “long” in its needs for ethylene.

[358] On November 15, 2005, Mr. Tulk sent Mr. Mirosh an email, copied to Mr. Flint, Mr. Broenink and Ms. Apuzzo, on the subject of negotiations with Dow on the Casper project. The email outlined two scenarios:

- a) if certain government support was obtained, Casper ethane would be put in the Pool and used in the future negotiations with Dow in dissolving the Pool;
- b) if there was no government support and Nova still wanted to proceed with Casper, Nova would want to maximize Dow’s share of the costs and risks. Dow would only participate in an expensive/risky feedstock source if Nova had some form of leverage, for example, restrict Dow’s access to E3 or reduce ethylene supply from E1.

[359] Mr. Tulk noted that:

My recommendation is that we proceed with Casper under the current situation... This approach is the simplest and provides Nova with the greatest flexibility to drive whatever outcome we deem best. Especially if we keep the leverage that we currently enjoy on Dow’s access to E3 and E1 ethylene supply.

[360] Mr. Ramachandran testified that at a December 1, 2005 meeting of senior representatives in Chicago, very little progress was made.

[361] For Dow, one issue was completely non-negotiable: E3 needed to run at maximum rates and Dow needed to get 50% of the output. Mr. Ramachandran felt that Nova kept making proposals that had strings attached to an agreement on that concept.

[362] Mr. Ramachandran testified that, over his years of discussions with Mr. Mirosh and Mr. Flint, the expressed reason for not running E3 at full capacity was a lack of ethane. He stated that they never advised him that E3 was mechanically constrained, nor did anyone else from Nova.

[363] In an internal email dated May 9, 2006, Mr. Broenink indicated that, given an ethane shortage, Dow should be put on ethane allocation and E3's operating rate should be reduced. The email stated that, without ethane allocation, Dow would receive incremental ethylene at ethane variable cost while Nova would have to crack propane at a higher cost.

[364] On March 23, 2006, Mr. Tulk made a presentation to the OPOL team indicating that without the Casper project, Nova's ethane shortfall could be made up by low conversion and propane cracking with the occasional lost chain margin, but that Dow would likely be short 350 million pounds of ethylene.

[365] On June 23, 2006, general counsel for Dow delivered a Notice of Default under section 9.0(c) of the COA to Nova. At that point, Mr. Ramachandran had left his position as President of Dow Canada and been replaced by Jeff Johnston. The notice sets out a number of alleged breaches by Nova relating to its failure to optimize production at E3 and its appropriation of ethylene from E3. A Statement of Claim was filed by Dow on June 29, 2006.

[366] Mr. Flint responded to the Notice of Default by letter of July 21, 2006. In addition to denying the allegations, the letter states that the Notice is invalid. It also states that:

Dow has long been aware of the procedures used by Nova Chemicals for allocating ethane at Joffre. Prior to April 30, 2005, the allocation procedures were the subject of meetings and discussions between Nova Chemicals and Dow on a number of occasions since 2000, at least one of which involved a presentation to the president of Dow Canada, Ramesh Ramachandran. The allocation procedures were formally agreed in the ethane streaming agreement dated May 1st, 2005. To complain now about such well-established and well-known procedures that are now agreed in writing appears to be an attempt to gain leverage in advance of the upcoming end of the term of the ethane streaming agreement on October 31, 2006.

[367] On July 25, 2006, Nova issued a Notice of Default to Dow pursuant to Article 9 of the COA, alleging that Dow was in breach by acquiring ethane from the Pool area. This letter references the substantial part played by Dow's ethane supply portfolio in Alberta, some of which had been entered into before the Dow/UCC merger.

[368] Mr. Flint testified that Nova had not issued a Notice of Default for this alleged breach earlier because its philosophy at the time was to recognize that Dow had already been buying ethane in the pool area to support its LHC-1 plant. Further, Nova and Dow had an ethane streaming agreement at the time that had Dow under the obligation of bringing ethane to the Joffre site, "so we recognized the reality that's associated with Dow acquiring ethane in the Pool area as soon as Dow acquired Union Carbide."

[369] On July 27, 2006, Mr. Johnston replied to the Notice of Default, stating as follows:

We have received firm advice of counsel that those provisions of the OSA that purport to preclude [Dow] from acquiring ethane in the pool area and the consequences of breach of them should be regarded as unenforceable. This is because [Dow] and Nova would be parties to an agreement to prevent or lessen, unduly, competition in the purchase of ethane or otherwise to restrain or injure competition unduly contrary to Section 45 of the *Competition Act (Canada)* if they were to abide by the exclusivity provisions. This is a criminal offence.

[370] Mr. Flint testified that this was the first time Nova had heard of this issue, but cross-examination revealed that this was not credible.

[371] On cross-examination, Mr. Flint conceded that, at the time of the merger, Nova knew that Dow would need to continue to obtain ethane in Alberta in order to maintain its ethane and ethylene derivative businesses in Alberta and that it would need to obtain even greater amounts of ethane if it chose to expand those businesses. He agreed that, given the merger, Nova recognized that the agreement provisions that said only Nova could purchase ethane from the Pool area and that Nova had to provide detailed information with respect to feedstock acquisitions raised legal issues. Mr. Flint acknowledged that Nova sought legal advice with respect to the legality and enforceability of section 5.1(a) of the OSA. He agreed that Nova came to the view that it could not conduct itself with Dow as it had with UCC. Mr. Flint conceded that it may have been his view at the time of the merger that having a single purchaser of ethane in the Pool area was anticompetitive, and that he had indicated as much at questioning. Mr. Flint indicated, however, that his current view was that the situation was “not necessarily an anticompetitive situation”.

[372] Mr. Flint also confirmed that, following the merger, Nova proceeded to discuss potential resolutions of the E3 issues that involved Dow continuing and increasing its ethane acquisitions in the Pool area, so that Dow could bring ethane to its share of E3.

[373] On July 28, 2006, Ms. Apuzzo sent Mr. Spiess, a memo summarizing current issues with Dow to aid him in preparing for an upcoming meeting with Dow. The E3 loading issue was characterized as “probably Dow’s biggest issue”. The memo notes that the E3 agreements do not contemplate ethane Pool shortfall, but that Nova “established allocation protocol when there is not enough ethane to fill all three plants ... Several times this allocation protocol [has] resulted in Dow getting less than 50% of E3’s actual production Dow’s issue here is that it does not get 50% of whatever E3 produces”. In cross-examination, Mr. Flint conceded that the text of this email implies that ethane allocation was done without Dow’s consent.

[374] On September 21, 2006, an internal Nova analysis indicated that, from the beginning of operations in 2000 until September, 2006, Nova had only delivered Dow’s full EPP of ethylene to Dow in 2004.

[375] Mr. Mirosh wrote back to Mr. Johnston on August 4, 2006. He stated that Nova did not agree with Dow’s analysis of the competition law aspects of the prohibition on purchasing ethane in the Pool area, pointing out that this had not arisen at the time the Competition Bureau originally reviewed the E3 agreements with UCC, and that the Competition Bureau would have had a chance to review them again at the time of the Dow/UCC merger.

[376] After the streaming agreement terminated on October 31, 2006, Nova continued to impose ethane allocation on Dow.

[377] A November, 2006 presentation to Nova's Petrochemicals Business Team indicated that the COP had addressed limitations to E3 known at the time, and that further rate capability could be attained by addressing some specific areas. It noted that E3 had demonstrated over █%, but was limited to about █%. With some suggested modifications, E3 could achieve over █% of design capacity. The presentation sought approval to proceed with a "Front end E3" optimization study. This was never done.

[378] On December 1, 2006, in a draft report prepared for Nova's executive leadership team entitled "R-3 Project Update", a slide set out the post-2008 capability of E3 as █ MPV or █% of nameplate capacity. This was the same number for E3 that had been shown to Dow and Nova executives in Pittsburgh in April, 2004. On the next slide, Dow's E3 share of capacity post-COP was indicated to be █ MPV.

[379] On March 28, 2007, Mr. Mirosh delivered a Notice pursuant to section 5.15 of the OSA to Dow stating that Nova objected to Dow's acquisition of ethane in the Pool area from certain suppliers. The Notice stated that Dow was required to dispose of the incremental ethane supply within 60 days. Dow did not comply with this Notice.

[380] On May 29, 2007, Mr. Mirosh sent a letter indicating that Dow's failure to comply with the Notice was a material breach, and Nova gave notice that it may avail itself of its rights under Article 9 of the COA.

[381] Mr. Mirosh sent another default notice on August 9, 2007, this time referring to Dow's acquisition of ethane from a different supplier, again requiring Dow to dispose of the contract. Dow did not.

[382] At the November 6, 2007 E3 Management Committee meeting, Mr. Wilke of Nova gave a presentation on E3 nameplate re-determination. This arose from a request, initiated by Dow but agreed to by Nova, to undertake a process to identify the nameplate capacity potential of E3. The conclusion of the presentation (by Nova as Operator) was that the nameplate of E3 could be █% of the old nameplate capacity of 2.81 if certain work was done. The presentation indicated that if this work was not done, █% of current nameplate was unachievable and the result would be █% of current nameplate.

[383] However, the minutes of the E3 Management Committee meeting indicate that the Co-owners agreed that E3's new nameplate capacity was █% of the original nameplate capacity of 2.81.

[384] The work identified by the presentation was never done, as it was cancelled in 2008. Mr. Johnson requested Nova to agree to change the nameplate capacity of E3 to █ BBL per year if Dow agreed to support the scope project financially, but Mr. Flint refused.

[385] Mr. Flint testified that Nova did not agree with the nameplate change because Nova had already been sued by Dow. While it "obviously is the capability of the plant to produce ethylene", Nova's position was that there was not enough feedstock to operate at that level, and it would be inappropriate to publicly restate the nameplate and then be unable to perform.

[386] Mr. Flint anticipated that a change in nameplate would lead Dow to request a feedstock fraction change, and that Dow would thus be able to obtain more ethylene from E3.

[387] In a presentation made on January 23 and 24, 2008 at a Nova olefins leadership conference in Ontario, Mr. Tulk and Mr. Broenink provided a slide on the Joffre ethylene/ethane balance. Mr. Tulk conceded that this slide, adjusted to correspond with the impending termination of the E1 Toll, indicates that Joffre site capacity was substantially higher than Nova's ethylene demand, and that, to meet Nova's demands, Nova could run E3 and E2 to capacity and make only 610 MPV at E1. The slide also indicates that it was Nova's assessment that, as long as Nova filled up E3 to its full capacity of [REDACTED] billion pounds a year and delivered half of the ethylene produced to Dow, Dow would be balanced in its ethylene demand and would not need to use the expensive E1 Toll.

[388] On December 19, 2008, Mr. Broenink, who was then Director, Ethane and LPG Feedstock for Nova, wrote to Mr. Johnson, the President of Dow Canada, and to Mr. Flint, indicating that, over the past few weeks, "demand for ethylene and hence ethane at the Joffre site, including E3, had dropped dramatically and is forecasted to not recover until sometime next year at the earliest."

[389] The letter stated that:

Based on the Operator's outlook for Joffre demand and ethane supply to the Pool, we believe it is prudent to reject a significant portion of the December ethane supply in order to reduce working capital for both co-owners.

...

Based on these steps we are anticipating ~\$40 M reduction in the Ethane Pool's working capital by the end of December.

The current outlook for Q1'09 indicates that ethane supply to the Pool will continue to be greater than Joffre demand and as such, we will be reviewing our ethane rejection strategy on an ongoing basis in order to manage working capital. However, as highlighted in the recent presentation at the E3 Management Committee meeting in November, despite a potential ethane inventory build in Q1, we are forecasting a potential shortage of ethane feedstock to meet Joffre demand later in 2009. As such, we continue to anticipate that ethane allocation may be required later in 2009 even if inventory is built to the maximum storage available in Q1.

[390] Mr. Broenink testified that the reason he was rejecting ethane in December, 2008 while anticipating ethane allocation in 2009 was:

The objective at the end of winter was to have our ethane storage full ...Do I fill that ethane inventory in December and be full going into January and reject in Q1, or do I reject that ethane in December, save the working capital, and then build that ethane inventory so our storage is full in Q1. So the impact on what it would have later in 2009 didn't come into play here as long as our ethane inventory was full at the end of winter.

[391] Mr. Broenink says that Nova exited the 2008/2009 winter with full ethane inventory.

[392] Mr. Tulk, to whom Mr. Broenink then reported, advised Mr. Thomson, Ms. Apuzzo, Mr. Baker and Mr. Flint on December 1, 2008 that he was "not comfortable with the risk we are

taking [with the ethane rejections plan]”. He noted that “[o]nce a barrel is rejected it is gone forever.... Q3 and Q4 will be very challenging given our current outlook on export gas volumes.”

[393] The General Counsel of Dow Canada responded to Mr. Broenink with a letter dated December 22, 2008 to Nova’s Assistant General Counsel, objecting to Nova reducing the ethane Pool “working capital” on the basis that Nova had no authority to do this without the prior consent of the E3 Management Committee, and that Nova, as Operator, had no authority to curtail production of E3 without the prior consent of the committee. The letter also states:

Nova had acknowledged, in Mr. Broenink’s letter, that it anticipates “ethane allocation” in 2009. As you are well aware, Nova’s practice of “Allocation” and the so-called “Allocation protocol” ... are among the issues in the lawsuit between our respective companies. So that it is absolutely clear, Dow will not agree to a curtailment of the Ethane Pool that will also have the direct result of allowing Nova to convert more of Dow’s Ethylene produced at E-3 to Nova’s benefit.

Further, Nova’s stated intention of drastically curtailing the Ethane Pool and Ethylene production at E-3 this month is far beyond the Third Party Sales permitted under Section 5.10 of the OSA and designed to allow the Operator to balance Ethane inventory or to lower overall Pool costs, particularly when doing so will contribute to an acknowledged shortfall in Ethane in 2009.

Inventory of, and use of, the current and projected amounts of ethane in the Pool for E3 is completely manageable by the parties and Dow can only conclude that this drastic action is taken for the sole year end benefit of Nova at Dow’s expense.

[394] Mr. Broenink responded as follows:

Based on the actual December nominations of the two Co-owners, the Operator’s outlook on the supply demand balance for ethane, and the ethane storage situation in Alberta, the actions taken by NOVA Chemicals as Operator are prudent in the circumstances and reduce working capital for both Co-owners. Our current outlook suggests that these activities do not increase the probability or change the timing of any ethane allocation that may be required later in 2009.

[395] When Richard Van Hemmen became Leader, Olefins West for Nova in 2008, he understood that Dow was vehemently opposed to ethane allocation, and testified at trial that he understood that there was no agreement between the parties for ethane allocation.

[396] By letter dated February 9, 2009, Nova agreed to change Dow’s ethane usage on an energy content basis. The letter made no reference to past practice.

[397] An April 14, 2009 internal email chain indicates that Dow polyethylene facilities were being shut down due to a lack of ethylene.

[398] On May 11, 2009, Mr. Flint as Vice President, Business Development of Nova wrote a letter to Mr. Tulk as Vice President NGLS. This letter was a request by Nova in its capacity as Co-owner of E3 to Nova in its capacity as Operator as per Section 5.9 of the OSA for the Operator to acquire up to 18 thousand barrels per day of ethane to meet Nova’s requirements at E1, given the expiry of the E1 Toll.

[399] Mr. Tulk responded the same day to Nova and Dow, acknowledging the request and noting “[a]s the proposed changes will have an impact on the calculation of the feedstock

fraction”, the Operator would be prepared to meet with the parties. He testified that the requested ethane was not acquired before his departure from Nova on August 31, 2009, nor were the feedstock fractions changed.

[400] Mr. Tulk conceded that, with the expiry of the E1 Toll, Nova’s feedstock fraction would go up, and Dow’s feedstock fraction would go down, “[a]t the point in time when supplies showed up”.

[401] Testimony indicated that the 2008/2009 financial crisis had a severe effect on Nova. As a result, Nova undertook restructuring efforts, and in July, of 2009 became a subsidiary of the International Petroleum Investment Corporation (IPIC), a corporation owned by the Emirate of Abu Dhabi.

[402] At the end of 2009, Mr. Broenink took over Mr. Tulk’s position.

[403] In the minutes of a Nova Board meeting dated March 11, 2010, Nova’s then President of Olefins and Feedstock, Grant Thomson, noted that:

2010 is forecast to be the first year where the company will not be able to run its PE assets at the rates it desires due to lack of ethane supply.

[404] An April, 2010 presentation to the Nova Board indicated that, historically, Nova typically had since 2008 sufficient ethane to meet internal and external ethylene demand. Mr. Flint suggested that “ethane” should have read “feedstock” as propane cracking was involved, but he conceded that the volumes of propane actually cracked were tiny.

[405] On October 25, 2010, Nova sent Dow another Notice of Default, in this case pursuant to Section 3.2 of the OSA. Nova cited Dow’s objections to Taylor Processing Inc’s application to the Energy Resources and Conservation Board relating to the Harmattan co-stream project.

[406] On August 25, 2011, Mr. Broenink authored a “white paper” on ethane supply for Joffre, which incorporated certain assumptions behind the ethane supply outlook supporting a proposal to build a new gas phase reactor at Joffre. This paper indicted that significant progress had been made over the previous two years to stabilize and grow feedstock availability, and that there would be sufficient ethane supply for Joffre to meet existing derivative demand by 2013.

[407] In 2013, ethane allocation was imposed in April, June and November.

[408] An August 31, 2011 Nova internal memo stated that running all three crackers at ██████% of nameplate capacity would satisfy all of Nova’s inventory, derivative and third party needs.

[409] On October 26, 2012, Nova sent an objection pursuant to Section 5.15 of the OSA with respect to Dow’s acquisition of ethane from Keyera Corp. Nova demanded disclosure of the contract or penalty payment, termination of the contract, or assignment. Dow did not comply.

[410] Ethane allocation was imposed in February, November and December of 2012.

[411] At trial, Mr. Broenink testified that, as Nova’s ethane supplies have increased, he did not see any need for ethane allocation on a go-forward basis.

APPENDIX B – ACRONYM GLOSSARY

| | |
|------------|--|
| AEEP | Alberta Ethane Ethylene Project |
| AEGL | Alberta Ethane Gathering System |
| AFE | Authorization For Expenditure |
| AGEC | Alberta Gas Ethylene Corporation or Alberta Gas Ethylene Company |
| AGTL | Alberta Gas Line Trunk Company |
| AICHE | American Institute of Chemical Engineers |
| AOG/AOGCL | Alberta & Orient Glycol Company Limited |
| AST | Advanced SCLAIRTECH Technology |
| AUDB | Asset Utilization Database |
| BBL | Barrel |
| BCF | Billion Cubic Feet |
| BPD | Barrels Per Day |
| BPY / BPPY | Billion Pounds Per Year |
| Btu | British Thermal Units |
| C1 | Methane |
| C2 | Ethane |
| C2+ | Ethane and heavier natural gas liquids (NGLs) |
| C2= | Ethylene |
| C3 | Propane |
| C3+ | A mix including propane and heavier natural gas liquids (NGLs) |
| C3= | Propylene |
| C4 | Butane |
| C4+ | A mix including butane and heavier natural gas liquids (NGLs) |
| C5 | Pentane |
| C5+ | A mix including pentane and heavier natural gas liquids (NGLs) |
| CAD | Canadian Dollar |

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| CAPEX | Capital Expenditure |
| CAR | Capital Authorization Request |
| CEMJV | Cochin Ethane Marketing Joint Venture |
| CFCT | Cash Flow Cycle Time |
| CG | Cracked Gas |
| CHOT | Chain Optimization Team |
| CMAI | Chemical Market Associates Inc. |
| CO ₂ | Carbon Dioxide |
| COA | Co-Owners Agreement |
| COP | Capacity Optimization Project |
| COS | Cost Of Service |
| CPP | Cents per pound |
| DFS | Dow Fractionator |
| Dow Canada | Dow Chemical Canada ULC |
| Dow Europe | Dow Europe GmbH |
| E1, E2, E3 | Ethylene plants located at Joffre |
| E4, E5 | Potential ethylene plants to be located at Joffre |
| EBT | Ethylene Business Team |
| EDC | Ethylene Dichloride |
| EDP | Ethylene Delivery Point |
| EDS | Ethylene delivery system |
| EEEP | Edmonton Ethane Extraction Plant |
| EG | Ethylene Glycol |
| EGLJV | Empress Gas Liquids Joint Venture |
| Empress 1, Empress 2, Empress 5 | Ethane Extraction Plants at Empress |
| ENC | Ethylene Nameplate Capacity |
| EO | Ethylene oxide |
| EOI | Experimental Operating Instruction |

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| EOR | Enhanced Oil Recovery |
| EPP | Ethylene production proportion |
| EPSTA | Ethane Plus System Trading Agreement |
| ESA | Ethylene Streaming Agreement |
| ESTA | Ethylene Transportation Services Agreement |
| FCS | Feedstock Cost Statement |
| Fort Corp | Fort Saskatchewan Ethylene Storage Corporation |
| Fort Saskatchewan EO/EG Facility | EO/EG facility located at Fort Saskatchewan, owned by Dow Canada until June, 2004 when it was sold to ME Global Canada Inc. |
| Fort Saskatchewan EDC Facility | Dow Canada's EDC facility located at Fort Saskatchewan, closed in October, 2006 |
| Fort Saskatchewan PE Facility | Dow Canada's LLDPE facility, located at Fort Saskatchewan |
| Fort Saskatchewan VCM Facility | Dow Canada's VCM facility, located at Fort Saskatchewan, closed in March, 2006 |
| FRAC | Short for "Fractionator" |
| FSEEP | Fort Saskatchewan Ethane Extraction Plant |
| FSESC | Fort Saskatchewan Ethylene Storage Company |
| FSESLP | Fort Saskatchewan Ethylene Storage Limited Partnership |
| FSSJV | Fort Saskatchewan Storage Joint Venture |
| GAUR | Global Asset Utilization Resources |
| GCA | Gas Cost Allowance |
| HDPE | High Density Polyethylene |
| HOG | Hydrogen Offgas |
| IEEP | Incremental Ethane Extraction Policy |
| IOL | Imperial Oil Limited |
| IPIC | International Petroleum Investment Company |
| JEEP | Joffre Ethane Extraction Plant |
| JFP | Joffre Feedstock Pipeline |

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| Joffre | Nova's Petrochemical Site North of Red Deer |
| JPPT | Joffre Production Planning Team |
| KBD OR KBDP | Thousand of Barrels Per Day |
| kMt | Thousand Metric Tons |
| kPa | Kilopascal; a unit of measurement of pressure = 0.145 pounds per square inch |
| kT | One thousand metric tons; a unit of measurement |
| LAO | Linear Alpha Olefins |
| LCP | Liquid Co-Products |
| LCPMA | Liquid Co-Products Marketing Agreement |
| LDPE | Low Density Polyethylene |
| LCH-1 | Dow's ethylene processing facility located at Fort Saskatchewan, Alberta |
| LLDPE | Linear Low Density Polyethylene |
| LP7 | Polyethylene plant at Prentiss owned by Dow |
| LTD | Life to Date |
| M3 or m3 | Cubic meter, a unit of measurement |
| MAC | Maximum Asset Capability |
| MC | Management Committee |
| MCF | Million Cubic Feet |
| MEG | Mono Ethylene Glycol(may also refer to MEGlobal, an ethylene glycol company) |
| Miscible Flood | Use of ethane and other NGLs to assist in the production of oil |
| Mg or MG | Megagram; a unit of measurement equal to one metric ton |
| MgH or MGH | Megagrams per Hour |
| MIMI | Nova's Material Inventory Management software |
| MMBtu | Million British Thermal Units |
| MMR | Monthly Management/OPO Report |
| MOR | Maximum Operating Rate |
| MOU | Memorandum of Understanding |

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| MPY | Million Pounds per Year |
| MT | Metric Tons; a unit of measurement |
| MTD | Month to Date |
| NBS | Net Balance Statement |
| NCC / NOVA | NOVA Chemicals Corporation |
| NCCL | NOVA Chemicals (Canada) Ltd. / NOVA Chimie (Canada) Ltee. |
| NEB | National Energy Board |
| NGL | Natural Gas Liquid |
| NGTL | Nova Gas Transmission Limited |
| NIT | Nova Inventory Transfer |
| NUR | Net Unit Return |
| OBSD | Overhead Billing Start Date |
| OC2 | Olefinic ethane |
| OPO | Olefins and Polyolefins |
| OPOL | NOVA's Olefins Polyolefins Leadership Team |
| OSA | Operating and Service Agreement |
| P1 | Ethylene glycol plant in Prentiss, Alberta; a joint venture between Dow Canada and MEGlobal |
| P2 | Ethylene glycol plant in Prentiss, Alberta; a joint venture between Dow Canada and AOG |
| PBT | Petrochemical Business Team |
| PCOA | Plant Co-Owners Agreement (same as COA) |
| PE | Polyethylene |
| PE1, PE2 | Nova polyethylene plants at Joffre |
| PEBT | Polyethylene Business Team (may also be referred to as "PBT") |
| PEEP | PanCanadian Ethane Extraction Plant (also called Encana, Provident and now Pembina) |
| PFD | Process Flow Diagram |
| PFO | Pyrolysis Fuel Oil |
| PPM | Parts per Million; a unit of measurement |
| Prentiss | Dow's petrochemical site north of Red Deer |

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| PSI | Pounds per Square Inch; a unit of measurement equal to -6.9 kilopascals |
| PSV | Pressure Safety Valve |
| QW | Quench Water |
| R3 | Nova's polyethylene output capacity expansion project at Joffre |
| RFS | Redwater Fractionator |
| RMB | Reconciled or Rectified Mass Balance |
| ROFR | Right of First Refusal |
| S&OP | Sales and Operations Planning |
| SMO | Short-term Margin Optimization (may be referred to as "STMO") |
| SOR | Stable Operating Rate |
| SPR | Site Production Report |
| SWEC | Stone & Webster Engineering Corporation |
| T/A | Turnaround |
| TDCC | The Dow Chemical Company |
| TLX | Transfer Line Exchange |
| TMT | Tube Metal Temperature |
| UC | Union Carbide Corporation |
| UCC | Union Carbide Canada Inc. |
| UCESA | Union Carbide (Europe) S.A. |
| USD | US Dollar |
| USG | US Gallon |
| USGC | US Gulf Coast |
| USX | Ultra Selective Exchanger |
| VCM | Vinyl Chloride Monomer |
| VEEP | Villeneuve Ethane Extraction Plant |
| VCT | Value Centre Team |
| VFD | Variable Frequency Drive |
| WACOE | Weighted Average Cost of Ethane |

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| WACOG | Weighted Average Cost of Gas |
| WCSB | Western Canadian Sedimentary Basin |
| YTD | Year to Date |

APPENDIX C – COMPETITION ECONOMICS EXPERT OPINIONS

I. Dr. Leonard Waverman

[1] Leonard Waverman is the Dean of the Degroote School of Business at McMaster University. He was previously the Dean of the Haskayne School of Business at the University of Calgary from 2008 to 2012, and a Professor of Economics at two universities. He earned a Bachelor of Commerce and a Masters degree in Economics from the University of Toronto, and a Doctorate degree in Economics from MIT. In addition, Dr. Waverman is a Director of Berkeley Research Group, LLC, a global expert services and consulting firm.

[2] Dr. Waverman has taught natural resource and energy economics, as well as public utility economics, for 20 years. He has published extensively in energy economics, public utility economics, and competition policy. In addition to teaching, writing and consulting, Dr. Waverman has been a regulator twice: once in the mid-1970s as a part-time member of the Ontario Energy Board for two years, and from 2003 to 2007 as a non-executive Board member of the Gas and Electric Markets Authority (GEMA) in the UK. He has also been a member of several policy committees and, in the mid-1970s, developed a model of the demand for and supply of natural gas.

[3] Dr. Waverman has testified before the Competition Tribunal, and has filed evidence before the Federal Communications Commission in the US and the Australian Consumer and Competition Commission, as well as testifying on competition policy matters at the French Competition Agency, the European Directorate General for Competition, and the European Court of Justice. He also testified before the European Court of First Instance, the appeal court for decisions from the Director General of Competition and the European Commission. In Canada, he has testified before the Competition Bureau and the Competition Tribunal, and before the Federal Court of Appeal, the Ontario Superior Court, as well as at a number of antitrust hearings.

[4] At trial, Dr. Waverman was qualified as an expert to give opinion evidence on economics, including as it relates to the assessment of markets and the competitive effects of actual or proposed conduct.

[5] He was retained by Dow to examine the restrictions on the ability of UCC to acquire ethane set out in the OSA, specifically, whether implementing these restrictions during the time period from 2001 to the present would have lessened or prevented competition in the purchase of ethane in a “relevant” market and whether any effect on competition would have been significant. Dr. Waverman also evaluated whether implementing these restrictions would have controlled or lessened the production or supply of ethylene during the same period. In his report, he discussed the impacts on the purchase of ethane and production or supply of ethylene if the restrictions were to be applied in the future.

[6] He assumed that the restrictions applied to Dow and its affiliates in all capacities. In his report, he addressed what he called the “no-ethane restriction”, as set out in section 5.1(a) of the OSA, the “sufficient ethane contracts” restriction which he understood Nova was proposing, and the “surplus ethane” restriction. He did not address the surplus ethane restriction, as it was not pled at the time of trial.

[7] He described his understanding of the no-ethane restriction as interpreted by Nova as being a covenant not to acquire ethane in the Pool Area, governing not only the purchase of ethane for the E3 joint venture but the acquisition of any ethane in the Pool Area. His understanding of the sufficient ethane contracts form of restriction was that, in the event UCC or its affiliates directly or indirectly acquire ethane from any source in the Pool Area other than from the Pool, the procedure set out under section 5.15 of the OSA would apply. He noted that Nova alleged in its third amended counterclaim that, upon receipt of a Notice under section 5.15, Dow was obligated to dispose of sufficient ethane contracts to allow the Operator to fill the Pool at the lowest cost to the Co-owners. He understood from the pleadings and Nova's Notices that Nova took the position that it could object to Dow's ethane contracts no matter when they were entered into, what volume of ethane was involved, whether the volume had any relationship to any shortage or whether the volume had any relationship to any allocation.

[8] His conclusions were that:

- a) there is a relevant market for the purchase of ethane in Western Canada, synonymous with Alberta;
- b) Nova and Dow are the only two significant ethane buyers in the relevant market and they compete to acquire ethane, and that:
 - (i) this competition has increased ethane prices, and
 - (ii) it has also encouraged greater investment in ethane extraction;
- c) the implementation of the restrictions would have lessened and possibly even eliminated this competition, in that:
 - (i) the restrictions would have created a market structure with only one significant buyer – effectively a purchasing monopsony, and
 - (ii) this would result in reduced ethane prices, output and investment in ethane extraction facilities;
- d) implementation of the restrictions would have controlled and allowed Nova to lessen ethylene production or supply in Alberta because:
 - (i) nearly all Alberta ethylene is manufactured from ethane, and
 - (ii) ethane makes up a substantial part of the cost of ethylene manufacturing. If Alberta ethylene is a relevant market, the restrictions would have lessened or eliminated competition in this market as well; and
- e) implementing the restrictions now would have the same effects for both ethane and ethylene.

[9] Dr. Waverman described how he had determined that there is a relevant market for the purchase of ethane in Western Canada. He analyzed the industry structure in Alberta, with Dow and Nova representing over 95% of ethane purchases during the time period 2000 to 2012. He reviewed the numbers of ethane producers, concluding that there were many active natural gas liquids suppliers and ethane suppliers in Alberta. His opinion, in summary, is that buyer side market concentration is much higher than seller side. He noted that Dow and Nova are the only two ethylene suppliers, and that the barriers to entry into ethylene production are huge. Based on history, there will not be any other Alberta suppliers of material volumes of ethylene going

forward. On the demand side, merchant ethylene sales in Alberta are significant, in that about 40% of Alberta ethylene consumption capacity is at third party plants.

[10] Dr. Waverman then looked at market definition, analyzing the relevant market to determine what impact the restrictions could have on competitive behaviour. He used the “hypothetical monopsonist test” to assess Alberta as a candidate market of ethane produced for use in ethylene production. He first looked at alternatives available to ethane extractors, both on the product and geographic side, and determined that there were no alternatives on either side. The only option for ethane extractors in the Alberta market when faced with a 5% price decrease over a period of one year, which is the threshold price used by economists and competition agencies in analyzing this issue, would be to cease extracting ethane from the natural gas stream. Therefore, the question according to Dr. Waverman’s analysis is whether, when Dow and Nova compete for ethane supplies, ethane prices have been high enough so that they would continue to encourage ethane supply after imposition of a “small but significant non-transitory decrease in price” (SSNTDP) of 5%.

[11] Dr. Waverman analyzed this question using three different methods of determining prevailing prices:

- a) average prices under all contracts for Nova between 2004 – 2012 , and for Dow between 1999 – 2012;
- b) the average effective prices for key contracts; and
- c) prices from Dow and Nova C2 contracts that have a simple fixed premium.

[12] From this analysis, Dr. Waverman concluded that, with Dow and Nova competing as they have been, the price of ethane has been sufficiently high that extractors would not forego extracting ethane in response to a 5% reduction, and that therefore there is a relevant market for the purchase of ethane in Alberta.

[13] Dr. Waverman responded to the criticism from Nova’s expert, Dr. Mazzarotto, that when defining the relevant market for the assessment of the competitive effects of the restrictions, it is the outside options available to sellers of ethane that will therefore determine the boundaries of the relevant market. He noted that the SNNDP test is the standard test for defining a relevant market, and that Dr. Mazzarotto did not identify any “outside options” for Alberta ethane producers.

[14] Dr. Waverman then analyzed the effects, if any, of the restrictions on competitive prices and production. He noted that the evidence is clear that price competition between Dow and Nova has raised prices. He concluded that the impact of the no-ethane form of restriction in the short run would be that:

- a) Dow would be precluded from purchasing ethane;
- b) Nova could have an ethane purchasing monopsony, that it would reduce purchases and prices would fall or it would reduce prices and production would fall, although this would not affect contracts already in existence;
- c) the structure of the industry gives Nova incentives to exercise monopsony power.

[15] Dr. Waverman noted that, under the no-ethane form of restriction, as of 2001, Dow would have been forced to acquire ethane for its LHC-1 cracker from Nova, and Nova would

have had incentives to restrict the amount of ethane it purchased in the market on behalf of Dow because it would gain if LHC-1 reduced or eliminated its production.

[16] Thus, reduced ethane demand, purchases, and prices would be the result.

[17] In the long run,

- a) Nova would be the sole buyer of ethane in Alberta;
- b) reduced prices would transfer wealth from ethane sellers to Nova;
- c) entry into ethane extraction and expansion by existing suppliers would be deterred; and
- d) ethane production in Alberta would be reduced over time relative to the level that would have otherwise prevailed.

[18] Therefore, the result would be reduced investment and ethane production.

[19] Dr. Waverman explained that, since existing suppliers have “sunk” extraction assets:

- a) the exercise of monopsony power would reduce prices towards levels that only cover the avoidable costs of extracting ethane;
- b) prices would fail to provide an adequate return on capital, which would discourage investment in ethane extraction; and
- c) production would fall relative to what would prevail absent the imposition of the no-ethane restriction.

[20] The no ethane restriction would result in reduced ethane production over time, and there would be many renewal periods even for long-term contracts in the 80-year time period of the restrictions.

[21] The restrictions would have an impact on prospective suppliers, in that having only one potential buyer would reduce profit opportunities and increase risk. While existing contracts may not be affected, they would become so on renewal, and this is significant given that there are over 60 years left in the term of the joint venture agreements.

[22] Dr. Waverman pointed out that a no-ethane restriction means that Nova, by controlling the ethane market, would control Dow and Dow’s production. Nova’s control over Dow’s ethane supply would have allowed it to stop or, at a minimum, discourage Dow from expanding its ethylene production in Alberta. It would be in Nova’s best interests to reduce the production of its only rival in Alberta.

[23] In summary, his conclusion was that implementing the no-ethane restriction now would significantly lessen or prevent competition in the Alberta ethane market for the foreseeable future.

[24] Dr. Waverman performed a similar analysis with respect to the “sufficient ethane contracts” restriction. He noted that:

- a) Dow would be required to provide competitively-sensitive contract information to Nova, which alone would harm competition. Nova would get not only a complete understanding of Dow’s bidding strategy, it would get information that sellers would

- not want Nova to have, since Nova would then know what sellers were willing to accept;
- b) disposing of its lowest cost contracts to Nova would raise Dow's costs relative to Nova. Thus, Dow would be softened as a competitor;
 - c) Nova would have reduced incentives to compete for ethane contracts because it would gain the option of taking one or more of Dow's lowest cost ethane contracts. Nova could bid less aggressively and instead of bidding for new contracts would go to the "bank" of Dow contracts;
 - d) the financial penalties that Dow would have to pay Nova for its objected-to contracting activities under section 5.15 of the OSA would harm competition; and
 - e) the restriction would harm Dow's ability to obtain contracts for ethane because it would harm Dow's reputation as a reliable buyer, increase risk for sellers, and result in increased costs to Dow to mitigate those risks. Dow would become a "tainted" buyer, as a contract may not stay with it.

[25] Dr. Waverman concluded that implementing the sufficient ethane contracts restriction would have harmed incentives to compete and reduced ethane production over time.

[26] Both restrictions would reduce viability and harm incentives to invest in other ethane extraction:

- a) Dow's ethane disposals to Nova would leave Dow short of ethane for LHC-1;
- b) expansion of Dow's ethylene producing capacity at LHC-1 or elsewhere in Alberta would be jeopardized or limited by uncertainty over ethane availability; and
- c) disposing its lowest cost contracts would disadvantage Dow's ethylene production business for a long time.

[27] By controlling the availability and cost of ethane feedstock to Dow, Nova would be able to control Dow's ethylene production.

[28] Dr. Waverman was cross-examined extensively on his testimony and his expert reports:

- a) He confirmed that he had not expressed an opinion that the restrictions were anti-competitive in the period prior to February 2001, as UCC was not purchasing ethane before or after the joint venture. This makes sense, as the facts indicate that the OSA did not change the market with respect to buyers of ethane at the time.
- b) He declined to comment on whether, given that the Dow/UCC merger was approved by the Competition Bureau, he would expect that Dow took the position that there were no competition issues with respect to Nova's concerns about the issue, noting that that would be speculation on his part.
- c) He confirmed that the annual report of the Commissioner of Competition that commented on the Dow/UCC merger did not reference ethane or ethylene in Alberta, commenting:

A. ... because the Bureau, when looking at the Dow/UCC acquisition, will be looking at horizontal effects in the ethane market. Since Union Carbide was not in the ethane market, that would be kind of a very

quick analysis. They'd be looking at horizontal effects in the ethylene industry, and I think this addresses some of those, and they'd be looking at potential vertical effects between ethane and ethylene.

Q. ... Do you know, or are you speculating?

A. If I was conducting it – a normal merger acquisition, you look at the horizontal, you look at the vertical, and you look at any potential horizontal/vertical. I don't know if they did that here. I'm just ... I'm offering my opinion on what would normally be done between UCC and Dow within Canada.

- d) In response to the suggestion that, when Nova was the only buyer of ethane in Alberta from 1979 to 1994, there was nevertheless investment in the ethane extraction industry, he pointed out that this was part of the Alberta government-sponsored introduction of petrochemicals into the province. He commented on re-examination that this period of time was not relevant to his analysis, as it involved cost-of-service agreements both upstream and downstream, that it was an “unnatural experiment because the circumstances are so different”.
- e) With respect to whether his opinion on monopsony did not hold because there is not a single posted market price received by all suppliers, he testified that this is not the prevailing view of competition policy economists, particularly in North America. He noted that, while in the textbook monopsony model, the “simplest version”, there is a single market price, what is important is the insight from the model that gives the economists the intuition that they use in a more complex, real-world situation. Dr. Waverman did not agree that certain comments made by other economists about a “market price” being necessary for a monopsony to exist meant a single price. He acknowledged a tension in the academic literature between monopsony power, which depends on a market that has a market price, and bargaining power where terms of trade are determined by bilateral bargaining, but noted that insisting that there must be a “single price” for monopsony to exist was “setting up a straw man”. He was concerned about academic opinions that narrowed the definition of monopsony “to limit its insight into real-life situations ... when we're analyzing real-life industries”. Dr. Waverman did not retract his opinion in the face of thorough cross-examination on this issue, and his answers on cross-examination were persuasive and sensible.
- f) Rigorous cross-examination of Dr. Waverman about seller power merely indicated the constantly changing nature of the seller group. While Nova submits that Drs. Waverman and Shehadeh “used definitional gymnastics to put themselves in a position to argue that there are many ethane suppliers”, the cross-examination instead used such gymnastics to attempt to prove the opposite. While counsel on cross-examination used comparisons with the Competition Bureau’s “safe harbours threshold” to establish that some ethane suppliers had some measure of market power, Dr. Waverman cited the lack of evidence of such seller power in Dr. Mazzarotto’s report.

Although he was not asked the question, even if evidence established the existence of some seller power through a more concentrated seller group, it is

clear that such seller power as existed did not prevent an increase in premium paid for ethane over time, even though sellers had the option of two buyers. To suggest that this seller power would be sufficient countervailing power with one buyer is illogical.

- g) With respect to whether inter-relationships between sellers of ethane, Nova as buyers, and those sellers as users of ethylene would mean greater seller power, he noted that: “I don’t know how you can say that one party, because of complex relationships, is more dependent than the other party. They’re interwoven, so I don’t know who has the greater bargaining power in that relationship.”
- h) Cross-examination of Dr. Waverman on alleged issues with his comments on “feedback effect” and how this influenced negotiations with respect to contracts did not establish that he was mistaken in his views of how feedback affects the market in Alberta, and he met suggestions that there were significant barriers to entry to the ethane supply market with convincing and persuasive responses.
- i) With respect to whether he had failed to consider whether, if Nova did have monopsony power, it would have the incentive to exercise it, Dr. Waverman established that he had looked at the relevant facts, including Nova’s business records and data, and that those records supported the existence of the varying incentives that a monopsony buyer would have to lower the price it pays for ethane or to turn down volumes with the intent of influencing the price it would pay in the future downward.

[29] Dr. Waverman did not discuss Dr. Mazzarotto’s “bargaining power” framework to any great extent in his initial report as he did not consider it to be the correct approach, for reasons he sets out in his rebuttal report. He did not ignore bargaining power, but did not follow that framework because in his view there was no evidence of ethane seller market power that Nova or Dow needed to countervail. He noted in his surrebuttal report that:

Dr. Mazzarotto provides neither direct evidence of substantial seller side market power nor any indepth evidence on the issue using market shares or market concentration measures. He also does not provide an analysis of the structural characteristics of the ethane markets to reach conclusions regarding the extent of seller market power, if any.

[30] In summary, the credibility and persuasiveness of Dr. Waverman’s opinion was not affected by cross-examination. He was a knowledgeable and candid witness, careful and consistent in his evidence under days of intense cross-examination.

II. Dr. Ramsay Shehadeh

[31] Ramsey Shehadeh is Senior Vice President at National Economic Research Associates (NERA) and the Chair of their Global Competition Policy Practice. He is also a partner and a member of the board of directors. He has been with NERA for approximately 25 years. He received his Masters and Doctorate degrees in Economics from Cornell University, specializing in industrial organization, regulation and econometrics. He also taught a graduate class in mathematical economics.

[32] Dr. Shehadeh has conducted research and prepared expert reports on the competitive effects of mergers, joint ventures, and other business combinations in a variety of industries. His research includes a broad range of market power and manipulation issues. He has given evidence numerous times in federal and state court proceedings in the United States, as well as to the Canadian Competition Bureau and in other types of proceedings.

[33] In addition, Dr. Shehadeh has had consulting engagements that include assessing the competitive effects of corporate acquisitions in the petrochemical industry, including the pipeline, midstream and refinery businesses. He previously evaluated the competitive effects of an acquisition by Dow of a specialty chemical company in around 2007.

[34] At trial, Dr. Shehadeh was qualified as an expert to give opinion evidence on economics as it relates to the assessment of markets and the competitive effects of actual or proposed conduct, including through the application of quantitative economic methods.

[35] Dr. Shehadeh was asked by Dow to evaluate the competitive effects of certain restrictions under the OSA that Nova alleges apply to Dow; specifically to evaluate whether or not these purchasing restrictions had the effect of preventing or lessening competition as it relates to ethane in Alberta, and also to evaluate whether or not these purchasing restrictions would have the effect of lessening or controlling the supply of ethylene in Alberta.

[36] He assessed the issue using econometrics techniques, including simulation analysis and critical loss analysis in the context of the hypothetical monopsonist test for assessment of the relevant market in which to evaluate the competitive effects of the restrictions.

[37] Dr. Shehadeh also evaluated the extent to which the purchasing restrictions, as they relate to ethane, would have the effect of controlling or lessening the supply of ethylene, using the same economic tools.

[38] In summary, he concluded:

- a) the purchase of ethane in Western Canada is a relevant market in which to assess the effects of the proposed purchasing restrictions;
- b) Nova's proposed purchasing restrictions would have significantly lessened competition for the purchase of ethane in the relevant market, reducing the price for and supply of ethane;
- c) Nova's proposed restrictions would have controlled and lessened the production and supply of ethylene in Alberta;
- d) if implemented, Nova's proposed restrictions would continue to have these effects in the future;
- e) the "no ethane" restriction would have significantly lessened competition for the purchase of ethane and would have had the economic effect of controlling and lessening the production and supply of ethylene;
- f) the "sufficient ethane contracts" restriction would have significantly lessened competition for the purchase of ethane and would have had the economic effect of controlling and lessening the production and supply of ethylene; and
- g) if implemented, Nova's proposed restrictions would continue to have these effects in the future.

[39] Dr. Shehadeh described how he conducted the data analysis, which included regression analysis, simulation analysis and critical loss analysis.

[40] He looked first at market definition, using regression analysis and critical loss analysis. Regression analysis looks at the relationship between the quantity of ethane supplied and the price paid, across a number of variables. Key facts for him included that:

- a) ethane production costs vary by facility depending on volumes and extraction technologies;
- b) the main extraction cost is shrinkage; other costs include energy, transportation, and capital investments; and
- c) suppliers can vary ethane production by:
 - (i) processing more or less natural gas;
 - (iii) changing ethane recovery rate with existing equipment;
 - (iv) increasing capacity of facilities;
 - (v) investing in more efficient extraction technologies; and
 - (vi) building new facilities.

[41] In his view, the fact that costs can vary amongst and within ethane facilities helps inform the incentives that ethane suppliers have to respond to changes in ethane prices. He was satisfied from his assessment of ethane production over the years at issue that ethane production can respond to incentives.

[42] Another important fact in his analysis was that the only economic means to transport ethane in commercial quantities is pipelines, and there is only one main pipeline system in Alberta that is economical to move ethane in commercial volumes.

[43] He noted that demand for more than 96% of the use of ethane is for ethylene. Ethane prices are typically determined under medium to long-term contracts that come up for renewal all the time, and are often renegotiated during the term of the contract. This informed how he thought about how ethane suppliers will change to respond to changing inventories, over what period of time they will respond and how feedback is observed in negotiations for new contracts. He noted that negotiations do not take place in a vacuum.

[44] Dr. Shehadeh noted that there were basically two options for sellers of ethane, Dow and Nova, and observed exactly the kind of competition that would be expected from that scenario in the documents and data.

[45] He noted Mr. Flint's comment about competition for contracts with Dow. What he saw from his review was not a single price, but prices informed by expectations about supply and demand conditions when negotiations happen. The next contract would be informed by the previous one.

[46] He noted that Alberta is a closed system, in that alternatives for ethylene suppliers are to supply ethylene customers in Alberta, and, likewise, for ethylene customers in Alberta, the options are Dow or Nova.

[47] Dr. Shehadeh considered the “no ethane” restriction and the “sufficient ethane contracts” restriction as proposed by Nova. He had also considered the “surplus ethane” restriction, but as that had been removed from the pleadings, he did not testify about it.

[48] He discussed the concepts of monopsony power and bargaining power, and indicated that when bargaining power rises to the level of either monopoly power on the part of a supplier, so that the price goes up and output goes down, or monopsony power on the side of the buyer, so, for example, price goes down, output goes down and supply goes down, bargaining power would rise to a point at which it becomes a source of market power concern. He also referred to countervailing power, the type of bargaining power that can offset the market power of the counterparty.

[49] He noted that what economists want to focus on is the price and output effects, both in the short term and the long term, and that when the price goes down and output declines, either over the short term or the long term, that is a source of competitive concern.

[50] Economists compare price and output in the world in the absence of such monopsony power and in the world with such monopsony power.

[51] They also consider demand withholding, the other side of the coin. He commented that you can either have a monopsonist say, “I’m not going to pay you more than price X”, or you have the monopsonist say, “I’m only interested in purchasing quantity Y”. Economists recognize that those prices and quantity decisions are just two sides of the same coin in terms of what actually happens in terms of the market.

[52] Dr. Shehadeh noted that negotiations, in and of themselves, and bargaining, in and of itself, are common mechanisms for reaching terms of trades in markets throughout the economy, and bargaining, in and of itself, doesn’t relieve concerns about monopsony. The issue requires empirical evaluation.

[53] Dr. Shehadeh used the hypothetical monopsonist test, which asks how sellers will respond to lower prices. For the purpose of the test, he referred to the Competition Bureau Enforcement Guidelines:

A relevant market is defined as the smallest group of products and the smallest geographic area in which a sole profit-maximizing buyer, a hypothetical monopsonist, would impose and sustain a significant and nontransitory price decrease below levels that would likely exist in the absence of a merger.

[54] As the issue in this case is not a merger, he substituted “the absence of the restriction that is at issue” in the definition of relevant market.

[55] Dr. Shehadeh chose the hypothetical monopsonist test because, in informing himself about the market, he saw conditions that made it appropriate to apply the test. Twelve years of data, a robust data source and the nature of supply made the test appropriate.

[56] Dr. Shehadeh found the following requirements for a market to be susceptible to the exercise of monopsony power by a sole buyer:

- a) an upward-sloping industry supply curve in the relevant range of output (not fixed industry supply);

- b) producers earn economic rents, which is implied by the first requirement;
- c) barriers to entry for new buyers; and
- d) the sole buyer (who can be the buyer for 80-90% of the market) cannot price discriminate perfectly.

[57] These conditions are consistent with Canada's submission to the OECD Roundtable on Monopsony and Buyer Power. Dr. Shehadeh noted that the Competition Bureau emphasized in its submissions to the OECD that it uses empirical techniques to address these questions.

[58] His analysis led him to conclude that the Alberta market satisfies all four of these conditions; that if, in fact, there were a sole buyer of ethane in Alberta, that would present a dangerous possibility of anticompetitive effects, specifically preventing and lessening competition in the demand for ethane and leading to a reduction in the price of ethane and a reduction in the quantity of ethane supplied to the detriment of both ethane suppliers and economic welfare more generally.

[59] He applied a critical loss analysis to the market, regression analysis that evaluated the relationship between a dependent variable and various explanatory variables or independent variables. He also applied a simulation analysis, testing how competitive outcomes change in response to a change in the competitive environment. This involved building a structural model that described the economic outcomes of interest, calibrating the model and applying it to calculate the effect of a specific change in economic conditions.

[60] From his analysis, Dr. Shehadeh concluded that the effects of monopsony power on the input or upstream market would be lower prices, lower output and reduced incentives for investment and innovation. The effects on output, or the downstream market, would be lower output and higher prices.

[61] In his opinion, bargaining does not alleviate concerns with monopsony power in this case and seller bargaining power also does not alleviate competitive concerns.

[62] Dr. Shehadeh's analysis disclosed that ethane premiums were significant and increasing over time between February 2001 and December 2012. This reflects the ability of a hypothetical monopsonist to impose a small but significant nontransitory decrease in price (SSNDP) without ethane suppliers just stopping the supply of ethane.

[63] His analysis indicates that competition between Dow and Nova over ethane supply has created upward pressure on premiums. A hypothetical monopsonist would be able to reduce these premiums by imposing a small price decrease, because, when it relates to geographical market, ethane cannot be profitably diverted outside of Alberta in sufficient volumes to prevent the exercise of monopsony power.

[64] The reasons for this are that:

- a) the major ethane-consuming regions in North America are Alberta, Eastern Canada, the US Midwest and the US Gulf Coast;
- b) pipeline is the only cost effective way of transporting commercial volumes of ethane;
- c) no sufficient competitive constraint from pipelines transporting ethane out of Alberta existed in the past or are expected; and

d) natural gas pipelines that connect Alberta to other regions cannot transport ethane.

[65] Thus, he concluded that ethane is a relevant product market, that ethane suppliers cannot divert their ethane into other products in a manner that would be profitable or that would constrain a hypothetical monopsonist, and because they cannot do that, ethane is a relevant market.

[66] Dr. Shehadeh's critical loss analysis and regression analysis confirmed that ethane suppliers would not reduce their ethane supply in response to a SSNDP. This is consistent with the industry facts and testimony from trial.

[67] He tested his conclusion again with an "overidentification" test. His conclusion was that the purchase of ethane in Alberta is a relevant market for assessing the restrictions. The competitive effects of the proposed purchasing restrictions are as follows:

- a) Dow and Nova compete to purchase ethane, resulting in higher ethane premiums and output;
- b) the proposed purchasing restrictions would enable Nova to exercise monopsony power because they eliminate or reduce this competition;
- c) Nova's monopsony power would not be limited by strong supply response or the entry of another buyer; and
- d) Nova's proposed restrictions would control and lessen the production and supply of ethylene in Alberta.

[68] Dr. Shehadeh concluded that other buyers would not restore competition, given the historical facts. The competitive effects of Nova's monopsony power would be as follows:

- a) in the upstream market, it would:
 - (i) depress ethane prices and output below competitive levels; and
 - (vii) reduce incentives for ethane producers to invest in new capacity and innovation;
- b) in the downstream market, it would control and lessen the supply of ethylene in Alberta; and
- c) these effects would reduce economic social welfare.

[69] He went on to consider what the impact, if any, of Nova's no-ethane restriction on competition if it had been implemented. Under the no ethane restriction, Dow would have to abandon its existing contracts for ethane acquisition. He then considered what would happen with that ethane; what Nova would have done with the ethane that then became available as a result of Dow not acquiring it.

[70] He determined that the supply of ethylene would go down by about 11%, and the consumption of ethane would go down by about 10.3%. If the volume of ethylene production increased in the future, the effects would be exacerbated.

[71] The impact of the sufficient ethane contracts restriction would be a reduction in the supply of the ethylene as a result of the reduction in Dow's ability to produce and process ethane. Long term, this would significantly raise the cost of investment or reduce the return on investment. It would reduce Dow's incentive to expand.

[72] Dr. Shehadeh responded to Dr. Mazzarotto's comments on his opinions as follows:

- a) with respect to Dr. Mazzarotto's view that the hypothetical monopsonist test cannot be applied empirically in the Alberta ethane market, Dr. Shehadeh noted that the test is a standard tool in competition economics, identified in the Competition Bureau's merger guidelines. He testified that, not only is the test economically relevant, but relevant data exists in the twelve years at issue and the data was appropriate and sufficient for him to reach his conclusions;
- b) with respect to Dr. Mazzarotto's allegation that Dr. Shehadeh's critical loss analysis did not account for the price floor for Alberta ethane, Dr. Shehadeh pointed out that he accounted for that factor by looking at the lowest prevailing ethane premium over a six-month period over the time period for which he had data. Since the price floor had to be lower than that, his use of a higher price floor was thus conservative. He demonstrated how this worked in his simulation analysis and with respect to his market definition. He also indicated that, while it is appropriate to think about a price floor in the ethane supply industry, operations over the twelve-year period at issue did not go down to that level. They were at the upward-sloping portion of the supply curve. Dr. Shehadeh noted that this was consistent with the business documents he had reviewed, demonstrating with one such document. He indicated that these documents depict an upward-sloping cost curve consistent with an upward-sloping supply curve. He commented that this was a recognition that, over time, prices even on marginal supplies increase in response to market conditions, which was corroborated by the testimony of Mr. Flint, Mr. Mathieson and Mr. Broenink.

Although counsel for Nova attempted to discredit Dr. Shehadeh's use of the one Nova document, I accept his expert opinion and that of Dr. Waverman that sufficient data exists to establish an upward-sloping supply curve, and that long term and short term are relative concepts when discussing an 80-year contract.

While Dr. Mazzarotto noted that Dr. Shehadeh's analysis was done on an average basis and not an individual plant basis, his reasoning that average quantities and prices are not fully relevant to the choices of every individual ethane supplier does not address the validity of the direction of movement of average prices as part of the regression analysis. Dr. Mazzarotto and Dr. Shehadeh had differences in their views of whether certain considerations were short-term or long-term, but Dr. Mazzarotto's analysis of the various contracts, and his conclusion that the structure of these contracts did not show a direct relationship between prices and quantities, which in his view was also consistent with not having a clear upwards sloping marginal cost curve underpinning these contracts, does not ring true when compared with the evidence that underpins Dr. Shehadeh's analysis;

- c) with respect to Dr. Mazzarotto's comments on Dr. Shehadeh's regression analysis, Dr. Shehadeh persuasively defended his ethane production variables by referring to normal-course of business documents, and indicated that, had he used a different variable, it would not change his conclusions. He noted that Dr. Mazzarotto had not presented his own regression analysis. In his view, the revisions that Dr. Mazzarotto suggested to his regression analysis were not economically appropriate, neither robust nor valid as a model and failed the overidentification test he used to validate his

conclusions. Dr. Shehadeh explained why Dr. Mazzarotto's revisions were inappropriate in a clear and convincing manner, and demonstrated how, when the alternate regression analysis that Dr. Mazzarotto suggested was properly corrected, it confirmed Dr. Shehadeh's conclusions;

- d) with respect to Dr. Mazzarotto's view that a sole buyer would not have monopsony power because there is no upward-sloping relationship between price and volume in relation to the supply of ethane in Alberta, Dr. Shehadeh testified that this was inconsistent with the facts on the ground, in terms of the negotiations between Dow and Nova for ethane supply, in terms of the responses of ethane suppliers to demand conditions, to pricing, and to the recognition that when a new price is negotiated for a new contract at the marginal source of supply, that would affect renewals that come up in the future, as Mr. Flint testified;
- e) with respect to Dr. Mazzarotto's assertion that Nova, even if a sole buyer of ethane in Alberta, would have the incentive to purchase as much ethane as Dow and Nova do in competition, in other words, not to exercise monopsony power, Dr. Shehadeh referred to economic logic, supported by actual observations from the documents and data, the "business realities". Dr. Mazzarotto's allegations about Nova's ability to unilaterally direct gas to obtain ethane suffers from the same failure to recognize historical realities;
- f) with respect to Dr. Mazzarotto's criticism that Dr. Shehadeh "posits the existence of a supply curve", Dr. Shehadeh responded with cogent reasons why his conclusions were appropriately based on all the evidence, again citing some of Nova's own presentations. He indicated that his review of the documents "captures the reality on the ground", that:
 - ...costs do increase as ethane supply increases, and... that there are these feedback effects that negotiations for new supply at the margin affects pricing for the inframarginal supply, and again, I am not saying that that happens necessarily instantaneously. It doesn't have to. We know that there are contracts. Those contracts come up for renewal, but we know that that happens and will happen over time to give rise to these competitive effects, particularly over the 60-plus remaining years the restrictions would be in force;
- g) with respect to Dr. Mazzarotto's criticism of Dr. Shehadeh's simulation analysis on the basis that it relies on his econometric estimate of elasticity of supply in Alberta, which Dr. Mazzarotto suggested is flawed because of the existence of long term agreements, Dr. Shehadeh points out that this econometric analysis covers eleven years, which is long enough to capture contract renegotiations;
- h) with respect to Dr. Mazzarotto's bargaining framework, Dr. Shehadeh testified that he considered it, but ultimately concluded that it did not change his opinions. He noted that Dr. Mazzarotto's narrow bargaining framework requires isolated, independent, bilateral bargaining. He testified that this is not applicable to the Alberta ethane industry, in that there is a recognition by both buyers and sellers of the options that they have available to them and that negotiations are interdependent and not isolated, with ethane suppliers playing off Dow and Nova against each other and vice-versa.

He noted that the outcomes of one negotiation affect the outcomes of subsequent negotiations.

He disagreed with Dr. Mazzarotto's requirement of a single price because "I can't think of a real-world market where there isn't price dispersion, even in commodities".

Dr. Shehadeh testified that, even under Dr. Mazzarotto's bargaining framework, the restrictions as interpreted by Nova would lead to anticompetitive effects, as increased bargaining power exercised by buyers can reduce the incentives for suppliers to invest in equipment and innovation, leading to long-term output reductions. Restrictions would cause capital to flow away from Alberta ethane industry and ethane output to decline.

[73] On cross-examination, Dr. Shehadeh indicated that::

- a) the competitive question he was asked to evaluate was the application of restrictions to Dow, which could only happen after the acquisition, but that if there were economic conditions prior to that that would inform the analysis, he did not limit his review;
- b) the single price requirement that Dr. Mazzarotto relies upon exists only in textbooks and not in real-life markets;
- c) the roughly fourteen sellers he identified were in his view a "large" number for the purpose of his analysis;
- d) he considered relative bargaining power and financial dependency, in the sense that these factors had existed historically, and he reviewed the historical outcomes of negotiations. As Dr. Shehadeh noted, it would be different if the restrictions changed the nature of the suppliers, and not just the elimination of Dow as a buyer. He indicated that:

. . . to the extent that [the factors Dr. Church lists as important in influencing the buyer's and seller's outside options] aren't changing, my econometric analysis takes those into account, and for the ones that are changing, the list that we just went through, that's the simulation analysis that evaluates and the other analysis that evaluates what happens when those things change, when Nova becomes a relatively larger buyer, when Nova gains market power downstream, when sellers become increasingly financially dependent on Nova, when the relative size of Nova increases relative to the sellers;

- e) in response to the suggestion that his simulation does not take into account any possibility that in the future, Nova, as a large buyer, would seek to enter into arrangements with large suppliers to avoid an underinvestment problem, Dr. Shehadeh noted that, in a "classic holdup problem", the focus is on the relationship between the monopsonist and the suppliers, but "[w]hat distinguishes this situation is that Nova's activities affect Dow's operations, and so that changes the incentives to address these types of issues". He described the way in which his simulation model addressed this issue.

[74] In summary, cross-examination did not affect the reliability or persuasiveness of Dr. Shehadeh's opinion in any material respect.

[75] I am satisfied and accept that the anticompetitive effects of the restrictions as identified by Dr. Shehadeh have been established, and are more than sufficient to support the conclusion that sections 5.1(a) and 5.15 would have unduly lessened competition within the meaning of section 45 of the *Competition Act* as it stood until March 2010, and after it was amended so that market structure and behavioural inquiries were no longer required. I accept Dr. Shehadeh's opinion as persuasive, logical, supported by empirical analysis and consistent with the evidence as a whole.

III. Dr. Nicola Mazzarotto

[76] Nicola Mazzarotto obtained a degree in statistics and economics from the Sapienza University of Rome in 1997, his MSc in economics from the London School of Economics in 1999, and his PhD in economics from the University of East Anglia in 2005. His dissertation was entitled "Buyer Power: Economic Theory and Competition Policy toward the Retail Sector". From January 2011 to present, he has been a member of KPMG LLP in London, UK, a partner and Head of Competition Economics since October 2013. Prior to that, he was with the European Commission, the Office of Fair Trading, a senior expert in competition policy with the OECD and with the UK Competition Commission, latterly as the Head of Policy Analysis.

[77] Dr. Mazzarotto was qualified to give expert opinion evidence on competition economics, including in relation to buyer power and the assessment of the competitive effects of mergers, joint ventures, and other contractual arrangements, including through the use of qualitative and quantitative analysis.

[78] Dr. Mazzarotto was not offered as an expert on Canada competition law, and there were objections to portions of his testimony in which he appeared to be giving opinion about what the Canadian Competition Bureau reviewed in 1997 and 2001 and what assessment and decisions it made. I allowed Dr. Mazzarotto's evidence with respect to these issues on the understanding that, while a portion of Dr. Mazzarotto's slides that accompanied his testimony seemed to indicate opinions that might exceed the scope of his expertise, Dr. Mazzarotto's testimony with respect to these matters was more nuanced. I therefore indicated that I would consider and weigh his evidence on the basis of the scope of his experience and expertise.

[79] Dr. Mazzarotto's instructions in preparing his reports were:

- a) to assess whether the restriction set out in section 5.1(a) of the OSA is anti-competitive. and
- b) to comment on the analysis and conclusions of Dr. Waverman and Dr. Shehadeh.

[80] In forming his view, he indicated that he followed the definition of anti-competitive effect set out in the *Competition Act*, being a substantial lessening or prevention of competition.

[81] His conclusions, in summary, were as follows:

- a) the restrictions have been reviewed twice by the Competition Bureau during the Nova/ UCC joint venture and the Dow/ UC merger. In both cases, no action was taken by the Competition Bureau in relation to the restrictions.

- b) by this, Dr. Mazzarotto appeared to mean that the OSA, which includes the restrictions, was given to the Competition Bureau, as it is clear that Dr. Mazzarotto could not give evidence about whether the restrictions were in fact reviewed;

These reviews by the Competition Bureau were the appropriate ones for assessing the competitive effect of the restrictions.

- c) by appropriate, Dr. Mazzarotto appears to mean that the review was the right context to review the restrictions;
- d) he reviewed the facts available to him that in his mind were relevant for the Competition Bureau's E3 joint venture review, and found that there was no reason to disagree with the Competition Bureau's assessment; and
- e) he also assessed the restrictions as they apply to Dow. This was relevant to whether the merger between Dow/ UC should have been allowed to proceed by the Competition Bureau without remedies relating to the restrictions. He found that there was no reason to disagree with the Competition Bureau's decision.

[82] Dr. Mazzarotto noted that, in reviewing the OSA, a competition economist would not have any interpretation of any of the clauses in mind *per se*, but would just ask what could go wrong, would review worse-case scenarios. The joint venture context was important to the review, and the ARC would provide some form of assurance to the parties.

[83] He noted that:

. . . the Competition Bureau concluded that the E3 joint venture between Nova and Union Carbide, which included the restrictions I think in the sense that we just discussed, so included the clauses that are being interpreted as giving rise to certain restrictions, was not anticompetitive. And the Bureau also cleared that the Dow/UCC acquisition, without remedies, specifically to Canada and certainly without remedies that would have addressed any of the competition issues that allegedly might arise from the restrictions. And specific remedies were not required in light of the other remedies that were being ordered by other competition authorities and, in particular, those ordered by the FTC.

[84] He testified about why he thought the E3 joint venture was the appropriate context for reviewing the restrictions. He indicated through a reference to academic literature that the FTC is "rationally hospitable to production joint ventures, even among direct competitors". He also noted that non-competitive clauses in joint ventures are not considered to be anti-competitive if they facilitate a broader joint venture that has pro-competitive effects.

[85] Given that the Competition Bureau issued an ARC, Dr. Mazzarotto concluded that the E3 joint venture was reviewed under the merger provisions. In his view, the effects of the restrictions on competition should be considered as part of E3 joint venture, which the Competition Bureau conducted under the merger provisions of the *Competition Act*.

[86] Despite his testimony, Dr. Mazzarotto clearly could not give an opinion that the Competition Bureau reviewed the restrictions as part of its review of the joint venture. However, he indicated that:

Given that there has been a review of that E3 joint venture agreement, then effectively, the question that I'm asking myself is whether there is any reason to believe that the Bureau somehow got it wrong or either because they didn't anticipate that the restrictions could be interpreted in the way that they have been interpreted or because they hadn't foreseen some problems or because they didn't do the kind of job that they were supposed to do in reviewing them.

[87] He conceded that "one could take different positions in terms of an opinion on that". His question was whether there were any reasons to think that the original joint venture would lead to a substantial lessening of prevention competition "at this time where this would have been reviewed."

[88] He noted that, in terms of any potential anticompetitive effects, clearly, the first thing to note is that UCC did not purchase ethane or produce ethylene in Alberta at the time of the E3 joint venture, so applying any form of the restrictions could not be seen as reducing competition because competition wasn't there. He saw no reason why a competition concern would have been raised at the time.

[89] Dr. Mazzarotto noted that, since the restrictions are part of the E3 joint venture, the question of whether the restrictions are anti-competitive depends on their role in facilitating the E3 joint venture and its overall effect on competition.

[90] He listed the positive aspects of the joint venture, and indicated that, since the construction of E3 was a massive investment, the parties needed contractual arrangements to reduce vulnerability to opportunistic behaviour.

[91] Dr. Mazzarotto concluded that he had "no reason to think the Bureau did not pick up on possible competitive concerns that might have arisen out of those agreements."

[92] In his view, the effect of the restrictions as applied to Dow is relevant only to whether the Dow/UCC acquisition should have been allowed to proceed unconditionally. The appropriate context to conduct an economic assessment of the competitive effects of the restrictions as they apply to Dow is in the context of that acquisition.

[93] Dr. Mazzarotto then concluded that, since the Competition Bureau cleared the Dow/ UC merger unconditionally, that covered the acquisition of the E3 stake by Dow. He testified that he interpreted the views of Drs. Waverman and Shehadeh as being that they thought there was something amiss in the Bureau's analysis. He asked himself the question of whether the specific interpretation of the restrictions set out in their reports as looked at in the context of the merger analysis could have been seen to have led to adverse effects on competition.

[94] Dr. Shehadeh gave a different view of his opinion on the Competition Bureau's review. He testified that, first, he sought to understand what review the Competition Bureau had undertaken, and had found that there was no information on either the extent to which these issues were considered by the Competition Bureau or what conclusions, if any, it drew. Then he noted that, in the ARC application, Nova was being referred to as being a purchaser of ethane for Joffre. The application did not say "for the Pool Area" or "for Western Canada", it said for Joffre. In his view, that one piece of information would be inconsistent with the Competition

Bureau evaluating the restrictions as applying to, not just Dow as Co-owner of Joffre, but as applied to Dow's operations in Western Canada more generally.

[95] Therefore, in his view, there was no indication that the Competition Bureau understood the restrictions would be applied to Dow's operations, that Nova would take away Dow's ability to purchase ethane in Alberta. Therefore, there was nothing there to inform his conclusions or to indicate that he should not rely on his empirical analysis, including data that wasn't available to the Competition Bureau at the time.

[96] Finally, Dr. Mazzarotto concluded that, to take a different position on the restrictions now, outside the context of the Competition Bureau's reviews, "has the potential to undermine effective competition policy in Canada and thereby reduce incentives to invest in Canada".

[97] Dr. Mazzarotto considered only the "no ethane" restriction, being the most restrictive interpretation of the clauses at issue. The key question to him was whether the removal of Dow as an additional buyer of ethane would likely have led to a substantial lessening or prevention of competition over the period at issue. He indicated that his view was that his conclusion with respect to the no-ethane restriction would apply to the other restrictions.

[98] Dr. Mazzarotto testified that the tests articulated by Dr. Waverman and Dr. Shehadeh did not fully represent the Canadian submission to the OECD Roundtable on Monopsony and Buyer Power. He described the Competition Bureau's two stages to assessing the likelihood of monopsony power being exercised, from its submission to the Roundtable:

- a) the Competition Bureau first determines whether it is likely that a firm has buyer power. It then tries to determine whether that buyer power is likely to entail the special case of monopsony power. This involves the inherently difficult exercise of trying to determine whether prices are competitive or not.

Dr. Mazzarotto indicated that he thought that all three experts were in agreement in this area; that the first step in assessing whether an entity is likely to have buyer power is typically a determination of the relevant market where the buyer makes its purchases. The second step is to consider barriers to entry into that market;

- b) the Competition Bureau then indicated that if the entity has high buyer shares and there are barriers to entry into buying, the following are likely factors to consider to distinguish between bargaining and monopsony power:
 - (i) "the shape of the supply curve . . . upward sloping supply curves are a necessary condition for monopsony power. Relevant considerations include such factors as pre-existing contracts that may influence the time it takes for supply to adjust to new demand conditions";
 - (viii) "whether upstream supply is characterised by a large number of sellers and low barriers to entry such that the normal selling price of a supplier is likely competitive". Dr. Mazzarotto was of the view that this was not picked up explicitly in the other experts' tests, however it was certainly addressed in testimony by both Dr. Waverman and Dr. Shehadeh;
 - (ix) "whether it seems likely that certain suppliers will exit the market in response to the anticipated price decrease or will scale back production";

- (x) “where possible, empirical techniques for analysing the effect of historical changes in supply on price and quantity help determine whether monopsony power exists”.

[99] In Dr. Mazzarotto’s view, Dr. Waverman’s and Dr. Shehadeh’s conditions take in to account the first of these factors set out by the Competition Bureau but not all of the others. I must disagree, as both of these experts addressed these factors in their testimony. Dr. Shehadeh explicitly addressed the fourth factor.

[100] Dr. Mazzarotto was of the view that, if it appears monopsony power is possible, the Competition Bureau would consider whether it was likely to be used, and that Dr. Waverman and Dr. Shehadeh had failed to consider that issue, including the possible costs to the potential monopsonist of decreased output in the downstream market that may follow decreased input purchases. However, Dr. Mazzarotto’s analysis of this issue was weak and unconvincing, both logically and in terms of the reality of the situation between Dow and Nova.

[101] Dr. Mazzarotto testified that whether Nova being the sole buyer of ethane in Alberta confers a significant increase of buyer power on Nova will depend on its relative bargaining strength compared to ethane extractors.

[102] He referred to factors in the academic literature that address the relative bargaining strength of buyers and sellers, and concluded that, since in his view the supply of ethane in Alberta is relatively concentrated, failure to reach agreement with any one of certain facilities risks Nova being unable to run its ethylene production facilities at full capacity, with substantial adverse consequences to Nova. He also concluded that sellers of ethane may be customers of or have other broader commercial relationships with Nova that they can leverage in negotiations. Dr. Shehadeh’s response to these views, as previously discussed, cast doubt on whether this would actually occur.

[103] He noted that, if Nova is the single purchaser in Alberta, ethane sellers could choose to leave ethane in the gas stream, although he concluded that there were opportunistic costs to doing so and this would not be what suppliers would want to do. He indicated that the complexity of the ethane supply context indicated to him that suppliers had “pretty strong” bargaining power. He disagreed that there were low barriers to entry in the supply market, referring to costs of building new projects.

[104] Dr. Mazzarotto indicated that, clearly, the no ethane restriction would lead to Nova becoming the sole buyer of ethane in Alberta, and clearly, that would impact the sellers’ options and reduce alternatives. However, he concluded that the evidence shows that it cannot simply be assumed that as a sole buyer Nova would be able to obtain significantly lower ethane prices or better terms than it has done when Dow was also purchasing ethane in Alberta. As noted, this is unconvincing given the historical context and documentary evidence.

[105] However, Dr. Mazzarotto indicated that, in any case, whether or not Nova’s buyer power increases – and whether or not prices reduce substantially as a result – is not the key question for the assessment of competitive effects in his view. He considered the important question to be, whether any increase in Nova’s buyer power would give rise to anti-competitive effects, consistent with what he understood to be the Competition Bureau’s approach.

[106] This led him to the question of whether the situation could be characterized as monopsony or bargaining power. The question is whether there is countervailing power, whether

there is something about the demand side of the market that means there is less harm likely to result from seller power because of the exercise of buyer power.

[107] Dr. Mazzarotto discussed “consumer welfare” standards, but indicated that:

So in a sense it doesn't matter if ethane suppliers, *per se*, face worse terms as a result of the restrictions. It doesn't matter if Dow faces or any other competitors faces, *per se*, worse terms from the application of these restrictions. What matters is whether any reduction or any changing of those terms for suppliers as for Dow results in an overall decrease in total welfare.

[108] In his view, an increase in buyer power can reduce total welfare if:

- a) it creates a short-run contraction of supply, leading to “deadweight loss”; or
- b) it leads to long-run reduced investment.

[109] With respect to deadweight loss, Dr. Mazzarotto was of the view that monopsony requires a single price. Dr. Mazzarotto testified that, in his view, it was hard to interpret the relationship between buyers and seller as an “upward-sloping curve” where there are multiple negotiated prices and the price that is being described for this relationship is not the market price but, instead, an average price made up of many different market conditions.

[110] According to his view, this is different under bargaining power, because of the ability to negotiate individually between buyers and sellers. Thus, he indicated, the buyer is able to bypass deadweight loss, and would have an incentive to bypass that deadweight loss, and therefore there would not be a contraction of supply as a result.

[111] Thus, in Dr. Mazzarotto's opinion, in the short-term, the welfare consequences of monopsony power versus bargaining power are very different.

[112] Dr. Mazzarotto quoted the Canadian submission to the OECD Roundtable as follow:

The shape of the supply curve in the relevant range of output: ... upward-sloping supply curves are a necessary condition for monopsony power . . . whether upstream supply of the input is characterised by a large number of sellers and low barriers to entry such that the normal selling price of a supplier is likely competitive.

[113] Dr. Mazzarotto then postulated that a necessary first condition for monopsony power is an unconcentrated supply and a single price. The second necessary condition is an upward sloping supply curve. In his view, without the first condition, the second condition cannot exist.

[114] Since there is no single price, or in his view, market price, for ethane in Alberta, and given that ethane supply contracts in Alberta are negotiated individually, it was Dr. Mazzarotto's opinion that supply is sufficiently concentrated such that the monopsony framework does not apply and the bargaining framework is instead the right economic model to analyze the restrictions.

[115] Dr. Mazzarotto indicated that Dr. Waverman's theory that feedback effects were one way that the Alberta ethane industry could approximate monopsony even with individually negotiated contracts was something new to him, and that he was not aware of it from the literature. He did

not find it plausible. Dr. Mazzarotto indicated that there could be other explanations for the feedback examples that Dr. Waverman cites, but he did not specify any persuasive examples.

[116] Dr. Mazzarotto testified that, even if there was an industry supply curve, there are other features of the ethane supply in Alberta that mean it would not be upward sloping:

- a) the contracts that he had analyzed did not show an increasing relationship between price and volume of ethane at the plant level, which he indicated was consistent with the marginal cost of ethane not increasing with the amount of ethane produced. It was difficult to understand why this fact was relevant; and
- b) at the industry level, there is no upward sloping relationship between price and volume of ethane, since volume cannot be directed by the buyer. Again, it was difficult to see how this countered Dr. Shehadeh's persuasive evidence of an upward-sloping curve.

[117] With respect to the second question, whether any increase in Nova's buyer power would lead to a reduction in investment, Dr. Mazzarotto indicated that the evidence does not suggest that as a single buyer, Nova would act so as to lead to a reduction in ethane extraction capacity in Alberta. He indicated that in his view this was consistent with the Competition Bureau's decision to approve Dow's acquisition of UC, "including its stake in the E3 joint venture"

[118] Thus, Dr. Mazzarotto concluded that the "evidence suggests that there would not be horizontal effects, [effects arising between firms that supply ethane] arising as a result of the application of restrictions to Dow" and that this is consistent with the Competition Bureau's clearance of the Dow/ UC acquisition.

[119] With respect to non-horizontal effects, or effects involving firms that produce products at different levels of the supply chain, Dr. Mazzarotto observed that the possibility of a substantial lessening or prevention of competition in ethylene is a "unilateral effect of a non-horizontal merger" in the terminology used in the Competition Bureau's merger enforcement guidelines. Such an effect arises if a merger enables a firm to eliminate rival firms' access to inputs or markets, thereby reducing or eliminating rival firms' ability or incentive to compete.

[120] He referred to the Bureau's merger enforcement guidelines on the assessment of this effect, posing three questions:

- a) whether, as a result of the merger, the firm has the ability to harm rivals;
- b) whether the firm has the incentive to do so; and
- c) whether the firm's actions would be sufficient to prevent or lessen competition substantially.

[121] Dr. Mazzarotto criticized Dr. Waverman for concentrating on the first question, and not considering whether Nova intends to continue to supply to Dow, or whether its actions would be sufficient to lessen competition.

[122] He noted that the choice of whether to restrict access to sources of ethane to Dow has nothing to do with benevolence and everything to do with profits (and possibly with the deterrent effect of antitrust action). He also commented that the effects on Dow as a competitor are no indications of effects on the market, and that the relevant question is not whether Dow's terms

would worsen or its incentives to invest will change, but rather whether there would be a change in the amount supplied in the market in the short or long run.

[123] With respect to ability, Dr. Mazzarotto conceded that the no ethane restriction gives Nova control of Dow's input. He then switched to considering the "sufficient ethane restriction" and noted that Nova's control under this restriction related "exclusively" to cost of ethane.

[124] With respect to incentives, he considered the bargaining of buyers, the competitive downstream market, and what he called "Dow's backstop", the possibility of selling its interest in E3. He concluded that it appears unlikely that Nova would earn sufficient profit through increased margins in ethylene or derivatives markets to outweigh the foregone profit on sales of ethane to Dow. In that case, Nova would not have an incentive to restrict the supply of ethane to Dow.

[125] He then concluded that, even if Nova had the incentive to restrict Dow, "[i]t seems likely" that any price effects would be limited to transfers of surplus and there would be little or no output effects.

[126] In conclusion, he indicated that the answers to the three questions were "not clear", and therefore he "had no reason to disagree with the Bureau's clearance of the Dow/UCC merger with respect to concerns about non-horizontal effects", and that, at any rate, Dow could always sell its interest in E3.

[127] Dr. Mazzarotto's opinions suffered under cross-examination:

- a) it became evident that Dr. Mazzarotto was not familiar with Canadian competition law or policy, or of the differences between these and the policies and laws he was using to analyze the restrictions. Although he frequently made reference to his opinions being "in keeping with the *Competition Act*, or based on criteria set out in the *Competition Act*," he was adamant that he was not giving opinions on Canadian law, but making general statements of economic policy;
- b) although he said in his report that he was aware of only one Canadian case in which an agreement related to the purchase of products (monopsony power) had been held to be anticompetitive, Dr. Mazzarotto could not recall the case or any of its specifics in his testimony. He did not appear to understand that the standard applied in the case was the relevant pre-2010 "undue lessening of competition standard", or that such standard is a lower standard than the "substantial lessening of competition standard" that he suggested was the appropriate standard in Canada. He was clearly unaware of numerous examples of Competition Bureau investigations and cases in which a substantial lessening or prevention of competition in the purchase of products was the focus;
- c) his insistence that monopsony requires a single price appeared to be inconsistent with a number of Canadian cases in which buyers did not pay the same price for the product (Chapters/Indigo, United Grain Growers) and the Commissioner of Competition concluded that the transactions would be likely to substantially lessen competition. It appeared that he was unfamiliar with these cases. As Dr. Shehadeh noted, this insistence of a single price is not consistent with real-world markets, is not a requirement for monopsony power, and the existence of price dispersion does not relieve concerns by competition economists.

- d) Dr. Mazzarotto's framework of analysis in that it involved weighing up any restrictions against the efficiencies and pro-competitive effects of joint ventures in determining their competitive effects appears to be contrary to a major Canadian case, *R. v Northern Electric Co*, [1955] 3 DLR 449 at p 469, but he was not aware of that.
- e) Dr. Mazzarotto acknowledged that the "ancillary restraints" analysis he undertook did not apply to Section 45 of the *Competition Act* at least as it existed at the times he opined were the appropriate times to consider the claimed restrictions – 1997 and 2001, but gave a unconvincing rationale for why he had applied it. Nor did he consider whether the duration of the restrictions was necessary or whether their geographic scope was broader than necessary, as required by the doctrine of ancillary restraints when it became available under the *Act* after March 2010. Because Dr. Mazzarotto considered only whether the joint venture itself was anticompetitive and whether the claimed restrictions were directly related to and reasonably necessary for the E3 joint venture in 1997, his analysis did not take into account the continuing effects of the claimed restrictions.
- f) although he denied that his words meant what they appear to say, Dr. Mazzarotto applied what is known as the "consumer welfare" standard in assessing the existence of substantial lessening of competition in 1997, although Canadian competition policy and law does not apply this standard.
- g) While in his report, Dr. Mazzarotto stated that "buyer power, such as that which may arise from agreements between buyers, is generally pro-competitive", and suggested that this accorded with Canadian competition policy, the Competition Bureau's Competitor Collaboration Guidelines actually say that "[j]oint purchasing arrangements are often pro-competitive . . . but [w]here the participants in joint purchasing agreements represent a significant portion of the input purchases and barriers to entry into the purchasing market are high, the Bureau will likely conclude that the participants hold buying power". The latter situation is consistent with the situation in this case.
- h) As noted earlier, in his report Dr. Mazzarotto stated that two conditions are necessary for a buyer or a group of buyers to exercise monopsony power:
 - (i) a large number of relatively small sellers, none of which has substantial market power, all charging the same price level; and
 - (ii) an increase in the quantity purchased of the input pushes up the price, such that a buyer can reduce the quantity it purchases and thereby pay a lower price – in other words an upward sloping supply curve.

Drs. Waverman and Shehadeh were of the opinion that only the second of these conditions is necessary to conclude that the restrictions would have conferred monopsony power on Nova and thereby significantly lessened or prevented competition.

In cross-examination, it appeared that the academic literature cited by Dr. Mazzarotto to justify these conditions did not actually support his view of the necessity of a single price or his first condition. Nova concedes that Dr. Mazzarotto's conditions are

“his own assessment and synthesis of the academic literature” but this was not how these conditions were presented.

Although Dr. Mazzarotto in his report stated that the Alberta market does not satisfy his first condition because ethane produced in Alberta is supplied through bilaterally negotiated contracts between ethane extractors and purchasers, the Competition Bureau Guidelines he relied upon do not reference this “necessary condition 1” or even its component elements.

However, Dr. Mazzarotto’s testimony was much more nuanced than his report, and his refinements in testimony brought him close to what Drs. Waverman and Shehadeh had opined, that a single market price is not required to conclude that the implementation of the claimed restrictions would confer monopsony power on Nova, nor is it a requirement that no single ethane supplier have market power, nor indeed is it a requirement that the sellers be so numerous that the buyer cannot negotiate with each of them. Instead, as he conceded, a market involving bilateral negotiations where there is no single price could result in the exercise of monopsony power, depending on whether there are inefficiencies around which the parties are unable or unwilling to negotiate and contract.

I accept from the evidence and from the opinions of Drs. Waverman and Shehadah that the Alberta ethane industry is characterized by a large number of ethane suppliers. While some suppliers are larger than others, the evidence is that no single supplier has had a market share above 35%. All of this casts doubt on Dr. Mazzarotto’s first condition, and at any rate, as noted previously, I accept that the fact that some suppliers may have a degree of market power is not determinative of whether monopsonist power exists.

Dr. Shehadeh commented that, in his view, Dr. Mazzarotto’s conditions differ because he is using a “consumer welfare” standard often used in the United States and Europe, rather than the Canadian “social welfare” standard;

- i) Dr. Mazzarotto’s assertion that, since Nova relies on contracts with only ten facilities and fewer suppliers, by “dependence”, Nova would be susceptible to seller market power, suffers from the fact that if Dow were subject to the claimed restrictions, Nova would have available for its purchase *all* extracted ethane supply; considerably more than it would need to satisfy its own demand. It could refuse supply if a supplier would not reduce its price or if it wished to demonstrate to other (potential or existing) ethane suppliers that it is unwilling to pay above a certain price;
- j) Dr. Mazzarotto’s position that his second necessary condition, an upward sloping industry curve is not met, is belied by the evidence. I accept Drs. Waverman and Shehadeh’s testimony that there is clear evidence of increasing costs for additional ethane extraction in Alberta at the industry level, that extracting more ethane requires the deployment of higher-cost production resources and thus higher prices. The conclusions drawn by Dr. Mazzarotto from his review of specific provisions, certain contracts are not consistent with evidence from witnesses and documentation produced at trial that establish an upward-sloping industry curve;

- k) Dr. Mazzarotto's conclusion that bargaining can effectively negate the anticompetitive effects of buyer power, even if Nova were the only major buyer of ethane in Alberta is not supported by evidence, and is contrary to a more persuasive modern economic analysis of bilateral bargaining. Dr. Mazzarotto's opinion that bargaining between Nova as the sole buyer of ethane and the Alberta ethane suppliers and that bargaining between Nova and Dow on the one hand and the Alberta ethylene buyers on the other will result in the same competitive outcomes for the next 60 plus years is unreasonable and illogical, particularly given the history between Dow and Nova and the events that led to this litigation.

[128] On the more general level, Dr. Mazzarotto was a very difficult and uncooperative witness on cross-examination. He was evasive, and refused to give direct answers to direct questions, frequently going off on tangents instead of focusing on the questions.

[129] For all these reasons, I give Dr. Mazzarotto's opinions little weight, as they did not accurately represent the situation as described in the evidence and lack an air of reality with respect to the context of the joint venture and its parties. He exceeded his expertise from time to time when he gave views on matters of Canadian competitive policy and law.

IV. Conclusion

[130] As the OECD Policy Roundtable on Monopsony and Buyer Power provides:

The distinction between the two types of buyer power is based on their source and the effect of their exercise. A firm has monopsony power if its share of purchases in the upstream input market is sufficiently large that it can cause the market price to fall by purchasing less and cause it to rise by purchasing more.

When there are relatively few suppliers and buyers and the terms of trade are determined by bilateral bargaining, bargaining power determines the extent to which a buyer is able to extract surplus from a supplier. Differences in bargaining power are reflected in differences in individually negotiated discounts. Bargaining power refers to the bargaining strength that a buyer has with respect to its suppliers.

[131] It was necessary in this case that I decide whether to accept the conclusions reached by Drs. Waverman and Shehadeh that the restrictions at issue would give rise to monopsony power and its attendant anti-competitive effects, or accept Dr. Mazzarotto's conclusions relating to bargaining power.

[132] For the reasons set out in my analysis of their opinions, I accept the conclusions of Drs. Waverman and Shehadeh. While there may be differences in academic opinion with respect to the intersection of monopsony and bargaining power, I accept the opinions of the two experts most qualified in Canadian competition economics as applied to these specific restrictions.

[133] Dr. Waverman clearly looked at the relevant facts. While his views on what is necessary to establish the presence of monopsony power may not be shared in their particularity by all competition economists, his review of the business records, data and history of this matter added force to his opinions, which were unshaken in cross-examination. Dr. Shehadeh's empirical

analysis based on years of data was persuasive and, again, not affected in a material way by cross-examination. I am unable to accept the premise of Dr. Mazzarotto's opinion that if Nova was the sole buyer of ethane in Alberta, bargaining power would negate the anticompetitive effects of buyer power, particularly given the history of the relationship between the parties to this litigation.