

## FRACKING AND WATER USE IN ALBERTA: A CRITICAL REVIEW

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*In Alberta, there is an endless debate over environmental conservation and economic development. This article bridges this gap by recognizing the need for water conservation and, at the same time, proposing a regulatory framework that promotes innovation while still facilitating energy development. The current legislative and regulatory frameworks were not designed to address or manage the risks that fracking poses to Alberta's water scarcity, such as the removal of vast quantities of water from the hydrological cycle. Fracking and its water use in Alberta should be regulated differently so that Alberta can more effectively steward its freshwater resources. While implementing regulatory measures to effectively steward Alberta's water resources, policymakers should simultaneously strengthen Alberta's energy industry.*

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### I. INTRODUCTION

Benjamin Franklin once said, “[w]hen the well is dry, we know the worth of water.”<sup>1</sup> This statement is especially relevant to Alberta, a province with seemingly rich freshwater

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<sup>1</sup> James Slutz et al, “Key Shale Gas Water Management Strategies: An Economic Assessment Tool” (Paper presented at the SPE/APPEA International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production in Perth, Australia, September 2012) (2012) Society Petroleum Engineers 1 at 1.

resources and its energy industry, a key economic institution heavily reliant on water to meet its production needs.<sup>2</sup> Environmental critics are understandably wary about Alberta's apparently cavalier use of its freshwater resources:<sup>3</sup> “you don't know what you got till it's gone.”<sup>4</sup>

Environmental critics have a point, but rhetoric on both sides of the endless debate over environmental conservation and economic development does little to further productive conversation about the issue. In this article, I hope to bridge this gap by recognizing the need for water conservation and, at the same time, proposing a regulatory framework that promotes innovation while still facilitating energy development. Water use in hydraulic fracturing (fracking) is one critical area where there is substantial room for improvement, and thus, my main argument is that fracking and its water use in Alberta should be regulated differently so that Alberta can more effectively steward its freshwater resources.

This article is organized into three parts. Part II provides a brief overview of Alberta's current regulatory framework governing fracking and water use. Part III describes the current regulatory framework's limitations and explains why these limitations are concerning. Finally, Part IV offers several recommendations for improving the regulatory framework and assesses the drawbacks associated with those recommendations.

One final introductory note — given the current economic climate, an article on the need for a stronger regulatory framework for fracking and its water use may seem out of place. Though oil prices are currently — and unexpectedly — up, Alberta's oil and gas industry is struggling. Imposing additional regulatory burdens at this time would increase costs for industry, and this prospect is understandably concerning. Nonetheless, it is important to assess our regulatory structures with a critical eye and constructively solve problems to balance current industry needs with long term environmental sustainability. I, therefore, also argue in Part IV that policymakers should simultaneously strengthen Alberta's energy industry while implementing regulatory measures to effectively steward Alberta's water resources.

## II. THE CURRENT REGULATORY REGIME

Before I provide my critique of the current system regulating fracking and water use, it is important to understand the scheme itself. Alberta's regulatory framework for fracking water use is composed of three main parts: (1) the *Water Act*<sup>5</sup> and its regulations, (2) a series

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<sup>2</sup> See generally Ahmed M Mroue et al, “Water-Energy Nexus: The Role of Hydraulic Fracturing” in Regina M Buono et al, eds, *Regulating Water Security in Unconventional Oil and Gas* (Springer International, 2020) 21 at 22, 28 [Buono et al, *Regulating Water Security*].

<sup>3</sup> See generally Wally Braul, “The Changing Regulatory Scheme in Northeast British Columbia” (2011) 49:2 *Alta L Rev* 369 at 374 (“Fracking has attracted strong public criticism.... An increasing body of public criticism focuses on fracking's use of ground and surface water”); C Alexia Lane, *On Fracking* (Victoria: Rocky Mountain Books, 2013) at 4.

<sup>4</sup> Joni Mitchell, “Big Yellow Taxi,” *Ladies of the Canyon*, 1970, online: <jonimitchell.com/music/song.cfm?id=13>.

<sup>5</sup> RSA 2000, c W-3.

of Alberta Government (GoA) guidelines outlining how industry should strive to conserve water, and (3) the Alberta Energy Regulator (AER) approval process.<sup>6</sup>

## A. THE WATER ACT AND ITS REGULATIONS

The *Water Act* and its associated regulations govern water management and use in Alberta. This legislation performs several key functions. Most importantly, the *Water Act* sets out various rights to Alberta's water resources and the limitations on those rights. In addition, like other resource management statutes, the *Water Act* outlines the processes for accessing those rights, the scope of the Minister's powers<sup>7</sup> and delegated authority, administrative procedures, and rules for enforcing the regulatory regime.<sup>8</sup>

The system of rights laid out by the legislation is as follows. The Crown in right of Alberta (the Province) owns Alberta's water,<sup>9</sup> and both the Province and any other party who wants to do anything in and around Alberta's water are subject to the *Water Act* and its corresponding regulations.<sup>10</sup> Parties who want to divert or use water<sup>11</sup> must seek approval from the appropriate delegated authority — the *Water Act*'s Director (more on the Director below).<sup>12</sup> Anyone who wants to divert water or operate a “works” as defined by the *Water Act*<sup>13</sup> must apply for a licence.<sup>14</sup> Interested parties must also pay an annual fee for diverting water under a licence.<sup>15</sup> According to the current “*Water Act*: Licences” factsheet, the annual licence fee for diverting between 62,501 and 125,000 cubic meters of water ranges from \$90 to \$150.<sup>16</sup> The Province's water use is also subject to the rules under the *Water Act* and its regulations — the Province has the right to divert<sup>17</sup> and use the water that it owns, subject to regulations under the *Water Act*.<sup>18</sup>

When water is in short supply, the principle of prior allocation is used to distribute water between licensees.<sup>19</sup> Interested parties acquire water entitlements on a first-in-time, first-in-right (FITFIR) basis.<sup>20</sup> Essentially, this means that the first parties to obtain licences or

<sup>6</sup> For brief and helpful overviews of Alberta's water rights and management system, see David R Percy, “Water Rights in Alberta” (1977) 15:1 *Alta L Rev* 142 [Percy, “Water Rights”]; David R Percy, *The Framework of Water Rights Legislation in Canada* (Calgary: Canadian Institute of Resources Law, 1988) [Percy, *Water Rights Legislation*]; Lane, *supra* note 3 at 61–71.

<sup>7</sup> See especially *Water Act*, *supra* note 5, s 169(2).

<sup>8</sup> See generally *ibid*, ss 93–169.

<sup>9</sup> *Ibid*, s 3.

<sup>10</sup> *Ibid*, ss 3–4.

<sup>11</sup> See *ibid*, s 1(b) for definition of “activity,” which refers to actions in and around water.

<sup>12</sup> See also *ibid*, ss 36–38.

<sup>13</sup> See *ibid*, s 1(mmm) for definition of “works.”

<sup>14</sup> *Ibid*, ss 49–51.

<sup>15</sup> *Ibid*, s 50(1).

<sup>16</sup> Government of Alberta, “Water Act: Licences,” online: <[open.alberta.ca/publications/water-act-licences](http://open.alberta.ca/publications/water-act-licences)>. This is the most current information that Alberta Environment has listed on Government of Alberta, “Water Legislation and Guidelines,” online: <[www.alberta.ca/water-legislation-and-guidelines.aspx#toc-5](http://www.alberta.ca/water-legislation-and-guidelines.aspx#toc-5)>.

<sup>17</sup> See *Water Act*, *supra* note 5, s 1(m) for definition of “diversion of water.”

<sup>18</sup> *Ibid*, s 3(2).

<sup>19</sup> See *ibid*, ss 27–31; Nigel Banks, “Policy Proposals for Reviewing Alberta's Water (Re)Allocation System” (2010) 20:2 *J Envtl L & Prac* 81 at 81 [Banks, “Policy Proposals”]; Deborah Curran, “Hydraulic Fracturing in Canada: Regulation by Moratorium or Specialized Agencies in Landscapes of Aboriginal and Treaty Rights” in Buono et al, *supra* note 2, 309 at 315; Oliver M Brandes & Linda Nowlan, “Wading into Uncertain Waters: Using Markets to Transfer Water Rights in Canada – Possibilities and Pitfalls” (2009) 19:3 *J Envtl L & Prac* 267 at 271–72.

<sup>20</sup> Curran, *ibid* at 315; Brandes & Nowlan, *ibid* at 271–72.

register the amount of water they divert<sup>21</sup> have the right to divert their full allocation of water before parties that acquired licences or registered later on.<sup>22</sup> The priority of the licence is determined by the date of the application or registration.<sup>23</sup> There are two exceptions to this general rule: household users and traditional agricultural users.<sup>24</sup> If a dispute about licence priority arises, the Director can decide how to apply the priorities while respecting the priority allocation system.<sup>25</sup>

The *Water Act* also defines the scope of the Minister's powers. It gives delegated authority to a Director who may grant licence approvals and other permits within the scope of the legislation. The Minister can establish "water guidelines,"<sup>26</sup> and the Director can set "water conservation objectives."<sup>27</sup> The Director also has authority to grant or withhold approvals, licences, licence renewals, preliminary certificates, and temporary diversion licences.<sup>28</sup> The Director can suspend or cancel an approval<sup>29</sup> or licence<sup>30</sup> if certain conditions are satisfied. Similarly, the Director can refuse to renew a licence in other specific circumstances.<sup>31</sup>

Overall, the *Water Act*'s stated purpose is to "support and promote the conservation and management of water, including the wise allocation and use of water" in light of Alberta's other needs and responsibilities — a healthy environment, economic growth, flexible governance systems, and so on.<sup>32</sup> The legislation enables the Minister and the Director to pursue these goals via water guidelines, water conservation objectives, Crown water reservations,<sup>33</sup> emergency measures,<sup>34</sup> and licensing processes. To further these goals, the Director can also use a "public interest" assessment to refuse an approval, licence or licence renewal, registration or water allocation transfer application, or to holdback 10 percent of a water allocation under a water allocation transfer.<sup>35</sup>

Broadly speaking, the Director has authority to determine how water is used under the *Water Act*. The scope of the Director's authority is important as it impacts how effectively the GoA can conserve water. The Director has wide discretion to grant applications allowing water usage (for example, licence, approvals, preliminary certificates, and water allocation transfers). In contrast, the Director's discretion to cancel or suspend those entitlements is narrower.

The Director must consider both mandatory and discretionary factors when evaluating an application for an approval, licence, preliminary certificate, or water allocation transfer. The following factors are discretionary, unless they are incorporated into a water management

<sup>21</sup> See *Water Act*, *supra* note 5, s 73. Registration is used to continue the priorities under the *Water Resources Act* to under the 1999 *Water Act*.

<sup>22</sup> See *ibid*, ss 27–31.

<sup>23</sup> Bankes, "Policy Proposals," *supra* note 19 at 81.

<sup>24</sup> *Water Act*, *supra* note 5, ss 19, 21.

<sup>25</sup> *Ibid*, s 32.

<sup>26</sup> *Ibid*, s 14.

<sup>27</sup> *Ibid*, s 15.

<sup>28</sup> See *ibid*, ss 38, 51.

<sup>29</sup> *Ibid*, s 43.

<sup>30</sup> *Ibid*, s 55.

<sup>31</sup> *Ibid*, s 60(3).

<sup>32</sup> *Ibid*, s 2.

<sup>33</sup> *Ibid*, s 35.

<sup>34</sup> See *ibid*, s 105.

<sup>35</sup> *Ibid*, ss 34, 60, 83.

plan (WMP). Where there is a WMP in place, the Director must consider the factors that are specified in that WMP.<sup>36</sup> Generally, whether discretionary or, as mentioned above, mandatory because incorporated into a WMP, these factors include: “any existing, potential or cumulative (i) effects on the aquatic environment; (ii) hydraulic, hydrological and hydrogeological effects; and (iii) effects on household users, licensees and traditional agriculture users, that result or may result from the activity”<sup>37</sup> and “(i) effects on public safety, and (ii) any other matters applicable to the approval that, in the opinion of the Director, are relevant.”<sup>38</sup>

On the other hand, the Director can only cancel or suspend one of these statutory entitlements or deny a licence renewal if a more specific, closed list of factors applies.<sup>39</sup> A cancellation or suspension without the holder’s consent requires: an emergency, risks for public safety, indebtedness to the GoA, non-performance or serious breaches of the approval or licence terms, among a few other requirements.<sup>40</sup> The Director can only deny a licence renewal if the renewal creates significant adverse environmental effects, if the renewal fails to meet requirements of a water conservation objective and so on, or if the licensee is indebted to the GoA.<sup>41</sup>

In many of their decisions, the Director is entitled to consider the public interest.<sup>42</sup> Public interest is not defined in the *Water Act*. The term is used throughout Alberta’s environmental regulation legislation, but is not clearly defined.<sup>43</sup> In Alberta’s water law context specifically, the Director has discretion to define what is in the public interest. The Director theoretically could use this discretion to give highly varied decisions across applications but seems unlikely to do so, however, as that action would undermine rule of law principles (such as the certainty and transparency of the regulatory system) and likely generate litigation from industry.<sup>44</sup>

## B. THE WATER GUIDELINES

The details of Alberta’s water conservation strategy, both generally and in relation to fracking, can be found in its water guidelines. These guidelines cover a broad range of water management topics, including wetlands, wastewater, groundwater, and irrigation, among

<sup>36</sup> *Ibid*, s 38(2)(a).

<sup>37</sup> *Ibid*, s 38(2)(b).

<sup>38</sup> This is quoted from the *Water Act*, *ibid*, s 38(2)(c) but the requirements for licences and preliminary certificates under section 51(4) are almost identical. Approvals for water allocation transfers are more complicated (*ibid*, s 82).

<sup>39</sup> See *ibid*, ss 43(1) (suspension, cancellation), 60(3) (licence renewal).

<sup>40</sup> See *ibid*, ss 43, 55.

<sup>41</sup> See *ibid*, ss 43(1) (suspension, cancellation), 60(3) (licence renewal).

<sup>42</sup> *Ibid*, ss 34, 60, 83.

<sup>43</sup> For commentators’ input on how to define the public interest in these contexts, see Jodie L Hierlmeier, “‘The Public Interest’: Can it Provide Guidance for the ERCB and NRCB?” (2008) 18:3 J Envtl L & Prac 279; Neil J Brennan, “Private Rights and Public Concerns: The ‘Public Interest’ in Alberta’s Environmental Management Regime” (1997) 7:2 J Envtl L & Prac 243. For a water law context specifically, see Bankes, “Policy Proposals,” *supra* note 19; Nigel Bankes, “Shining a Light on the Management of Water Resources: The Role of an Environmental Appeal Board” (2006) 16:2 J Envtl L & Prac 131.

<sup>44</sup> For a summary of why certainty and predictability are important to the rule of law, see Jeremy Waldron, “The Rule of Law,” online: *Stanford Encyclopedia of Philosophy* <plato.stanford.edu/entries/rule-of-law/>; Jeremy Waldron, “The Rule of Law and the Importance of Procedure” (2011) 50 NOMOS 3 at 3–6.

others.<sup>45</sup> The GoA only has one water guideline on fracking: “Water Conservation and Allocation Guideline for Oilfield Injection.”<sup>46</sup> This guideline was published in 2006.<sup>47</sup> According to the GoA’s 2013 water conservation action plan “Our Water, Our Future,” the GoA planned to provide further guidance on water conservation and fracking in 2015,<sup>48</sup> but at the time of writing, no update to the 2006 guideline appears to have been made.

The fracking guideline, *OIG*, aims to encourage water conservation via policy, regulatory procedures, and monitoring and reporting requirements.<sup>49</sup> Generally, the guideline simply turns the factors the Director may consider in granting applications into requirements for approval. For example, the *OIG* reiterates requirements for licences under the *Water Act*, indicating that applicants must evaluate the cumulative effects of the proposed licence on the aquatic environment, “maximize efforts” to replace the non-saline water in Alberta’s “water-short” areas, and provide an environmental risk assessment according to a three-tier classification system.<sup>50</sup> The guideline also attempts to provide incentives for water conservation by, for instance, allowing applicants with demonstrated water conservation efforts<sup>51</sup> to undergo a “concise economic and environmental evaluation” when they apply for a licence renewal.<sup>52</sup>

The *OIG* is in effect the GoA’s primary means of regulating water use for fracking because (1) the *Water Act* only provides bare minimum requirements for licence approvals, renewals, cancellations, and suspensions and (2) these thresholds are generally structured in the licensee’s favour (the threshold for licence approvals and renewals is low and the threshold for licence cancellations and suspensions is high). This legislative structure suggests that the GoA’s efforts to encourage water conservation in Alberta’s fracking industry are implemented through its guideline as applied by the AER in its approval process. The one exception to this arrangement is fracking activity in the South Saskatchewan Regional Plan (one of four WMPs), for which no licence can currently be obtained but where a transfer must be sought.

The GoA has also published several water management policy statements intended to provide a governance framework for the water guidelines, beginning with the “Water for Life” strategy in 2003,<sup>53</sup> followed by “Water for Life: A Renewal” in 2008<sup>54</sup> and “Our Water,

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<sup>45</sup> See the full list of water guidelines at Government of Alberta, “Water Legislation and Guidelines,” *supra* note 16.

<sup>46</sup> Government of Alberta, “Water Conservation and Allocation Guideline for Oilfield Injection” (2006), online: <open.alberta.ca/publications/water-conservation-and-allocation-guideline-for-oilfield-injection> [*OIG*].

<sup>47</sup> *Ibid.*

<sup>48</sup> Maureen Carter-Whitney & Burgandy Dunn, *Environmental Regulation in Canada*, 2nd ed (Toronto: LexisNexis Canada, 2008) (loose-leaf updated 2016) at 4.113.2.

<sup>49</sup> *OIG*, *supra* note 46 at 4.

<sup>50</sup> *Ibid* at 9.

<sup>51</sup> Water conservation efforts in the *OIG* on this point are defined as reducing non-saline water requirements or increasing resource productivity and efficiency by 30 percent (relative to actual use or productivity and efficiency, respectively, in the previous term) (*ibid* at 10).

<sup>52</sup> *Ibid* at 10.

<sup>53</sup> See Lane, *supra* note 3 at 66; Government of Alberta, “Water for Life: Alberta’s Strategy for Sustainability,” online: <www.alberta.ca/water-for-life-strategy.aspx>.

<sup>54</sup> Government of Alberta, “Water for Life: A Renewal,” online: <open.alberta.ca/publications/9780778576709>.

Our Future: A Plan for Action” in 2013.<sup>55</sup> This policy direction has been supported by the work of the Alberta Water Council, an arm’s-length organization with representation from government, industry, and NGOs established by the Minister of the Environment in 2004 to monitor the implementation of Alberta’s “Water for Life” strategy.<sup>56</sup> These policies have created reporting mechanisms for Alberta’s fracking industry, highlighted public concerns about Alberta’s water use, and encouraged discussion about Alberta’s water conservation needs.<sup>57</sup>

### C. THE ALBERTA ENERGY REGULATOR

The AER regulates water use in fracking.<sup>58</sup> Its jurisdiction to regulate water use under the *Water Act* comes from its enabling statute, the *Responsible Energy Development Act*.<sup>59</sup> The AER’s mandate is to regulate the development of Alberta’s energy resources. Where this development involves water, the mandate includes regulating water conservation and management.<sup>60</sup>

Practically speaking, the AER regulates fracking water use by reviewing energy-related applications under the *Water Act*.<sup>61</sup> Essentially, the AER fulfills the Director’s role under the *Water Act*. Energy companies must apply to the AER for licences and other permits under the *Water Act* before they can use Alberta’s water resources for fracking. To ensure compliance with its regulatory standards, the AER also conducts inspections, audits, and performance reviews.<sup>62</sup> Anecdotally, some have expressed concerns with the frequency and rigour of these AER inspections.

## III. THE CURRENT FRAMEWORK’S LIMITATIONS

This regulatory framework poses several challenges to Alberta’s freshwater conservation efforts.<sup>63</sup> This part first discusses the risks that fracking poses to water conservation in Alberta, and then outlines the historical context of the current legislative framework and its limitations. It concludes by explaining why the current regulatory framework does not effectively conserve Alberta’s freshwater resources.

<sup>55</sup> Government of Alberta, “Our Water, Our Future: A Plan for Action,” online: <open.alberta.ca/publications/9781460118900>.

<sup>56</sup> Alberta Water Council, “Alberta Water Council,” online: <www.awchome.ca/about/>.

<sup>57</sup> See *OIG*, *supra* note 46 at 4; Canadian Association of Petroleum Producers (CAPP), “Water Use for Hydraulic Fracturing in Alberta,” online: <www.capp.ca/publications/water-use-for-hydraulic-fracturing-in-alberta/>; Alberta Water Council, “Looking Back: Evaluating Sector Improvements in Water Conservation, Efficiency and Productivity,” online: <www.awchome.ca/projects/water-conservation-efficiency-productivity-1/> [AWC, “Sector Improvements”]; Alberta Water Council, “Review of *Water for Life* Implementation Progress: 2012–2015,” online: <www.awchome.ca/uploads/source/Publications/Water\_for\_Life/WFLIR\_Review\_Report\_2012-15.pdf> [AWC, “Review of Water for Life”].

<sup>58</sup> Alberta Energy Regulator, “Water,” online: <www.aer.ca/providing-information/by-topic/water.html>. SA 2012, c R-17.3, ss 1(s) (definition of specific enactment includes the *Water Act*), 2(1) [REDA].

<sup>59</sup> See *ibid*, s 2(1). This is also the stated purpose of the *Water Act* (see *Water Act*, *supra* note 5, s 2).

<sup>60</sup> REDA, *ibid*, s 2(2)(d); Carter-Whitney & Dunn, *supra* note 48 at 4.118.02.1.

<sup>61</sup> Alberta Energy Regulator, “Water,” *supra* note 58.

<sup>62</sup> This article focuses on freshwater specifically. Although similar concerns apply to using other sources of water (for example, low salinity brackish groundwater, which has been used to minimize freshwater consumption (José M Estrada & Rao Bhamidimarri, “A Review of the Issues and Treatment Options for Wastewater from Shale Gas Extraction by Hydraulic Fracturing” (2016) 182 Fuel 292 at 294)), they are not as pronounced. Saltwater can be another source of water (see Stephen Rassenfoss, “From Flowback to Fracturing: Water Recycling Grows in the Marcellus Shale” (2011) J Petroleum Technology 48).

The subsection that follows will address the risks fracking creates for Alberta's water needs and conservation efforts. The general environmental risks that fracking poses are well-documented, so I do not address these concerns.<sup>64</sup> In the literature, debates about fracking's impact on water quality largely center on groundwater contamination.<sup>65</sup> My focus is on freshwater availability: my concern is that the more freshwater is used for fracking and disposed of underground, the less clean — or easily treatable — water will be available.

## A. FRACKING EXACERBATES WATER SCARCITY

At first glance, Alberta may not seem to be a strong candidate for water scarcity because it possesses "immense water wealth."<sup>66</sup> But Alberta cannot take its water resources for granted. Southern Alberta already has recurrent problems with water security,<sup>67</sup> due in part to its large agricultural industry.<sup>68</sup> In addition, water is becoming increasingly scarce because of pollution, population pressures, drought,<sup>69</sup> climate change, and overconsumption.<sup>70</sup> Alberta is already impacted by these forces, and no doubt, will continue to be.

Fracking poses a unique and serious risk to Alberta's water security for several reasons. First, fracking requires huge volumes of water<sup>71</sup> and generates massive amounts of wastewater.<sup>72</sup> Typically, in Alberta, that water is sourced from freshwater sources.<sup>73</sup> Fracking is used to initially open a well for production and this fracturing process requires the

<sup>64</sup> Estrada & Bhamidimarri, *ibid* at 294; Andrew Kondash & Avner Vengosh, "Water Footprint of Hydraulic Fracturing" (2015) 2 *Environmental Science & Technology Letters* 276 at 276; Joel Minor, "Local Government Fracking Regulations: A Colorado Case Study" (2013) 33:1 *Stan Env'tl LJ* 61 at 67–71; Terry W Roberson, "Environmental Concerns of Hydraulically Fracturing a Natural Gas Well" (2012) 32:1 *Utah Environmental L Rev* 67; Regina M Buono et al, "Regulating Water Security in Unconventional Oil and Gas: An Introduction" [Buono et al, "Introduction"] in Buono et al, *Regulating Water Security*, *supra* note 2, 3 at 16; James D Bradbury & Courtney Cox Smith, "Global Conflicts Surrounding Hydraulic Fracturing and Water" in Buono et al, *Regulating Water Security*, *supra* note 2, 69 at 73–74; Monika U Ehrman, "Overview of Oil and Gas Wastewater Injection Induced Seismicity in Hydrocarbon Regions in the United States, Canada, and Europe" in Buono et al, *Regulating Water Security*, *supra* note 2, 291; Lane, *supra* note 3 at 5.

<sup>65</sup> See generally Estrada & Bhamidimarri, *supra* note 63 at 295; Minor, *ibid* at 69–70; Alan Harvie, "Trade Secrets v. Public Disclosure: Growth in Hydraulic Fracturing Puts New Pressures on Oil Industry" (2013) 33:13 *Lawyers Weekly*; Mroue, *supra* note 2 at 28 (see for causes of groundwater contamination); Brett A Miller, "Unconventional Oil and Gas: Interactions with and Implications for Groundwater" in Buono et al, *Regulating Water Security*, *supra* note 2, 267; Steven H Leitzl, Elizabeth J Nickless & Robert J Froehlich, "Recent Judicial Decisions of Interest to Energy Lawyers" (2015) 53:2 *Alta L Rev* 481; Buono et al, "Introduction," *ibid* at 15; Lane, *ibid* at 32.

<sup>66</sup> Brandes & Nowlan, *supra* note 19 at 267.

<sup>67</sup> *Ibid* at 267.

<sup>68</sup> For conflict between fracking and agricultural productivity because of water use, see generally Lane, *supra* note 3 at 13.

<sup>69</sup> See Mroue, *supra* note 2 at 25 (risks that fracking presents to the water supply in periods of drought).  
<sup>70</sup> Brandes & Nowlan, *supra* note 19 at 267.

<sup>71</sup> Chad Staddon et al, "Regulating Water Security in Unconventional Oil and Gas: Common Challenges, Trade-Offs, and Best Practices from Around the Globe" in Buono et al, *Regulating Water Security*, *supra* note 2, 397 at 403; Buono et al, "Introduction," *supra* note 64 at 4; Mroue, *supra* note 2 at 22 ("According to the U.S. Environmental Protection Agency (EPA), hydraulic fracturing uses two to five million gallons of water per well (Rahm 2011)"), 25 ("A single hydraulic fracturing operation can use between three and eight million gallons of water, depending on the length and geology of the well"); Estrada & Bhamidimarri, *supra* note 63 at 294. See generally Kondash & Vengosh, *supra* note 64 (summary of overall water footprint from fracking in the US from 2005 to 2014); Minor, *supra* note 64 at 70 (summarizes amount of water used for fracking in Colorado between 2020 and 2015).

<sup>72</sup> Estrada & Bhamidimarri, *ibid* at 293: "The generation of huge amounts of wastewater and its management is one of the main concerns associated with hydraulic fracturing for shale gas extraction."

<sup>73</sup> Alberta Energy Regulator, "Hydraulic Fracturing: Water Use Performance," online: <[www.aer.ca/protecting-what-matters/holding-industry-accountable/industry-performance/hydraulic-fracturing-water-use.html](http://www.aer.ca/protecting-what-matters/holding-industry-accountable/industry-performance/hydraulic-fracturing-water-use.html)> [AER, "Hydraulic Fracturing"].



injection of high volumes of water.<sup>74</sup> Once the well is fractured, less water is needed.<sup>75</sup> The amount of wastewater that fracking generates depends on the amount that returns to the surface during a well's lifetime,<sup>76</sup> but the cumulative amounts are enough to make wastewater disposal economically burdensome.<sup>77</sup> Researchers anticipate that the water volumes needed for fracking will only grow over time.<sup>78</sup>

This issue is exacerbated by the fact that Alberta produces a considerable amount of petroleum and natural gas via fracking.<sup>79</sup> Canada is one of the top natural gas producing countries in the world,<sup>80</sup> and Alberta and British Columbia together produce 75 percent of that natural gas.<sup>81</sup> Alberta's oil and gas industry is currently struggling, but as soon as the economic climate is more favourable, fracking operations will increase once again, and this means increased freshwater use. Alberta's total freshwater consumption for fracking already is significant and likely will increase — for instance, 7 million cubic meters of non-saline water was used for fracking in Alberta in 2016,<sup>82</sup> whereas 29 million cubic meters of water was used for fracking in Alberta in 2018.<sup>83</sup>

Second, although other industries — for example, agriculture — use more water annually than fracking,<sup>84</sup> fracking is detrimental to Alberta's freshwater reserves because it removes water entirely from the hydrological cycle,<sup>85</sup> in part because some of the water never returns to the surface once injected. The amount of water that returns to the surface varies across well sites, plays, and geographical areas,<sup>86</sup> but the academic literature indicates that the amount can be anywhere from 8 to 70 percent.<sup>87</sup> Fracking also removes water from the hydrological cycle because industry's standard practice is to dispose of the frac wastewater using deep well injection,<sup>88</sup> though some operators recycle and reuse the frac water.<sup>89</sup> The extent to which operators recycle and reuse their frac water depends on a number of factors,<sup>90</sup>

<sup>74</sup> Estrada & Bhamidimarri, *supra* note 63 at 294.

<sup>75</sup> *Ibid* at 294.

<sup>76</sup> *Ibid* at 295.

<sup>77</sup> Rassenfoss, *supra* note 63 at 49–50.

<sup>78</sup> Buono et al, *supra* note 64 at 4.

<sup>79</sup> AER, "Hydraulic Fracturing," *supra* note 73 (in 2018, Alberta produced over 521 million barrels of oil equivalent via fracking).

<sup>80</sup> Curran, *supra* note 19 at 312.

<sup>81</sup> *Ibid* at 312.

<sup>82</sup> CAPP, *supra* note 57 at 1.

<sup>83</sup> AER, "Hydraulic Fracturing," *supra* note 73.

<sup>84</sup> CAPP, *supra* note 57; Alberta Energy Regulator, "Water and Oil: An Overview of the Use of Water for Enhanced Oil Recovery in Alberta" at 19, online: <[www.aer.ca/documents/applications/WA\\_WaterOil\\_UseOfWaterForEnhancedOilRecovery.pdf](http://www.aer.ca/documents/applications/WA_WaterOil_UseOfWaterForEnhancedOilRecovery.pdf)>.

<sup>85</sup> Mroue, *supra* note 2 at 28 ("The injection of produced water from hydraulic fracturing into deep formations for disposal removes potential water supply from the hydrologic cycle"), 31.

<sup>86</sup> The 8 to 70 percent number relies on heavily on US data (Estrada & Bhamidimarri, *supra* note 63 at 295).

<sup>87</sup> Estrada & Bhamidimarri, *ibid* at 295; Romany Webb & Katherine R Zodrow, "Disposal of Water for Hydraulic Fracturing: Case Study on the US" in Buono et al, *Regulating Water Security*, *supra* note 2, 221 at 222 ("The amount of these return flows varies between geological formations, ranging from just 10% of injected volumes in the Marcellus to over 100% in the Barnett (EPA 2015, p. 4-3)").

<sup>88</sup> See Estrada & Bhamidimarri, *ibid* at 297 ("In the US, wastewater management trends have gradually shifted in time from the initial disposal in wastewater treatment facilities to reuse and deep well injection mainly due to the development and enforcement of tighter environmental regulations"); Webb & Zodrow, *supra* note 87 at 226; Lane, *supra* note 3 at 28.

<sup>89</sup> See Webb & Zodrow, *ibid*; Lane, *ibid* at 28.

<sup>90</sup> This is discussed in more detail in Part IV of this article.

but in 2018, Alberta's fracking industry only sourced 2 percent of its water from recycled water.<sup>91</sup>

Finally, the use of water in fracking is concerning because its long-term impacts are difficult to assess. The lasting costs of freshwater use in fracking in Alberta are ultimately unknown. This is largely due to the uncertainty that scientists face when making predictions about how human behaviour impacts the environment.<sup>92</sup> This risk especially suggests that Alberta should steward its freshwater resources carefully. The difficulty, however, is that the current regulatory system was not designed to and does not adequately address the water scarcity risks that fracking presents.

## **B. THE LEGISLATIVE FRAMEWORK WAS NOT DESIGNED TO MANAGE THESE RISKS**

The current legislative framework was not designed to address or manage the risks that fracking poses to Alberta's water scarcity.<sup>93</sup> Rather, both, the underlying doctrine of riparian rights and the water use legislation throughout the prairie provinces, were shaped by their historical context.<sup>94</sup> Because the current regulatory framework is based on a system designed in this historical context, it does not adequately address the novel challenges that fracking poses to water scarcity, including the removal of vast quantities of water from the hydrological cycle.

Water rights in Western Canada were first established in a context where water was plentiful. They originated from a doctrine of riparian rights<sup>95</sup> developed in England and the Eastern United States, locations with abundant water resources.<sup>96</sup> Transplanting this doctrine in Western Canada seemed appropriate because water in Western Canada also appeared plentiful.<sup>97</sup> However, riparianism did not prevail in Western Canada because the doctrine was not suited to dry areas — and Western Canada was drier than it initially seemed.

Alberta's water rights system is inherited from legislation that Parliament developed with the express intention of addressing Canada's irrigation needs in the face of drought. Alberta's current *Water Act* is a modified version of the *Water Resources Act*,<sup>98</sup> which was based on Canada's *Northwest Irrigation Act*<sup>99</sup> of 1894. The *Northwest Irrigation Act* was obviously not designed to regulate fracking. It was designed to promote irrigation on the Prairies to combat a serious drought that began in 1887, a problem which riparianism could not address.<sup>100</sup> Although the *Northwest Irrigation Act* was designed with this irrigation purpose

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<sup>91</sup> AER, "Hydraulic Fracturing," *supra* note 73.

<sup>92</sup> Curran, *supra* note 19 at 311.

<sup>93</sup> See also Lane, *supra* note 3 at 61–63. This is consistent with general findings of Staddon et al, *supra* note 71 regarding other frameworks regulating fracking and water security throughout the world (*ibid* at 402 ("As unconventional energy technologies such as hydraulic fracturing develop, they often outstrip the speed of regulatory evolution, meaning that legal/regulatory gaps are un-addressed or that law and policy are borrowed from adjacent or analogous areas")).

<sup>94</sup> Percy, "Water Rights," *supra* note 6 at 145.

<sup>95</sup> *Ibid* at 143.

<sup>96</sup> *Ibid* at 142; Lane, *supra* note 3 at 64–65.

<sup>97</sup> Percy, "Water Rights," *ibid* at 143.

<sup>98</sup> RSA 1980, c W-5.

<sup>99</sup> SC 1894, c 30.

<sup>100</sup> Percy, "Water Rights," *supra* note 6 at 143–45.

in mind, its provisions still “regulate[d] appropriations of water for all purposes and remain[ed] the basis of water use legislation in all three prairie provinces” in the 1970s.<sup>101</sup> Though Alberta’s water legislation was rewritten in 1999, this regulatory structure is still embedded in Alberta’s current *Water Act*.<sup>102</sup>

Because the new *Water Act* subsumed the old legislation’s water management system, the legislation did not and could not contemplate the risks to water security posed by fracking. Although water use in irrigation and fracking have some parallels (for instance, both involve taking large amounts of water from the source supply, and neither are practically possible under riparianism), irrigation is distinct from fracking because it involves non-consumptive use. In irrigation, water generally returns to the hydrological cycle through run off or evapotranspiration, whereas in fracking, it does not. Given this important difference, Alberta’s regulatory framework needs to be adapted to meet Alberta’s current water conservation needs.

### C. THE CURRENT REGULATORY FRAMEWORK DOES NOT EFFECTIVELY MANAGE THESE RISKS

Alberta’s current approach to managing its water security risks in this context is thus limited in part by its historical context. Neither the *Water Act* nor its corresponding regulations have specific rules designed to promote water conservation in fracking operations where water is entirely removed from the hydrological cycle. However, Alberta’s current system also has these gaps because of the GoA’s approach to regulating the matter under the *Water Act*. Though the GoA could arguably use the *Water Act* itself more deliberately to steward the province’s resources, this article is particularly concerned with the fact that the GoA has primarily relied on water guidelines to implement its policy goals. Taking this approach has negative repercussions for water stewardship when it comes to fracking: it means that the current structure lacks regulatory teeth and thus, cannot sufficiently protect Alberta’s freshwater resources.

#### 1. THE GUIDELINES DO NOT CREATE SUFFICIENT INCENTIVES TO CONSERVE WATER

As mentioned in Part II, Alberta’s current regulatory framework relies primarily on its *OIG* guideline to promote water conservation in fracking operations. Helpfully, the *OIG* and other GoA policy directives have made industry’s voluntary steps towards water conservation more visible — they have instituted reporting mechanisms, highlighted public concerns, and encouraged discussion about Alberta’s water conservation needs.<sup>103</sup> However, the *OIG* is a guideline, not legislation, and as such, it lacks regulatory teeth. Even though the

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<sup>101</sup> *Ibid* at 145.

<sup>102</sup> Banks relies on Percy, “Water Rights,” *ibid* and Percy, *Water Rights Legislation*, *supra* note 6 as an overview of Alberta’s water rights system in his May 2010 article (Banks, “Policy Proposals,” *supra* note 19 at 82). Banks also indicates that Alberta’s reform to its water licensing system via the 1999 *Water Act* did not change the fundamental structure of the FITFIR system; it simply “enhanc[ed] the ability of a licensee to transfer its entitlement” (*ibid*). This suggests that the claim from Percy’s 1977 article that the regulatory structure from the *Northwest Irrigation Act* forms the basis of Alberta’s water rights system 1977 article is still correct today. See also Lane, *supra* note 3 at 64–65.

<sup>103</sup> See *OIG*, *supra* note 46 at 4; CAPP, *supra* note 57; AWC, “Sector Improvements,” *supra* note 57.

AER could use the guideline to deny licence applications that use freshwater or to grant licences using strict conditions, this optional regulatory power is insufficient to meet Alberta's water conservation needs for two reasons: (1) it does not apply to temporary licences<sup>104</sup> and (2) its application is optional.

First, Alberta's guideline-based approach to regulating freshwater use in fracking cannot effectively conserve Alberta's water resources because it does not apply to temporary diversion licences. Temporary diversion licences<sup>105</sup> can only be issued for one year or less and can be used to consume, take, or remove water "for any purpose."<sup>106</sup> These licences are ideal for fracking as operators typically only use water in fracking for a limited amount of time.<sup>107</sup> Under the current system, an operator could obtain three to five temporary licences, each with a one-year duration, to access the freshwater they need. If they did so, they would not need to explore and comply with the water conservation requirements set out in the *OIG*. This situation creates a serious regulatory gap. Operators that use this strategy circumvent the *OIG* entirely, meaning that the guideline has no practical effect, and therefore, cannot adequately protect Alberta's water resources.

The second key and multi-layered problem with the guideline-based regulatory system is that it is optional. The AER has significant discretion in how it interprets and applies the *OIG* — meaning that the guideline's application is optional — and the guideline has no enforcement mechanism so, in effect, compliance with the guideline is also optional. As mentioned above, the AER *could* use the *OIG* to deny licence applications that use freshwater or to grant licences using strict conditions. However, a brief survey of *Water Act* licences and their amendments approved for "industrial injection"<sup>108</sup> purposes in fracking regions and posted on the GoA's Alberta Water Licence Viewer<sup>109</sup> database, indicates that the AER has not granted licences with strict conditions.<sup>110</sup> Although these licences contain provisions which allow for periodic review and modification to ensure the water is used in accordance with the public interest,<sup>111</sup> the licence conditions only include monitoring and reporting requirements.<sup>112</sup>

The AER is also unlikely to deny this type of licence application or grant a licence using strict conditions because of its commitments to and dependency on energy development in Alberta. The text of the AER's enabling statute indicates that the AER's mandate is primarily to foster energy development, and that this primary focus is modified by the need to ensure energy development occurs in an environmentally responsible manner: the AER is to "provide

<sup>104</sup> See *OIG*, *ibid* at 2.

<sup>105</sup> See *Water Act*, *supra* note 5, ss 62–65.

<sup>106</sup> See definition of "diversion of water" (*ibid*, s 1(m)(i)).

<sup>107</sup> Estrada & Bhamidimarri, *supra* note 63 at 294.

<sup>108</sup> See e.g. Alberta Environment, *Licence to Divert and Use Water Pursuant to the Water Resources Act*, File No 26497, Priority No 1993-12-15-02 (1995) at 2 [Licence 26497]; Alberta Environment, *Licence to Divert and Use Water Pursuant to the Water Resources Act*, File No 20702, Priority No 1983-09-02-03 at 2 [Licence 20702].

<sup>109</sup> See Government of Alberta, "Alberta Water Licence Viewer (AWLV)," online: <[www.alberta.ca/alberta-water-licence-viewer.aspx](http://www.alberta.ca/alberta-water-licence-viewer.aspx)>.

<sup>110</sup> Further research should include a detailed review of licences for "industrial injection" on the AEWLV and a review of the list of temporary diversion licence approvals on the AER's Publication of Decision search tool (see e.g. Alberta Energy Regulator, "Publication of Decision," online: <[webapps.aer.ca/Pod](http://webapps.aer.ca/Pod)>).

<sup>111</sup> See e.g. Licence 26497, *supra* note 108; Licence 20702, *supra* note 108.

<sup>112</sup> *Ibid*.

for the efficient, safe, orderly and environmentally responsible development of energy resources in Alberta.”<sup>113</sup> In addition, the AER generates most of its revenues from industry levies and assessment fees, which means that the AER relies heavily on industry’s development in maintaining its own budget.<sup>114</sup> These factors suggest that the AER will understandably be attentive and responsive to industry’s energy development concerns, and that the AER has an incentive to prioritize industry’s development needs over and above Alberta’s water conservation ones.

Furthermore, even if an AER decision maker with stronger conservation priorities used the *OIG* to deny certain licence applications or impose stricter conditions, these actions are less desirable than overarching regulatory change because of their inherent uncertainty. Industry will not know how strictly the guidelines are being interpreted until the specific decision is made, and this decision will be less accessible than statutory amendments to the *Water Act* or its regulations. Future decisions could be more or less strict, depending on the particular decision maker. This uncertainty would make it difficult for industry to plan for the future and would likely generate increased litigation consequences which would negatively impact business development. In contrast, implementing overarching regulatory change would apply equally to all industry actors, be announced in advance, and be more accessible. This approach would better uphold rule of law principles and provide industry with the certainty it needs to plan and, by extension, innovate.

The *OIG*’s optional nature is demonstrated by its language: industry is “encouraged to cooperate with the [guidelines] intent”<sup>115</sup> and asked to minimize its freshwater use where there are “reasonable and feasible alternatives.”<sup>116</sup> This language is broad and flexible, and it could be subject to any number of interpretations that do not adequately protect Alberta’s freshwater resources. Reasonable alternatives could be defined as measures that do not increase or only marginally increase the price per barrel of petroleum and natural gas extracted from the ground. Feasible could similarly be defined as what is profitable. In short, this language gives wide latitude to industry to define the scope of their water conservation obligations, even if that scope does not adequately conserve Alberta’s water resources.

A key objection to this criticism is that Alberta’s voluntary, guideline-based governance system has been effective because the energy industry has made demonstrated efforts to conserve water. Arguably, there is no need to institute mandatory consequences and incentives via legislation. This argument can be developed and addressed in the following ways.

First, one might argue that the Alberta Water Council’s (AWC) 2017 report on water productivity across heavy water-using sectors in Alberta supports the position that Alberta’s energy industry is effectively conserving water under this voluntary system. After all, the report concluded that Alberta’s seven major water-using sectors had improved their water

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<sup>113</sup> *REDA*, *supra* note 59, s 2(1)(a).

<sup>114</sup> See Alberta Energy Regulator, “Alberta Energy Regulator Financial Statements for the Year Ended March 31, 2019” at 5, online: <[www.aer.ca/documents/reports/AER\\_Financial\\_Statements\\_2018-19\\_OAG.pdf](http://www.aer.ca/documents/reports/AER_Financial_Statements_2018-19_OAG.pdf)>.

<sup>115</sup> *OIG*, *supra* note 46 at 2.

<sup>116</sup> *Ibid* at 3.

use efficiency by 32 percent over ten years.<sup>117</sup> The AWC is proud of this accomplishment because the “Water for Life” target for the reporting period was to increase efficiency by 30 percent.<sup>118</sup>

However, although the effort by these seven industries is laudable, this number does not support the position that Alberta’s *fracking* industry has effectively conserved water. The report summarizes the total water efficiency of Alberta’s seven major water-using sectors,<sup>119</sup> not just fracking operations and not even just Alberta’s oil and gas production industry. In addition, the numbers reported do not necessarily reflect increased efficiency or active conservation measures. For instance, the decreases in water diversion, net flow, and net use in the Chemical and Petrochemical sector<sup>120</sup> were due to economic conditions that prompted the sector to shut down some of its operating units and operate other plants below capacity.<sup>121</sup>

Second, one could argue that the actions of companies like Suncor and Shell Canada Energy demonstrate that Alberta’s oil and gas industry is committed to water conservation, and therefore, the guidelines are effective.<sup>122</sup> Suncor, for example, has dramatically increased its recycling efforts by sourcing approximately 88 percent of the water used for its mining and extraction operations from recycled tailings water.<sup>123</sup> Suncor also recycles about 96 percent of the water that it uses at its Firebag in situ site and about 100 percent of the water it uses at its MacKay River in situ facility.<sup>124</sup> Likewise, Shell Canada Energy tries to conserve freshwater by using the Town of Fox Creek’s treated wastewater in its completion operations.<sup>125</sup> These efforts are consistent with the AER’s general 2018 Water Use Performance report which indicates that Alberta’s energy industry recycled 79 percent of the water it used for energy development.<sup>126</sup>

While these voluntary efforts are commendable and should be encouraged, they do not adequately address the specific problems that fracking poses for water scarcity — oil sands water use poses a different set of issues. In addition, for fracking itself, the numbers are not as promising. CAPP reports that of the 7 million cubic meters of non-saline water used for fracking in Alberta in 2016, 93 percent was sourced from surface water and fresh groundwater, while only 6 percent was from recycled water and 1 percent from alternative sources.<sup>127</sup> The AER’s findings for 2018 are worse: of the 29 million cubic meters of water used for fracking in Alberta, only 2 percent was sourced from recycled water and less than 3 percent was from alternative sources.<sup>128</sup> Thus, while these efforts by industry are helpful

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<sup>117</sup> AWC, “Sector Improvements,” *supra* note 57 at 4–5.

<sup>118</sup> *Ibid.*

<sup>119</sup> *Ibid.*

<sup>120</sup> *Ibid.* at 22. See percentage highlights: 21 percent decrease in total water diversion, 49 percent decrease in return flow, 11 percent decrease in net use (*ibid.* at 23).

<sup>121</sup> *Ibid.* at 24.

<sup>122</sup> CAPP, *supra* note 57 at 2.

<sup>123</sup> Suncor, “Report on Sustainability 2019: Water Performance and Stewardship,” online: <sustainability-prd-cdn.suncor.com/-/media/project/ros/shared/documents/reports-on-sustainability/2019-report-on-sustainability-en.pdf>.

<sup>124</sup> *Ibid.*

<sup>125</sup> CAPP, *supra* note 57 at 2.

<sup>126</sup> Alberta Energy Regulator, “Water Use Performance,” online: <www.aer.ca/protecting-what-matters/holding-industry-accountable/industry-performance/water-use-performance.html>.

<sup>127</sup> CAPP, *supra* note 57 at 1.

<sup>128</sup> AER, “Hydraulic Fracturing,” *supra* note 73.

in other areas of oil and gas development, they do not sufficiently address the water scarcity risks that fracking poses.<sup>129</sup>

Finally, one could argue that Alberta's fracking operators conserved an adequate amount of water because they only used about 18 percent of their non-saline water allocation in 2018.<sup>130</sup> However, not only is this true of many water allocations, but we do not know whether the AER's initial allocations did enough to conserve water and manage the water scarcity risks posed by fracking. Likely, they did not, given the low threshold for licence approvals under the *Water Act*, the scientific difficulties in measuring ecological impacts, and the bias inherent in the approval process (industry makes an application for what they think they need, likely high-balling the figure to manage their own economic risks; then industry justifies its position and the regulator decides whether to approve or not with certain conditions). This does not mean that bias is inherently problematic or that another entity in the system should be making the application. It simply means that even though fracking operators used 18 percent of their water allocation for 2018, they still may not have — they likely did not — effectively conserved water.

The guidelines present a problem because they have little bearing on actual behaviour. In other words, they lack consequences and compelling incentives precisely because they are mere guidelines. The reality is that, for some, simply being encouraged to co-operate with guidelines for action is not enough to produce the desired behaviour. Unless the law actively binds people (and thereby institutions) to carry out particular actions, they may see compliance as merely optional.<sup>131</sup>

The monitoring and reporting requirements may act as a form of minor consequence — companies may be pressured into complying with the guidelines because of the social stigma that would accompany their violation. However, this behavioural modification is minimal when compared with stronger measures that could actively shape behaviour like imposing a higher cost on the volume of water used, punitive measures for violating the rules, or tax incentives for recycling frac water. In conclusion, a more robust regulatory framework is necessary not only because the current scheme can be circumvented by operators who choose to use temporary diversion licences, but also because the current regulatory scheme in and of itself is weak.

## 2. TRANSFERABILITY IS LIMITED

An article on fracking and water use would be remiss if it did not at least mention the issue of transferability. Yet, while transferability is theoretically relevant, given Alberta's current regulatory structure, it is not the best means of addressing water scarcity. It is hypothetically true that increasing the transferability of water rights could increase efficiency, and it is also true that Alberta's regulatory system, in effect, does not allow for that possibility. The *Water Act* contemplates water rights transfers, but they are highly restricted. Like its predecessor, the *Water Resources Act*, the *Water Act* allows water licences

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<sup>129</sup> For support as to why a comprehensive response to water conservation in fracking is imperative, see Staddon et al, *supra* note 71 at 399.

<sup>130</sup> See AER, "Hydraulic Fracturing," *supra* note 73.

<sup>131</sup> See e.g. Dianne Saxe, "Application of Provincial Environmental Statutes to the Federal Government, its Servants and Agents" (1990) 4 Can Environmental L Reports (Articles) 115.

to be transferred with the land to which they are attached.<sup>132</sup> Otherwise, water in a licensed allocation can be transferred only if it (1) is in an area of Alberta that is subject to an approved WMP and can be transferred under that plan<sup>133</sup> or (2) is approved by a Lieutenant Governor in Council order.<sup>134</sup> Currently, Alberta has four approved WMPs — for the Battle River, the Cold Lake-Beaver River, the Lesser Slave Basins, and the South Saskatchewan River Basin.<sup>135</sup>

In addition, the Director will only consider the transfer application if the proposed transfer allocation is not from a licence (1) whose allocation is the result of a transfer and (2) whose allocation will revert back to the licence it was transferred from (meaning that the licence which the allocation is being transferred from must have an allocation to give; if that licence's allocation reverts back to the licence *it* was transferred from, it will have no allocation to give to the new licence).<sup>136</sup> The licence which the proposed transfer is coming from must also be in “good standing.”<sup>137</sup>

These requirements, coupled with a rigorous procedure for transfer applications,<sup>138</sup> make trading water allocations notoriously difficult.<sup>139</sup> Energy law scholar, Nigel Bankes, has observed, writing in 2009, that “[o]ver the last 10 years there ... have been just over 30 transfers in Alberta and some parties have reported extraordinary difficulties in trying to acquire secure rights in the market.”<sup>140</sup> Recently, the number of transfers in the approved WMP for the South Saskatchewan River Basin specifically has been more promising: as of 2017, there have been “210 approved transfers ... in the closed part of the basin since 2007.”<sup>141</sup> However, the reason that water transfers in this WMP have been higher is because the basin has largely been closed to new licence applications since 2007, and generally speaking, the only way to acquire water rights in this basin is via an approved “water transfer.”<sup>142</sup>

Allowing water rights transfers among fracking operators could promote water conservation by encouraging the most efficient use of each licensee's water allocation, but only under certain conditions. Transfers would only encourage water conservation in a situation where three criteria are met. First, operators must actually acquire licences to use water. Second, operators must use the full allotment under their licences and need more water. Finally, the licence supply must be limited or the cost of a licence must increase (from its current cost). Otherwise, water use will merely increase because operators could generate

<sup>132</sup> *Water Act*, *supra* note 5, ss 45, 58, 72, 75; *Water Resources Act*, RSA 1980, c W-5.

<sup>133</sup> *Ibid*, s 81(7)(a)(i).

<sup>134</sup> *Ibid*, s 81(7)(a)(ii).

<sup>135</sup> Government of Alberta, “Water Management Plans,” online: <[www.alberta.ca/water-management-plans.aspx](http://www.alberta.ca/water-management-plans.aspx)>; Government of Alberta, “Water Act\* Administrative Guideline for Transfer of Water Allocations (and Agreements to Assign Water, and Licence Amendments),” vol 2 at 10, online: <[open.alberta.ca/dataset/07741435-0383-4d0b-ad56-826cabd0d4cd/resource/1023192b-d2f3-42bb-a634-d8daecc17864/download/2014-guidelinetransferwaterallocation-nov2014.pdf](http://open.alberta.ca/dataset/07741435-0383-4d0b-ad56-826cabd0d4cd/resource/1023192b-d2f3-42bb-a634-d8daecc17864/download/2014-guidelinetransferwaterallocation-nov2014.pdf)>.

<sup>136</sup> *Water Act*, *supra* note 5, s 81(7)(b).

<sup>137</sup> *Ibid*, s 81(7)(c).

<sup>138</sup> Bankes, “Policy Proposals,” *supra* note 19 at 83–84.

<sup>139</sup> *Ibid* at 84–85.

<sup>140</sup> *Ibid* at 86.

<sup>141</sup> See Nigel Bankes & Cheryl Bradley, “Water for Coal Developments: Where Will It Come From?” (4 December 2020) at 3, online (blog): <[ablawg.ca/wp-content/uploads/2020/12/Blog\\_NB\\_CB\\_Coal\\_Water.pdf](http://ablawg.ca/wp-content/uploads/2020/12/Blog_NB_CB_Coal_Water.pdf)>.

<sup>142</sup> *Ibid*.



extra revenue by selling their excess water allotment to others in industry. As such, expanding the transferability of water licences is not an effective means of increasing efficient water use at this time given that in 2018 fracking operators used only 18 percent of their water allocations.<sup>143</sup>

If the AER was able and willing to decrease initial water licence allocations to an amount lower than that which fracking operators currently use, then a more streamlined transfer system for water in fracking could: (1) incentivize conservation because individual licensees would limit their consumption to the amount they actually need to generate revenue from selling the rest; (2) increase water use efficiency because the water could be used by the licensees who want it most; and (3) increase flexibility because the system would be better able to accommodate the changes in water availability from year to year.<sup>144</sup> To summarize, water rights transfers in fracking could increase water conservation but only under certain conditions that are not currently present in Alberta.

#### IV. RECOMMENDATIONS FOR IMPROVEMENT

Given the importance of Alberta's freshwater resources and the limitations outlined above, changes to Alberta's regulatory framework must be made at some point. Ideally, these changes should be made sooner than later. Yet the current economic climate is understandably a limiting factor. To effectively promote water conservation in fracking, policymakers should evaluate their priorities and adjust other regulatory forces to facilitate a stronger market for oil and gas while simultaneously implementing these water conservation-focused regulatory changes. This section outlines recommendations for change, provides a rationale for those recommendations, and evaluates the associated drawbacks.

##### A. RECOMMENDATIONS

Given the need to protect Alberta's water resources while still promoting oil and gas development, I would make the following recommendations. These recommendations are consistent with some of the inroads made in other jurisdictions (most notably, Pennsylvania and Texas).

First, if used for fracking, freshwater should cost something. That cost should be significant and proportionate to the amount of water used. It should be high enough that when coupled with disposal costs, it makes recycling efforts worthwhile. The Alberta Legislature should amend the *Water Act* to give the Minister of Environment powers to set regulations for the price of water, and cabinet should amend or draft new *Water Act* regulations to include a cost of water per cubic meter, to be reviewed annually and applicable to fracking operations only. Of course, this template could also be applied to other heavy water-using sectors, but that discussion is beyond the scope of this article. Using the same principles, other industrial users should likely be required to pay some amount for water.

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<sup>143</sup> See AER, "Hydraulic Fracturing," *supra* note 73.

<sup>144</sup> Buono et al, "Introduction," *supra* note 64 at 12.

Second, the Province should amend the relevant legislation to increase the cost of frac water disposal, creating an incentive for fracking operators to use water more efficiently. This recommendation has already been implemented in Pennsylvania, where recycling has been highly successful because the geographical and regulatory context makes wastewater disposal very expensive.<sup>145</sup> As in Pennsylvania, the total costs for freshwater and wastewater disposal should be more than the cost of recycling. Practically, this change should be implemented using the same drafting and amendment strategy as that outlined for the first recommendation.

Third, and importantly, as oil and gas fracking must remain economically viable in Alberta — tax and royalty changes should be made to incentivize recycling efforts and offset the total costs involved. This recommendation is consistent with Texas’s efforts in the area: Texas has exempted property used to recycle or reuse frac wastewater from state sales, excise taxes, and use taxes<sup>146</sup> and has considered providing tax credits to producers who use recycled wastewater in their operations.<sup>147</sup> Likewise, Alberta should create tax deductions or credits for recycling and reuse efforts, drafted and construed broadly to encourage recycling and reuse behavior. In addition, Alberta should institute lower royalties for operations that use recycled frac water.

Fourth, so as not to encumber energy companies with another regulatory burden that could discourage recycling efforts, Alberta should either have a streamlined permit approval process for recycling or no permit requirement at all. Several American states have already navigated this issue, and Alberta should look to them for guidance. For example, five of six major oil and gas producing American states regulate recycling operations, and three of those states require recycling permits.<sup>148</sup> These states instituted permitting requirements for recycling to ensure that recycling is done safely.<sup>149</sup> However, the extra regulatory burden unintentionally discouraged recycling,<sup>150</sup> and as a result, some states have streamlined the permitting process.<sup>151</sup> Alberta should follow suit.

Fifth and finally, these regulatory changes should come into force sometime, perhaps two years, after they are finalized and announced so as to provide industry with an opportunity to overcome current difficulties with the global pandemic and to adjust its business practices to comply with new regulations in a cost-effective manner. The tax relief and royalty adjustments should come into effect at the beginning of this process so that companies that commit to recycling and reuse methods can implement those methods and realize the corresponding benefits before the cost of water is introduced. Advance notice of the precise regulatory changes to be implemented would allow industry the time and certainty it needs

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<sup>145</sup> See generally Qiyang Jiang et al, “Application of Ceramic Membrane and Ion-Exchange for the Treatment of the Flowback Water from Marcellus Shale Gas Production” (2013) 431 J Membrane Science 55 at 55 (detail regarding Pennsylvania’s regulatory framework and geological context); Rassenfoss, *supra* note 63 at 49–50; Scott Jenkins, “Frac Water Reuse” (2012) 119:2 Chemical Engineering 14 at 14 (recycling can reduce expenses when wastewater disposal options are limited due to “high trucking costs, increased regulatory oversight and limited suitable underground sites”).

<sup>146</sup> Webb & Zodrow, *supra* note 87 at 238.

<sup>147</sup> *Ibid.*

<sup>148</sup> *Ibid* at 236–37.

<sup>149</sup> *Ibid* at 236.

<sup>150</sup> *Ibid.*

<sup>151</sup> *Ibid* at 236–37.

to adapt its processes accordingly. This measure would help minimize the economic impact of putting a price on water.

Practically, policymakers should ensure that these policies can be operationally validated before they implement them. They should identify economically strong industry actors with commitment to sustainability, and then engage in extensive dialogue with these actors to determine on-the-ground factors that will affect the success of these regulatory changes. The goal should be to assess and mitigate otherwise unforeseen economic, environmental, and legal risks. Factors to consider in this assessment should include: current disposal costs and practices; well fracturing locations, geography, and seasonal limitations; water storage practices and technologies; and water recycling and reuse technologies.

## B. RATIONALE

Unlike the current guideline-based system, these legislative-based measures would strongly incentivize water conservation by increasing recycling and reuse efforts in fracking. Significant consequences would ensue if fracking operators did not innovate because the total costs of acquiring fresh water and disposing of frac water would be higher. On the other hand, fracking operators could (at least partially) offset higher water costs with tax and royalty reductions — on the condition that they conserve water by recycling or reusing it.

This approach is consistent with data from the American states that successfully recycle and reuse frac water. The practices from these jurisdictions indicate that behavioural change is only possible if the geological or regulatory context makes acquiring freshwater and disposing of frac water more expensive than recycling or reusing it.<sup>152</sup> In Pennsylvania,<sup>153</sup> recycling has been widely adopted because frac wastewater disposal is highly restricted by geology and regulations.<sup>154</sup> Recycling has also become more popular in Texas<sup>155</sup> due to drought<sup>156</sup> and a stronger regulatory framework.<sup>157</sup> In both American jurisdictions (as well as elsewhere in the US), freshwater acquisition also actually costs something.<sup>158</sup> Water acquisition and disposal frequently costs more than water recycling and reuse, and as a result, recycling and reuse efforts have been economically successful in these jurisdictions.

This approach is also environmentally and economically responsible. Alberta's freshwater supplies are already limited in certain areas of the province, for example, in southern Alberta and the Horn River Basin.<sup>159</sup> Wastewater disposal will become increasingly expensive as

<sup>152</sup> Rassenfoss, *supra* note 63 at 49–50.

<sup>153</sup> See *ibid* at 48; Buono et al, "Introduction," *supra* note 64 at 14; Gabriel Collins & Julie A Rosen, "Frac Water Acquisition in the Major U.S. Unconventional Oil and Gas Plays" in Buono et al, *Regulating Water Security*, *supra* note 2, 89 at 104–105.

<sup>154</sup> Webb & Zodrow, *supra* note 87 at 238–39.

<sup>155</sup> Mroue, *supra* note 2 at 31–32 (recycling case study in Texas).

<sup>156</sup> Rassenfoss, *supra* note 63 at 49.

<sup>157</sup> Mroue, *supra* note 2 at 32–33.

<sup>158</sup> Collins & Rosen, *supra* note 153 at 96 (most common method in the US is to purchase the water from third party suppliers; sometimes landowners sell groundwater for a royalty; the "amounts of money at stake in such situations can be significant").

<sup>159</sup> Rassenfoss, *supra* note 63 at 51. See also Jenkins, *supra* note 145 at 14 ("Fresh water supplies for drilling and fracturing can be limited by regional climate, transportation logistics and competing industrial or agricultural uses").

viable disposal sites<sup>160</sup> become limited.<sup>161</sup> In addition, increased water use intensity<sup>162</sup> will also mean increased wastewater and so this problem will only continue to grow.<sup>163</sup> For these reasons, recycling and reuse of frac water has been widely recommended to conserve freshwater use in fracking, and Alberta will benefit by taking proactive steps to conserve water.<sup>164</sup>

Although these measures involve government interference, they would create a climate conducive to business growth. They would encourage industry to take responsibility for its resource use while relying on industry's ability to use its on-the-ground knowledge to innovate effectively. Specifically, these regulatory changes would prompt industry to research and implement the recycling technologies that are best for them and the Alberta market. As in the US, these measures would likely create a valuable spinoff effect — a growing market for water infrastructure.<sup>165</sup> Energy companies could become involved in and profit from this new business opportunity, diversifying by investing in this upcoming market.<sup>166</sup> Finally, these measures would support fracking operators' social licence to operate,<sup>167</sup> an important and increasingly valuable business asset in the present social climate.

Finally, these recommendations are appropriate because recycling<sup>168</sup> and reuse<sup>169</sup> of frac water is possible. For instance, in the Marcellus shale, fracking operators have reused up to 90 percent of frac wastewater.<sup>170</sup> Although treatment technology needs to be tailored to local needs,<sup>171</sup> some examples of recycling and reuse technology include:

- Fountain Quail's NOMAD technology, which converts flowback water into distilled water using a compressor to distill the wastewater at the lowest possible energy cost.<sup>172</sup>

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<sup>160</sup> *Ibid.*

<sup>161</sup> Jenkins, *ibid* ("wastewater disposal options are increasingly difficult because of high trucking costs, increased regulatory oversight and limited suitable underground sites").

<sup>162</sup> Collins & Rosen, *supra* note 153 at 92 ("once operators experience the increasing marginal returns of using more water per lateral foot, they are unlikely to scale back").

<sup>163</sup> Buono et al, "Introduction," *supra* note 64 at 13.

<sup>164</sup> Jenna Brown, "The Assessment and Acquisition of Water Resources for Shale Gas Development in the UK" in Buono et al, *Regulating Water Security*, *supra* note 2, 135 at 149.

<sup>165</sup> See Mroue, *supra* note 2 at 25 (fractured wells produce a large volume of water and these wells "provide a market for those willing to treat and sell produced water").

<sup>166</sup> See e.g. Nichola Groom, "Fracking Water's Dirty Secret – Recycling," online: <[www.scientificamerican.com/article/analysis-fracking-waters-dirty-secret/](http://www.scientificamerican.com/article/analysis-fracking-waters-dirty-secret/)>.

<sup>167</sup> Bradbury & Smith, *supra* note 64 at 83 (definition and why it is important); Staddon et al, *supra* note 71 at 408; Webb & Zodrow, *supra* note 87 at 236.

<sup>168</sup> See generally John W Ely et al, "Game Changing Technology for Treating and Recycling Frac Water" (paper delivered at the SPE Annual Technical Conference and Exhibition in Denver, Colorado, USA, October 2011), (2011) Society Petroleum Engineers; Lucas Fontenelle et al, "Recycling Water: Case Studies in Designing Fracturing Fluids Using Flowback, Produced, and Nontraditional Water Sources" (paper presented at the SPE Latin-American and Caribbean Health, Safety, Environment and Social Responsibility Conference in Lima, Peru, June 2013), (2013) Society Petroleum Engineers; Jenkins, *supra* note 145 at 15; Mroue, *supra* note 2 at 34; Collins & Rosen, *supra* note 153 at 104–105 (recycling at Marcellus play); Webb & Zodrow, *supra* note 87 at 233.

<sup>169</sup> Estrada & Bhamidimarri, *supra* note 63 at 298.

<sup>170</sup> *Ibid* at 298.

<sup>171</sup> Jenkins, *supra* note 145 at 15.

<sup>172</sup> Slutz et al, *supra* note 1 at 8.

- Gel-based water systems for fracking which tolerate high salt concentrations, such as Halliburton's UniStim service.<sup>173</sup>
- Frac fluid technology that means operators only need to lightly treat the water before reusing it.<sup>174</sup>
- Oxidation and precipitation water treatment used to treat water onsite, directly before it is used for fracking operations.<sup>175</sup>

Attention to on-the-ground detail and creating an environment for industry to innovate in this area is key because industry has, as F.A. Hayek calls it, "the knowledge of the particular circumstances of time and place."<sup>176</sup> Industry has access to knowledge that can only be known by people who fracture wells, assess ongoing business risk, and make decisions accordingly. Without communication from industry, this knowledge cannot be known by the government or the regulator, entities that are otherwise restricted by centralized decision-making processes.

Both the government and the regulator will govern better if they can access this knowledge because their decisions can then be rooted in the actual needs and risks that Alberta faces. Regulating water use in fracking in this way will facilitate this goal because it will harness that knowledge of particular circumstances. The government should be able to regulate this new technology without stifling innovation<sup>177</sup> so long as it balances competing interests and creates the right regulatory environment.

### C. DRAWBACKS

As with any policy changes, these recommendations have several drawbacks. The first is that, practically, regulators will have difficulty setting appropriate numerical values for freshwater acquisition and wastewater disposal, tax deductions and credits, and royalties to make recycling efforts cost-efficient. This process will inevitably involve trial and error and administrative costs. However, though this process will be imperfect, it should be better than the current regulatory framework. To maximize its chances of success and minimize discomfort, those making these determinations must be flexible, fair, and diligent in their work.

Second, recycling treatment will also increase the overall energy cost of production.<sup>178</sup> Nonetheless, this energy output can be reduced by using recycling technologies that recapture energy within the recycling process. Efficient recycling technologies do exist; for example, a desalination technology adopted in the Marcellus shale play in Pennsylvania uses

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<sup>173</sup> Pam Boschee, "Produced and Flowback Water Recycling and Reuse: Economics, Limitations, and Technology" (2014) 3:1 Oil and Gas Facilities 16 at 18–19.

<sup>174</sup> Collins & Rosen, *supra* note 153 at 105.

<sup>175</sup> Ely et al, *supra* note 168 at 1, 10.

<sup>176</sup> "The Use of Knowledge in Society" (1945) 35:4 American Economic Rev 519 at 521.

<sup>177</sup> See Staddon et al, *supra* note 71 at 402 ("Whether the regulatory framework is able to appropriately respond to new science and technology depends in part on the ability to develop comprehensive, bespoke guidelines that can regulate these 'pioneer' operations while not strangling innovation").

<sup>178</sup> See Boschee, *supra* note 173 at 20.

heat from condensation to offset the heat from evaporation required to run a thermal distillation.<sup>179</sup> Another option is to reuse the water by implementing fracking technologies that can tolerate high concentrations of dissolved solids.<sup>180</sup> These strategies could be pursued to reduce the higher energy costs of production that recycling would create.

A third difficulty is that putting a cost on water does not fully address Alberta's water conservation problem. Although we often fail to consider this point because water in Western Canada is seen as being so abundant, water is incommensurable. Water is essential to human health, and we will not truly know the value of our freshwater until it is gone.<sup>181</sup> Some would undoubtedly argue that these proposed changes do not go far enough. In answer to this concern, while these measures may not go far enough, they are a start. Alberta can take a step in the right direction by improving the current regulatory framework and conserving more water than it currently does. Ultimately, doing something — even if it does not entirely resolve the issue — is better than endlessly debating the issue and doing nothing. Compromise is key for moving forward.

The final and most significant drawback is that these measures will have a cost. Energy companies carrying out fracking operations in Alberta will pay more to acquire and dispose of the water they need for production. Recycling will also cost something. These costs will likely (at least in part) be passed along to consumers. Because oil and gas prices are volatile, these additional costs could also mean increased risk for energy companies involved in fracking operations.

However, energy companies who conduct fracking operations in other jurisdictions already pay for their water, and until 2020, they still have made fracking a profitable business.<sup>182</sup> As mentioned above, Alberta can minimize these business risks by supporting oil and natural gas production in the Province in other ways, particularly by providing significant tax relief or royalty adjustments for companies that rely heavily on recycled or reused water. Additionally, these recommendations are structured to minimize the damage by creating an environment that stimulates innovation and fosters a market for water infrastructure. If we care about water conservation as a society, we must tolerate some discomfort. We need to empower both the general public and industry to take responsibility for each other, the economy, and the environment.

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<sup>179</sup> *Ibid* at 20.

<sup>180</sup> Estrada & Bhamidimarri, *supra* note 63 at 298; Boschee, *ibid* at 18–19.

<sup>181</sup> See Staddon et al, *supra* note 71 at 401 regarding human right to water.

<sup>182</sup> Collins & Rosen, *supra* note 153 at 96 (the most common method in the US is to purchase the water from third party suppliers; sometimes landowners sell groundwater for a royalty; “the amounts of money at stake in such situations can be significant”).

## V. CONCLUSION

This article has argued for the need to change Alberta's regulatory framework governing fracking and water use by outlining Alberta's current regulatory framework, providing a critique of its limitations, and offering recommendations for its improvement. Fracking presents an unprecedented challenge to Alberta's freshwater resources. The current regulatory framework is ill-equipped to deal with that challenge. Alberta must institute a regulatory system backed by legislative power to precipitate the change necessary to adequately conserve its freshwater resources.

Although the political rhetoric on these issues — environmental stewardship and energy development — is increasingly polarized, it does not have to be. Alberta's leaders, energy industry, and the general public all need to take responsibility for Alberta's resources. The *Water Act* has two overarching public interest objectives.<sup>183</sup> One is water conservation. The other is energy and economic development. While these interests often conflict, they do not need to be mutually exclusive. For Alberta to thrive in an environmentally sustainable matter, we must pursue both.

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<sup>183</sup> See discussion in Part II and the *Water Act*, *supra* note 5, s 2.

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