

Ungovernable: How a Refinery Became “Too Big to Fail” — and What it Means to the People of Saskatchewan¹

By Patricia W. Elliott

with files from Kaitlyn Schropp and Julia Peterson

Publication information:

Elliott, P.W. (2024). Ungovernable: How a refinery became ‘too big to fail’ – and what it means to the people of Saskatchewan. In E. Eaton, A. Stevens & S. Tucker (Eds.), *Unjust transition: The future for fossil fuel workers* (pp. 88-116), Fernwood.

The Secret Box

In the archives of Saskatchewan’s Court of Queen’s Bench in Regina sits a brown cardboard box sealed with clear packing tape. A clue to its contents is revealed in red felt pen lettering on one side: “Files sealed as per order of Keene, J. on October 13, 2016 ... Co-operators vs. City of Regina.” From court records we know the box contains details of a Major Hazards Risk Assessment Report, commissioned in 2012 by the Co-operative Refinery Complex (CRC) at the request of the City of Regina.² From a released executive summary, we know it contains details of smokestack plumes that drift over residential areas.³ We also know the City of Regina was agreeable to publicly releasing the full report in response to a journalist’s freedom of information (FOI) request. And we know that the refinery’s legal counsel objected strenuously enough to ensure this would never happen.⁴ As for what major risks might have been revealed, that part is sealed.

For the city, its residents, and the refinery, the secret box is bound by codependencies as sticky as packing tape. If you peel back a piece, something might tear. In this light, the CRC presents a governance challenge that municipal and provincial authorities struggle to surmount. Official records suggest the refinery has been left to largely self-monitor its pollutant emissions with limited regulatory involvement or major penalties for transgressions, beyond cost compensation for stressing the municipal wastewater system. This reflects a wider picture of Saskatchewan's oil and gas sector, where direct provincial oversight of environmental impacts has been gradually reduced in favour of industry self-regulation that, in the words of a Ministry of Environment presentation, invites "environmental management aligned with a growing economy."⁵

The refinery has successfully propagated a general consensus that its operations are too crucial to the local economy to suffer any hinderance. "You can't survive without me" is the mantra of domination in a relationship. It is how secrets and transgressions accumulate unaddressed. What does this mean for the promise of a just transition? When it comes to the health of citizens, this is a crucial question to consider.

What's at Stake

James Whittingham lives 1.6 kilometres northwest of the refinery as the crow flies. Some homes in his neighbourhood are within three hundred metres of the plant. There are other industrial sites nearby, including a steel plant and a pipeline, but Whittingham says he can readily recognize the refinery's distinct odours and the particular wind conditions that bring them. "You sort of get accustomed to it and you don't react very much when it's at a lower level. But when it's really strong and you've got a sore throat or irritated eyes, then you get very concerned," he says in an

interview. Sometimes he awakens in the night to strong chemical odours and a sore throat. After shutting the windows, it can take an hour for the air to clear inside. As well, fumes have seeped through his car vents, strong enough to make him gag: “You wonder if you can breathe, it’s that bad sometimes, or if you should be breathing it.”

Whittingham notes Enbridge goes door-to-door to inform residents of upcoming work being done on their pipeline site. He’d like the CRC to similarly visit residents following refinery explosions or during planned releases, so they know when to close their windows. He would also like to know if cancer rates are higher in his neighbourhood, and if there are things he should be doing to protect himself. He wonders what the situation is for neighbourhoods to the south that are more often in the path of prevailing winds. In any case, he and his family love their home and plan to stay.

Whether or not the fumes scraping Whittingham’s throat can be conclusively attributed to the CRC, it’s a fact that living near any refinery carries risk of exposure to toxins. The CRC emits over fifty distinct substances that Environment Canada recognizes as potentially harmful to human health and/or the environment; the list includes toxic gases such as hydrogen sulfide (H₂S) and heavy metals such as arsenic and mercury.⁶ Refineries are required to track and report toxic releases annually to the federal National Pollutant Release Inventory (NPRI). Among sixteen reporting refineries in 2019, the CRC ranked sixth in production capacity at 130,000 barrels per day (bbl),⁷ but stood fourth in total pollutant emissions, releasing 19,058 tonnes of toxins.⁸ In 2020, the CRC’s production dipped to as low as 90,000 barrels daily during the pandemic downturn,⁹ yet still the refinery emitted 17,373 tonnes of toxins.¹⁰ By 2021, the most recent year of complete data, emissions bounced back up to pre-pandemic levels, registering 19,216 tonnes.¹¹

Ideally, such emissions are treated, stored, or recycled rather than released. The CRC captured and injected 48 percent of its emissions underground in 2021. Less ideally, refinery waste is released into the atmosphere through flaring and stack emissions, creating a cloud of CO₂ and particulate matter known as smog. Thirty-four percent of the CRC's air emissions went up the stack in 2021, standing fifth as a percentage of total Canadian refinery stack emissions. Smog contributes to global warming and, at a local level, can harm the health of nearby humans, animals, crops, and backyard gardens. Particulate matter in refinery smog includes liquid and solid particles that carry pollutants. The Co-op released 423 tonnes of particulate matter into the air in 2021.¹² Of this amount, 177 tonnes were fine particulate matter, meaning 2.5 microns or less in width, which Health Canada warns “poses a risk to your health because, when inhaled, it can travel deeply into your lungs.”¹³

Least ideal of all, pollutants can escape through unplanned leaks and spills. The CRC has long held Canada's top spot in refinery fugitive emissions, meaning releases of pressurized gas into the atmosphere through faulty equipment or operational errors.¹⁴ In 2021, among 3,688 tonnes of fugitive refinery emissions released nationally, the CRC contributed 1,772 tonnes, or 48 percent, an enormously outsized contribution.¹⁵ For comparison, the next highest was Shell's Corunna refinery, at 332 tonnes, or 9 percent.¹⁶ It is possible the CRC simply has better detection and reporting protocols than other refineries; however, this is immaterial at the local level, where 1,772 tonnes of fugitive toxins are still 1,722 tonnes, no matter what the neighbour's report card says.

Beyond unintended releases, the CRC is a top-level emitter generally, particularly in the category of volatile organic compounds (VOCs). While *organic* seems a friendly word, VOCs are anything but. They are one of the most prevalent factors in outdoor air pollutant-related

cancers, representing between 35 and 55 percent of all cases.¹⁷ The CRC led Canadian VOCs refinery emissions every year from 2011 to 2021; of 98,181 tonnes, no less than 35,019 tonnes — or 36 percent — emanated from the CRC over the decade. This far exceeded the next-highest contributor, Edmonton’s Suncor refinery, responsible for just 8 percent of emissions.¹⁸

Refinery-produced VOCs contain a roster of particularly hazardous substances.¹⁹ N-hexane, for example, can induce throat irritation and neurological symptoms such as headaches and vertigo at acute levels, while long-term chronic exposure has been related to damage to peripheral nerves in humans, causing weakness and numbness in the limbs, as well as reproductive damage in mice.²⁰ In 2021, the CRC alone was responsible for half of Canada’s total n-hexane refinery emissions, at a staggering 203 tonnes; its competitors averaged 12.6 tonnes. The Co-op also led the pack in total overall emissions of toluene, releasing 58 tonnes of the neurotoxin,²¹ and emitted 11 tonnes of benzene, a VOC that can lead to leukemia in humans subjected to long-term airborne exposure.²²

Altogether, the CRC emitted 2,708 tonnes of VOCs in 2021, of which 51 percent were fugitive emissions. For comparison, the next-highest VOC emitter, Suncor’s Edmonton refinery, released 801 tonnes — despite being a higher-capacity refinery at 142,000 barrels per day — and just 3.7 percent were accidental.²³ The CRC’s 1,393 tonnes of fugitive VOC emissions included 191 tonnes of fugitive n-hexane (highest in Canada); thirty-seven tonnes of ethylbenzene (highest in Canada); eleven tonnes of naphthalene (highest in Canada); 4.75 tonnes of cyclohexane (highest in Canada), eleven tonnes of toluene (second highest in Canada); and two tonnes of benzene (second highest).²⁴

Workers inside the complex are aware of lapses but feel constrained from speaking about them because of a stringent non-disclosure agreement and, in the words of one employee, there’s

“so much negativity about telling the truth.” Outside the gates, average citizens hear reassuring messages that all is well, but they have limited access to the information behind these messages. The public can read reports on the CRC’s website about how sustainability targets are being met, while hard data on pollutant exceedances and accident details are sequestered in annual environmental reports obtainable only in redacted format via the protracted process of formal FOI requests to the Ministry of Environment. The CRC has defended this practice before Saskatchewan’s Information and Privacy Commissioner on the grounds that its environmental reports are “prepared and presented to the Ministry of Environment in a manner which anticipated that such information was to be used internally only by the Ministry of Environment and not in a manner which anticipated further disclosure.”²⁵ Federally, the NPRI maintains a higher standard of public disclosure by providing an accessible online data portal on emissions from all industries. However, the data is very dense, requiring time and advanced research skills for citizens to extract relevant information. This leaves a large measure of public trust to the company’s word, which can be a scarce commodity. For example, the CRC did not respond to my requests for comment on information contained in this chapter.

Marriage Vows

Deference to industry and capital has deep roots in Regina. The small prairie city’s location was chosen not for proximity to natural bounties but for railway access and the ease with which the area could be depopulated of its original inhabitants and then divided and subdivided in an endless game of land speculation that drives the city to this day. Hence, the primary source of potable water is fifty-seven kilometres distant, drawn from Buffalo Pound Lake, which has now fully replaced the city’s relatively meagre underground aquifers.²⁶ The burden of washing away

all the city's effluent is given to tiny Wascana Creek, one of Saskatchewan's smallest watersheds, which winds toward the Qu'Appelle River system and Pasqua Lake.²⁷ Like a family in an overcrowded home, these physical limitations factor into the relationship between the city and refinery.

As with most marriages, things began well enough. In early January 1935, the newly formed Consumers' Co-operative Refineries Limited (CCRL) presented to Regina's city council a plan to set up shop on a plot of rural land just past Winnipeg Street on the Canadian National Railway branch line.²⁸ It would be the first co-operative refinery in Canada and today remains the world's only co-operative oil refinery.²⁹ Regina's founders had imagined a Chicago-sized hub city, but the Dust Bowl had dimmed visions of residential growth beyond the city's Eastern Annex, which stopped short of the Co-op's planned site. Although not on city land, the new refinery was intimately connected to Regina. The very first construction activity was to drill into Regina's aquifer for water to cool the facility.³⁰ In the midst of crushing drought, it was the same year Regina householders protested high utility charges for scarce water.³¹ But the refinery brought economic benefits to a deeply depressed economy, particularly for its 632 shareholding members,³² who held between them eight thousand shares at \$25 each³³ (\$480 per share in 2021 dollars).³⁴ Within its first eight months of operation, the new oil and gas refinery had generated jobs and a healthy \$28,000 surplus.³⁵

In March 1936, the provincial legislature considered a private member's bill to register the enterprise as a co-op, not a company, thereby exempting it from provincial income and corporate taxes. British American Oil objected, arguing the co-op structure was a mere tax dodge and that the refinery was in fact a joint stock company "in the fullest sense."³⁶ Liberal premier James Patterson responded, "The onus should be on the company to show that the 'savings' are

not ‘profits.’”³⁷ Patterson’s bar was apparently met: on April 1, 1936, the Act to Incorporate Consumers' Co-operative Refineries Limited was passed, providing tax-free leave to “to buy, sell and otherwise deal in crude petroleum oil and other oils, greases and products thereof,” as well as “to sink oil wells, to erect, acquire, buy, purchase, lease or otherwise maintain and operate oil refineries or plants.”³⁸ It was a vote of confidence not just in the refinery itself, but in the idea that co-operatives delivered a common good deserving of public support via tax-free status.

From that moment, the refinery was on a growth path. Within ten years, successive expansions increased capacity from 500 to 2,400 barrels per day. In 1944, it joined forces with co-operative wholesalers across western Canada under the banner of Federated Co-operatives Limited (FCL). In 1951, cheering crowds celebrated a major addition that leaped capacity forward to six thousand barrels per day. The outdoor event featured a rousing speech by Co-operative Commonwealth Federation premier Tommy Douglas, who dedicated the new addition “to the glory of the pioneers who conceived the refinery, to the memory of those who laboured to produce it and to the benefit of the people of the prairies who belong to the great world brotherhood of co-operatives.”³⁹

Representing the city as deputy mayor, Art Riddell’s remarks were somewhat less effusive, offering congratulations for “a great milestone of progress.”⁴⁰ Within a year, the refinery was bent on doubling production to twelve thousand barrels per day, a project that depended on the city’s agreement to extend water and sewer service to the growing complex. The sewer pipes needed to handle one thousand gallons per minute of refinery wastewater, which was to contain no oil. The refinery also required 850 gallons-per-minute capacity of clean water piped from the new Buffalo Pound Water Treatment Plant then under construction. At the same time, residents in the rural municipality of North Regina had been told they could not access the

city's piped drinking water due to lack of lift pumps. The question of why neighbouring householders didn't have equal access was deferred; the refinery's provision of two hundred jobs and its favourable prospects as a paying water customer sealed the deal.⁴¹

Tying the Knot

While tapping into the water system and other services, the refinery was not a tax-paying resident of the City of Regina. In 1951, the city pushed its limits further east but skirted the complex's land holdings. The public school board cried foul, claiming that out of 125 employees' children who attended the refinery's Christmas party, all but three attended Regina schools. It would take another two years of school board pressure for city council to reconsider annexing the land, with the refinery's reported agreement to not object.⁴² On January 1, 1954, the Co-op parcels were annexed, though it took additional time for the school board to secure expanded boundaries through the courts, following objections from two impacted rural boards. The urban board claimed during this time that it had to construct several new north-end schools, put twenty-six classrooms on double-shift to ease congestion, and pay for extra school buses to accommodate refinery families.⁴³

Meanwhile, CCLR grew beyond refinery ownership, expanding into oil drilling. Competitors complained the Co-op received unfair "plums" from the province in 1958 with a deal to drill on Crown lands outside a competitive bid process.⁴⁴ Expansion of the refinery itself laddered upward, with a \$1.3 million addition in 1957,⁴⁵ a \$1.25 million addition in 1961,⁴⁶ a \$30 million addition in 1978,⁴⁷ and a \$25 million addition in 1982 financed by a Saskatchewan Economic Development Corporation loan.⁴⁸ Then in 1988, a heavy oil upgrader was grafted onto the existing works, a highly complex \$700 million undertaking to turn heavy prairie crude into

lighter petroleum products such as gasoline and diesel fuel. Typically high in gases that corrode equipment and present safety hazards, Saskatchewan crude is notoriously difficult to handle.

“Other crudes are worse than ours, but then no one has built a facility specifically to refine these inferior crudes,” noted the company’s senior vice-president of refining.⁴⁹

In November 1988, the City of Regina and the refinery signed an agreement that waste would be sequestered in holding ponds until it had been cleaned to meet agreed-on maximum thresholds for oil, sulphides, heavy metals, and other contaminants before entering the sewage system.⁵⁰ On the Co-op’s side, hopes for an environmentally clean operation were high. A new company, New Grade Energy, was formed to assess impacts.⁵¹ “Using one of the most severely contaminated oils in the world, we’ll end up without any residue,” project director Ivan Donald enthused in an advertising supplement published in the *Regina Leader-Post*.⁵²

However, the first year of operation was plagued by fires, spills, and emissions, including a twenty-minute H₂S (sour gas) leak on February 27, 1989, that caused children at a nearby school to be overcome with nausea. Sour gas is one of the oil industry’s most feared emissions, capable of causing near-instant death in enclosed spaces at high concentration. Moderate levels bring sore throats, stinging eyes, and severe nausea. Long-term low-level exposure may contribute to low blood pressure, headaches, eye inflammation, a staggered gait, and neurological symptoms, including psychological disorders. Further, “chronic exposure may be more serious for children because of their potential longer latency period,” raising additional concerns for schools and daycares near refineries.⁵³

In another incident, residents complained of oil droplets landing on homes and cars up to two kilometres away. While the Co-op accepted that the H₂S leak was concerning and should have been reported to the Ministry of Environment sooner than it was, the oil spray incident was

“blown out of proportion,” according to refinery manager Bud Dalhstrom. “We created a helluva nuisance and it shouldn’t have happened. But we don’t really think we created a hazard,” he told local media.⁵⁴ Despite the company’s assurance of air safety, one resident told the media that inhaling the oily mist caused her throat to become sore and numb, while another reported a severe asthma attack.⁵⁵

Later that year, employees at an adjacent greenhouse fled in terror when a fiery explosion rocked the plant. The greenhouse, which was heated by the refinery, had a gas detector installed but never enabled. Afterwards, the workers and some local businesses requested an early-warning system to alert them when gases inside the plant were reaching dangerous levels. In response, refinery spokesperson Ivan Donald stressed that the fire had presented no danger to the public and argued an alert system would do more harm than good, saying, “If we set it off without knowing for sure there’s a problem, it will become a case of crying wolf. The best situation is the one we’ve got.”⁵⁶

Toxic Relations

As the humble refinery co-operative grew into today’s sprawling Co-op Refinery Complex, each expansion brought new employment but also new stresses to the City of Regina. Containing wastewater in the refinery’s sewage lagoon emerged as an ongoing problem. In 1992, spilled fuel was discovered floating in an aquifer that lay directly above the Regina aquifer, which supplied 10 percent of the city’s drinking water at the time (it is no longer used today). “Any refinery/upgrader is going to have the odd spill,” stated refinery co-chair Harold Empey. He added, “Show me some other site with this type of industry. All the other refineries have pulled

out of the province.”⁵⁷ The implication was that the refinery was doing Saskatchewan a favour by forsaking greener pastures elsewhere.

In 1992 it was also revealed that the refinery was flushing considerable amounts of oil and grease through the sewer system and had been doing so at least since 1989. The city had set fifteen milligrams as the acceptable upper limit but found seventy-four samples above that limit in 1992, with nine discharges registering one hundred to two hundred milligrams. A refinery spokesperson acknowledged the problem but took issue with the fifteen-milligram limit, describing it as an arbitrary measure that allowed the City to exaggerate the contamination.⁵⁸ Yet the original 1951 sewer access request included an understanding there would be no oil at all. At a works and utilities committee meeting, a councillor called for denial of sewer access or revocation of the refinery’s operations licence if the discharge wasn’t cleaned up. However, the earlier “greener pastures” message had seemingly been heard; another councillor expressed fear the simple requirement to not flush oil and grease into the sewer could somehow shut down the whole operation, endangering 450 jobs. In the end, sewer access continued uninterrupted, despite a city report that warned continued discharges could damage the sewer lines and the wastewater treatment plant.⁵⁹

The warning did not stop contaminants from finding their way into the city’s sewage services; in fact, the problem has been even worse in some years. According to a 2019 environmental report obtained through an FOI request, the refinery’s oil and grease discharges exceeded the City of Regina fifteen milligram-per-litre limit on 174 days, with a yearly average of 18.9 milligrams per litre. As well, refinery discharges exceeded the city’s limits for manganese in 148 of 151 of samples.⁶⁰ A beneficial mineral when occurring naturally in small amounts, manganese nonetheless poses risks when present in water in higher concentrations as a

result of industrial processes. The environmental report for 2020 shows elevated manganese in 294 samples, fifty-two over-the-limit oil and grease samples, as well as five days of zinc exceedances and one day when cyanide was detected at four times over the limit.⁶¹ In May 2020, oil and grease spiked at six hundred milligrams per litre, dramatically eclipsing the allowable fifteen milligrams per litre.⁶² Just four Canadian refineries discharged pollutants to municipal sewage systems in 2020: the Edmonton refinery discharged four kilograms; the Moose Jaw's refinery 250 kilograms; Burnaby's, 3.08 tonnes; and the CRC at a comparatively towering 12.1 tonnes.⁶³ The 2021 amount was 7.6 tonnes — a reduction, but still far greater than any other Canadian refinery.⁶⁴ At stake is the health of Wascana Creek, which joins the Qu'Appelle River, flowing toward Pasqua Lake and the Qu'Appelle Lakes chain, then following the Assiniboine and Red Rivers to Lake Winnipeg and Hudson Bay. Also at stake is the efficiency of a new multibillion-dollar public-private-partnership (P3) wastewater treatment plant operated by EPCOR. An internal report estimates more than \$15 million in upgrades could be required if current levels of industrial contamination are not curtailed.⁶⁵

In 2016, the CRC announced construction of a system to clean and recycle 100 percent of its wastewater. The project received a recognition award from *Global Water Intelligence* magazine in 2017⁶⁶ and in 2019 was honoured with a Resource Revolution Award from Suez Water Technologies & Solutions (now Veolia) — the same company that designed and installed the system.⁶⁷ Less heralded are wastewater breaches. In May 2020, EPCOR employees discovered that a tarlike substance had clogged pumping station equipment and was drifting toward the plant. They were able to divert sixty thousand litres of oily water into a separate lagoon, narrowly avoiding major damage to the plant and the prospect of untreated, hydrocarbon-laced sewage spilling into Wascana Creek.⁶⁸ An investigation by the Saskatchewan

Water Security Agency later found the contaminated water originated in a Co-op refinery storage pond. Although both the city and the refinery were aware of the release, there was no public notice and the Chief of Pasqua First Nation was not informed until one week after the incident. Instead, a concerned city councillor and attentive journalists brought the matter to public attention.⁶⁹

In response to an FOI request for documents pertaining to the spill, I received 1,774 fully redacted pages, on the grounds of solicitor-client privilege and potential prejudice to legal proceedings and contractual negotiations.⁷⁰ Thus, each page was its own secret box in the form of large grey squares placed over content labelled as remediation reports, sampling results, cost estimates, photographs, and other spill-related information.

On May 6, 2022, the city registered a claim for \$4.6 million from CCLR, citing the company's "wanton disregard" for safe handling of toxic waste and "egregious, oppressive, high-handed, reckless, destructive, [and] pervasive" conduct.⁷¹ The refinery responded with a statement of defence denying liability for "frivolous and baseless" claims.⁷²

Frustration had been simmering for some time. EPCOR had observed foaming in its lagoons repeatedly since 2015, the year the company took on a P3 contract with the city. This generally indicates something has gone awry with the microbial balance needed to break down wastes. There had also been repeated springtime E. coli spikes dating back to 2011, according to an investigation report obtained through FOI request. By early 2019, the plant was fully online and "operating in stable condition, without chemicals" — until April, when the water suddenly began to froth again. Following a second occurrence in May 2019, EPCOR launched an investigation that correlated foaming to elevated levels of vanadium, a heavy metal that occurs naturally in crude oil, as well as molybdenum, a metal used as a catalyst in refining heavy oil.

The metals harmed the microbes that clean wastewater, causing some to die off and others to go into defensive overdrive, opening the door to E. coli. During the investigation, a review of historical data found “significant increases” of additional metals, including mercury and lead, at approximately the same time every spring, as well as in October 2018. The situation abated after ECPOR contacted the city, and the city in turn communicated with “an external party in relation to the event.”⁷³ In its final report, EPCOR estimated the cost to restore its system would reach \$1 million.

Although naturally occurring and not normally harmful, high concentrations of vanadium from industrial processes are considered toxic by Health Canada, capable of causing cancer and damage to internal organs.⁷⁴ On June 28, 2020, above-standard levels of vanadium appeared again, revealed in test results returned to the plant on July 10. This time the substance was found not just in the influent, but in discharged treated water. Downstream users were informed by the City of Regina in a communiqué that stated:

The Water Security Agency was notified and has confirmed the metal released is low risk. The wastewater effluent leaving the City of Regina’s Wastewater Treatment Plant had the elevated metal for a short time period and long term exposure is not applicable for this situation.⁷⁵

Perhaps these words offered some small comfort to people who used the water during a twelve-day time lag between test sample and result. Downstream uses include watering livestock, fishing, irrigation, and potash mining.⁷⁶ Speaking to the media, a refinery spokesperson said the source water had been segregated and was being hauled offsite, and he assured the public that vanadium discharge was part of routine maintenance and not usually present in high amounts.⁷⁷

Statistical data presents a much different picture. In 2020, the Co-op reported 162 tonnes of vanadium waste, eclipsing all other refineries in Canada (in comparison, the next highest, Quebec's Raffinerie Jean-Gaulin, created just three tonnes). Of that, 157 tonnes were shipped to the Miller Environmental Corporation in Manitoba for treatment and disposal. However, the sheer volume of material left a significant amount dealt with on site, including 1.92 tonnes "transfer[red] to municipal sewage treatment plant," nearly double the amount in 2019.⁷⁸

Vanadium's presence in refining depends on both the nature of the crude oil and the combustion process; Regina's refinery appears to present a perfect storm. There is a green opportunity in this scenario, however: if recovered instead of disposed or dispersed, vanadium is in increasingly high demand for wind and solar power batteries.⁷⁹ For example, in 2019 Regina's EVRAZ steel plant recycled 19,334 tonnes of vanadium from its steel slagging process for use in strengthening steel alloys and manufacturing vanadium redox batteries for renewable energy production.⁸⁰ Burnaby's refinery reported three of its total four tonnes of vanadium were recycled in 2019, with none discharged into the municipal sewage system. The CRC, meanwhile, reported just 20 kilograms transferred for recycling in 2019, and it was the only Canadian refinery to send vanadium to a municipal wastewater plant, discharging one tonne into the sewage system.⁸¹ The refinery was more successful in reducing its stack emissions, from 4.6 tonnes to 1.3 tonnes by 2020, notable because airborne vanadium binds strongly to particulate matter and can travel far into the surrounding environment.⁸² However, sewer releases remained stubbornly high, at 1.28 tonnes.⁸³

Breaking with history, the city held fast with its legal claim, winning a \$4.6 million settlement.⁸⁴ This display of backbone was accompanied by a marked reduction in sewage

system releases to 290 kilograms in 2021.⁸⁵ However, stack emissions rose 25 percent that year.⁸⁶ While EPCOR's plant was protected, citizens faced increased risk.

Conditioned Tolerance

Resident James Whittingham has never complained to the CRC. Once, when the smell seemed different, he called Enbridge, which owns the main pipeline running through the neighbourhood, and found them very responsive about checking their line. As for the refinery, it's just the way things are in Regina, a familiar odour. "I think I read somewhere that you can phone a number and complain, but that seemed absurd to me," Whittingham says. "A very large complex like that, that one person ... would get them to shut down. It just didn't seem logical to me." Further, he doesn't think he'd be able to prove the source. Given the history of publicly downplayed incidents, it's perhaps not surprising citizens have been conditioned to accept that the onus of proof is on them, not the company.

Also, jobs are on the line; Whittingham agreed to be quoted only after a relative stopped working at the refinery. Similarly, an oilfield worker whose H₂S personal safety alarm went off while driving past the plant did not want to say anything publicly. In Saskatchewan's tightly networked economy, word gets around about people who complain about the bread and butter. Indeed, the records show the refinery fielded just five public complaints regarding chemical odours, dust, and ash in 2020, and four in 2019, although, as demonstrated above, the records show unplanned leaks are significant.⁸⁷

The problems are well known on the inside. In interviews with University of Regina researchers, past and current employees pointed to a combination of faulty equipment, underqualified operators, and inattentive management. As one worker explained, "There's all

kinds of emissions out there; they're so far behind on maintenance that you pretty much have to get a pump seal to the point where it's on fire before they're going to do anything." Another stated:

It's kind of the employer who has to really take charge if they want to make those changes ... if you know something's not running as efficiently as it should be or something's slowly leaking a little bit, like we should take charge as an employee and fix that if we can. But realistically some of the equipment is old and ... there's really not much you can do anyways.

One employee described persistent issues with airborne coker dust, which can cause severe heart and lung damage through prolonged exposure. Three employees raised questions about the much-heralded wastewater recycling project's efficiency, saying the system has never worked properly. "They received their award before it ever came online, and it still to this day has recycled almost nothing. They'd be better to sell the equipment and ship the water down the sewer like they always did," said one worker. Another employee said fear of speaking up contributes to an already underinformed public:

I think the information about hydrocarbons in the air, the spills, I think it's very poorly communicated to Regina and surrounding areas as a whole. I think the public should have more knowledge of what's actually going on up there, for their own safety, and when they're deciding where to live in the city.

Several expressed confusion about why they did not see provincial inspectors visiting the refinery on a regular basis or holding management to account for faulty equipment. This observation coincided with regulatory changes brought in by the Saskatchewan Party government.

Industry, Police Thyself

In June 1989, following a series of refinery accidents, a Conservative-led provincial government increased maximum environmental fines from \$5,000 to \$1 million and vowed to get tough on the refinery.⁸⁸ But as oil and gas gained primacy, the opposite occurred. In 2013, Saskatchewan's provincial auditor examined air quality enforcement and found that "since February 2011, the Ministry [of Environment] has not followed the existing law regarding the issuance of permits under the [Saskatchewan] Clean Air Act."⁸⁹ Rather than step up efforts to enforce the Act, the governing Saskatchewan Party instead chose to repeal it, effective November 2015. As part of the move, the government piggybacked air quality responsibility onto a national network of primarily industry-funded non-profit associations run by volunteer boards. Seven years later, the ministry's website describes "a successful program built on consensus-based decision-making and partnerships."⁹⁰ However, the system appears far from robust: of six designated air zones, just three have active volunteer associations. The Great Plains Air Zone (GPAZ), encompassing Regina, has three monitoring stations to cover forty thousand square kilometres. Although the GPAZ website features a picture of the refinery, the association has no technical or regulatory capacity to track down specific sources of pollution or issue fines, and it makes no claims beyond a mandate to raise awareness of air quality issues. A Ministry slide presentation titled "Transitioning from Facility Based Monitoring to Airzone Management" specifically clarifies the associations are in place "to reflect general air quality in an area, rather than monitor facility emissions."⁹¹

As for facility emissions, under the Clean Air Act companies had to apply for operations permits that could be revoked for non-compliance. But now the Act itself has been revoked,

rather than industry permits. The province has instead put in place a consolidated Saskatchewan Environmental Code that lays out minimum standards. To meet these standards, regulated industries were invited to create and monitor their own Environmental Protection Plans (EPPs) under the Environmental Management and Protection Act. Annual progress reports replaced the permit system, which, according to a ministry presentation, had presented “a barrier to economic growth and innovation.”⁹² Four years later, the refinery submitted two EPPs to the province, one for emissions and one for discharges. The discharges plan was brief, stating spills would be addressed immediately and reported to provincial authorities, with the exclusion that “CCRL will not report fugitive emissions resulting from commissioning, operating, or decommissioning works.”⁹³ The air EPP included a commitment to work toward reduced emissions, along with a pledge to conduct air quality assessments every ten years starting in 2020 and to conduct a human health risk assessment “following the completion of the air quality assessment.”⁹⁴ The assessments are commissioned and paid for by the company, relieving the ministry of costs and staff time. This model has been adopted elsewhere within the neoliberal framework of ever-thinner governance. As for the downside, Ontario’s provincial auditor pointed out the implications of industries performing their own environmental impacts analyses: “This means that spillers are left to police themselves and ensure effective environmental remediation, with little risk of Environment Ministry enforcement action.”⁹⁵

What We Don’t Know Will Probably Hurt Us

In 2007, CRC embarked on a five-year, \$2.7 billion expansion to boost capacity to 130,000–145,000 barrels per day (bbl) and handle Alberta oilsands production.⁹⁶ “The additional staff required for construction and operation of the Expansion Project and supporting industries will

positively affect the City's tax base," the project proposal promised. "During the construction phase there will be a major increase in cash flow throughout the city." As for emissions risks, the proposal stated that its commissioned study found "potential for minor reductions in air quality due to the Expansion Project; however, the modelled increase in emissions is expected to be small."⁹⁷ Others saw the data differently. Environment Canada and Saskatchewan Ministry of Environment officials noted that H₂S, benzene, toluene, and xylene were predicted to "substantially" exceed air quality guidelines, while overall CO₂ production was expected to increase 23 percent.⁹⁸ A report dispatched to CRC's corporate entity, CCRL, on February 4, 2008, stated that "[i]nternal reviewers have raised concerns regarding predicted increases in levels of certain materials, lack of evaluation of the implications of these emissions and the lack of proposed mitigation to deal with the concerns."⁹⁹ The City of Regina followed up with its own objections on February 22, writing, "The refinery emissions impact zone of benzene and hydrogen sulfide into Regina residential areas ... is of significant concern."¹⁰⁰ Confronted with divergent views of the same data, Saskatchewan's Ministry of Environment sent the report out for peer review. The results were, as one ministry official put it in an internal email, "less than stellar."¹⁰¹

The refinery's human health risk study was "not consistent with the current state of scientific knowledge and standard risk assessment protocols as required for similar projects in other Canadian jurisdictions," the review report stated. The review further noted that modelled elevations in H₂S, toluene, and benzene were in excess of air quality standards, concluding:

the analysis is not appropriate to support the conclusions reached, that "human health risks are deemed negligible" for all chemicals except [particulate matter], benzene, toluene, and H₂S. Insufficient data is presented to conclude that "it is

unlikely that human health effects due to H₂S exposure would arise at any of the assessed locations.”¹⁰²

CCRL replied that the review was “disappointing and unfortunate” because it “erroneously challenged” the refinery’s risk assessment by widening the research scope beyond what the ministry had previously agreed needed to be done.¹⁰³ A far bigger elephant in the room showed itself in a June technical panel review meeting, reported in a memo to Environment officials:

The most adamant “objectors” [to the expansion] were Min. of Health, the Health District and the City. Their focus seemed to be on the cumulative health effects on people (all sources) but I believe they recognized that the existing facility was by far the bigger emissions source.¹⁰⁴

In other words, the refinery already presented a problem, expansion or no. Concerns were raised about what emergency plan was in place to protect residents if there were a major accident. “Apparently the CCLR has such a plan but it is not widely known or understood,” the memo stated. Among the city’s list of demands in its February 22, 2008, email was a Major Hazards Risk Assessment — the document that now resides in a sealed box at the provincial courthouse.

In September 2008, Environment Minister Nancy Heppner settled the debate with a decision in favour of expansion. Her decision communiqué stated a study that had been peer-reviewed predicted increases in health-adverse emissions would be confined to the refinery’s property and would occur whether there was an expansion or not. On this basis, she wrote the project “does not pose any significant environmental or health risk.”¹⁰⁵

Construction began, marred by a 2011 explosion that injured fifty-two workers, six seriously. To follow up on the city’s air quality concerns, between July 2012 and August 2013 the Ministry of Environment conducted a study of twenty-five locations in city limits; just three

were in residential areas adjacent to the refinery. Taken together, the results from all locations presented a clean bill of health, with the exception of some elevated H₂S levels attributed to a municipal sewage lagoon. This report has been foundational in decision making to the present day.

In 2013, city council reviewed city planning amendments to accommodate a new neighbourhood, Somerset, seven hundred metres north of the refinery. The Ministry of Environment and Regina-Qu'Appelle Health Region raised objections to the plan, joined by the CRC itself "due to the proximity and possibility of complaints."¹⁰⁶ The city planning office responded that "the City does not have policies defining what is an acceptable level of nuisance, and this issue tends to be viewed subjectively."¹⁰⁷ The mayor was solidly behind the proposed neighbourhood, along with the majority of councillors. There were already homes much closer to the refinery than seven hundred metres, argued the area's councillor, who added that concerns about air quality were "a little bit of a scare tactic."¹⁰⁸ The Environment Ministry air study was not complete at the time, but the undisclosed Major Hazards Risk Assessment prepared for the refinery expansion indicated no major problems, the planning office reported. The development was approved but ultimately Somerset never made it past the drawing board.

On Christmas Eve 2013, another major explosion was heard across the city, the second in just over two years. In media interviews, nearby residents seemed fatalistic about potential future explosions. "If it's big, then I'm the first to go and I won't have to worry about it," remarked one. Another said she "loved" the neighbourhood and added, "If it's my time, it's my time."¹⁰⁹

No Warnings

In contrast to Regina's reliance on air samples taken a decade ago, refinery-adjacent residents of Sarnia and Aamjiwnaang First Nation in Ontario have ten continuously operating air monitors in their streets and school grounds. Residents can view hourly-refreshed data on a public website. An eleventh air monitor is planned near a daycare in Aamjiwnaang.¹¹⁰ Residents are also participating in major study into airborne refinery pollutants and health outcomes led by the Ontario Ministry of Environment. Further, in the event of toxic accidents, there are fifteen community-embedded sirens that alert people to "head indoors, close all windows and exterior doors, and turn off heating and cooling equipment."¹¹¹ While the system has been criticized as inadequate, it provides a measure of public information and safety at a level so far unknown — perhaps even undreamt of — in Regina.

No sirens sounded, for example, when 1.1 tonnes of sulfur dioxide (SO₂) were accidentally released up the refinery stack on March 16, 2020, in the midst of the CRC's lockout of its employees.¹¹² In addition to irritating the nose and throat, short-term sulfur dioxide spikes can trigger asthma attacks and cause breathing difficulties for children and seniors.¹¹³ When asked about a public alert, a Ministry of Environment official responded, "Based on information collected at the time of the event a decision was made to not notify residents in the surrounding area as there was no health based concern to warrant notification."¹¹⁴ The communication did not elaborate on who was responsible for making the decision, only that it "was made."¹¹⁵ It is possible to ferret out a few sparse details of such releases, after the fact, in an online database of incidents reported to the Ministry of Environment. However, exceedances are recorded only if it is an uncontrolled discharge: when air standards are breached as part of "normal operations," there is no such reporting requirement.¹¹⁶

The CRC employs two onsite fenceline air monitors as part of its internal alert system. However, stack pollution tends to move up and outwards before settling to ground level, sometimes several kilometres away. Outside the refinery, a lone GPAZ monitor in Regina's east end captures some pollution spikes at a distance, such as twelve H₂S exceedances detected in 2022.¹¹⁷ Monitoring specific residential areas is beyond the instrument's scope. The closest thing to a public alarm system like Sarnia's is a city-operated phone app, launched in 2015 with a three-year \$320,000 donation from the CRC, a funding partnership that expired in 2020. "notifynow" alerts its 96,000 subscribers via text message about emergencies such as storms. Without neighbourhood-level air monitoring, the system lacks a trigger to automatically sound the alert on airborne toxins. "If a discharge or air emission event occurs, industry is required to notify the City," a city spokesperson explained via email in response to my inquiry. As for how often this happens: "Since NotifyNow was initiated, there have been no public alerts issued concerning industrial air emissions or spills."¹¹⁸

Perhaps a Sarnia-style independent monitoring system would have repeatedly sounded the alarm on the CRC's twelve tonnes of fugitive H₂S emissions recorded in 2019.¹¹⁹ After the CRC brought a sulphur degasification project online, H₂S exceedances dropped to thirty-three incidents in 2020, as detected by the company's two fenceline monitors.¹²⁰ Nonetheless, NPRI data indicates H₂S fugitive emissions continued unchanged at twelve tonnes in 2020 and again in 2021, accounting for nearly 60 percent of all uncontrolled refinery H₂S discharges in Canada. While the long-term impacts of living amid frequent H₂S emissions are not conclusively known, the Canadian Centre for Occupational Health and Safety advises that "[s]ymptoms may include restlessness, reduced ability to think, muscle tremors, memory loss and personality changes. May harm the respiratory system."¹²¹ Despite this, the provincial Ministry of Environment states that

H₂S air quality standards “are intended to prevent detectable odours from impacting neighboring property, and are not a health-based standard.”¹²² The conception of H₂S as primarily a nuisance odour outside the CRC’s gates is compounded by repeated use of the neighbourhood samples collected across the city in 2012–2014. For example, ten years later, a consultant hired by the CRC to predict the degasification project’s benefits drew on this data to conclude the new installation would improve what was no more than an unpleasant odour issue without serious health risks. On this basis, the consultant’s risk assessment recommended developing a plan to curtail H₂S emissions “to the extent practicable to reduce odour complaints.”¹²³ Given how few citizens actually contact the refinery when they smell strange odours, this does not seem a heavy lift.

Too Big to Fail

Over nearly ninety years of operation, the Co-op Refinery Complex has expanded considerably, today occupying eight hundred acres of land and employing just over a thousand workers.¹²⁴ The City of Regina has expanded as well, with homes and business sprouting in the refinery’s shadow. As the two entities have aged together, their interactions have been fraught with tensions and risks and have lacked the guidance of higher authorities to step in where needed. From this has arisen a social consensus to get along as best possible, in a relationship defined as more codependent than co-operative.

On the near horizon is energy transition on a global scale. In January 2022, Federated Co-operatives Limited, in partnership with pulse crop producer AGT Foods, announced construction of a canola crushing plant near the Co-op Refinery Complex that will include renewable diesel production, “a hydrocarbon produced most often by hydrotreating and also via gasification,

pyrolysis, and other biochemical and thermochemical technologies.”¹²⁵ In public statements, FCL has presented the project in the context of replacing conventional fuel production over time, although the specifics are vague. For now, the anticipated biofuel capacity is 15,000 barrels per day (bbl), a fraction of the CRC’s conventional oil 130,000 bbl capacity, and the promise of transition is overshadowed by a long-standing power imbalance. While the industrial product may change over time, relationships tend to hold their shape. History suggests the biodiesel plant will bring a new array of municipal water requirements and waste management challenges, which the city will struggle to contain amid light-handed provincial environmental regulations. However, the biodiesel project promises \$2 billion in investment, 2,500 construction jobs and 150 permanent jobs.¹²⁶ Like the refinery itself, the project is already too big to fail and therefore very likely too big to govern.

As for conventional refinery operations, in May 2020 Ottawa stepped in where Saskatchewan dare not tread, drafting a suite of new regulations to control VOCs under the Canadian Environmental Protection Act. Not yet fully in force, the regulations focus on fixing leaky valves, plugging open-ended pipes, standardizing fence-line monitoring, conducting regular inspections, and submitting reports on leaks and repairs. According to the new rules, seals, valves, pumps, and storage vessels are to be inventoried and annually inspected by personnel trained in leak detection. Faulty equipment is to be repaired within fifteen days or, if it can’t be done that quickly, flagged to repair within sixty days. Leaky valves face three strikes, you’re out: any valve that has a significant leak three times in two years must be replaced with a certified low-leaking valve. The rules are being brought in slowly, the first step being a compliance audit of the past two years, due in 2024, that will presumably set baselines for improvement. The definition of a “significant” VOC leak as one thousand parts per million volume (ppmv) — down

from the current ten thousand ppmv — does not come into force until 2026. Beginning in 2028, the audit period will be extended to every four years.¹²⁷

None of the safeguards seem beyond the pale of what a member of the public might reasonably expect for a highly polluting industrial process. Neither do the additions overreach the national Environmental Protection Act’s declaration that “the protection of the environment is essential to the well-being of Canadians.”¹²⁸ Yet it seems inevitable these new regulations will be just as difficult to enforce as previous efforts. Indeed, the Canadian Fuels Association is already crying foul, arguing before a Senate committee that the VOC regulations, alongside other climate-focused initiatives, will contribute to the potential shutdown of up to five refineries and a 44 percent reduction in capacity.¹²⁹

While this is the most extreme scenario, the Co-op Refinery will doubtless face particularly difficult compliance challenges, given the facility’s age and history of leaks and accidents. There are some “outs” already baked into the regulations, such as the ability to propose an alternative fenceline monitoring program rather than adopting the federal standard, as well as an option to forgo inspection of a piece of equipment as long as a reason is listed in the report. Further, the refineries are given a large measure of responsibility to police themselves; if lapses are discovered, they trigger not fines and penalties but rather a corrective action plan, in which the refinery self-authors its cleanup plan and self-reports on its success. In short, Ottawa’s underlying enforcement mechanism echoes provincial oversight mechanisms that have so clearly failed to reduce emissions and accidents over the years.

The City of Regina has committed to net-zero carbon emissions by 2050. At the same time, a refinery sits within city limits, releasing thousands of tonnes of greenhouse gases annually. The Co-op’s net-zero commitment places its eggs in the basket of transporting captured

emissions to Whitecap Resource’s Weyburn carbon capture, utilization, and storage (CCUS) project, a facility that has generated its own record of mishaps — such as a two-hundred-million-litre CO₂ leak from a failed valve in 2017 — while pursuing a not-uncontroversial technology.¹³⁰ Indeed, a 2021 peer-reviewed independent study of 236 carbon capture initiatives found “most CCUS projects initiated in the past three decades have failed.”¹³¹ Further confounding net-zero pronouncements, the Weyburn unit transfers sequestered gases to the oil patch for the purpose of forcing out more hard-to-reach fossil fuel. Then there is the matter of what isn’t captured, namely the refinery’s ongoing high level of fugitive emissions. Such emissions have been flagged by the Global Observatory on Non-State Climate Action flags as “a blind spot” in the climate change picture:

Fugitive emissions represent a significant proportion of anthropogenic greenhouse gas emissions and their assessment, let alone reduction, is still in its infancy.

Often overlooked by climate policies and institutional mechanisms, actions in this area rely primarily on the emitters themselves, pushed by civil society and local stakeholders.¹³²

This statement encapsulates the situation in Regina, where pollution regulators at all levels — municipal, provincial, and federal — have long been backed into a corner by the refinery’s status as a major employer. This weak position places workers and residents at risk from exposure to toxic substances and the planet at risk from greenhouse gas emissions. One wonders at what point the refinery’s management, through lockouts and layoffs, will cross the boundary of its social licence. For now, as a refinery employee review on a popular jobs website states, “Just gotta put on a happy face and pretend everything is ok until you can go home.”¹³³

Notes

¹ This chapter was prepared as part of the Price of Oil Journalism Project, a national consortium of student and faculty researchers. Research was supported in part by the Corporate Mapping Project, funded by the Saskatchewan Social Sciences and Humanities Research Council. The author wishes to acknowledge the invaluable assistance of Price of Oil project coordinator Patti Sonntag and student research assistants Kaitlyn Schropp and Julia Peterson. Research interviews with employees quoted in this chapter were conducted by Emily Eaton, Sean Tucker, and Andrew Stevens.

² *Consumers' Co-operative Refineries Limited (CCRL) v. Regina (City)*, SKQB 335 (CanLII) (Saskatchewan Court of Queen's Bench, October 13, 2016) <canlii.ca/t/gvbpw>.

³ Barb Pacholik, "Portion of Co-op Refinery's Major Hazards Risk Assessment Report Released," *Regina Leader-Post*, November 21, 2016 <leaderpost.com/news/local-news/portion-of-co-op-refinerys-major-hazards-risk-assessment-report-released>.

⁴ *CCRL v. Regina*.

⁵ Saskatchewan Ministry of Environment, *Changing How We Do Business: An Introduction to Results-based Regulations and the Saskatchewan Environmental Code* (Regina: Government of Saskatchewan, 2014), 1.

⁶ National Pollutant Release Inventory (NPRI), *Single Year Data Tables by Facility — Releases, Transfers and Disposals — 2020 data* (Ottawa: Environment and Natural Resources Canada, 2022) <open.canada.ca/data/en/dataset/1fb7d8d4-7713-4ec6-b957-4a882a84fed3>.

⁷ Canadian Fuels Association, "Refining Sites and Capacity." <canadianfuels.ca/our-industry/fuel-production/>.

⁸ NPRI, *Single Year Data Tables*, 2019 data.

⁹ Arthur White-Crummey, "Co-op Refinery Production to 90,000 Barrels Per Day." *Regina Leader-Post*, April 16, 2020 <leaderpost.com/news/saskatchewan/co-op-refinery-cuts-production-to-90000-barrels-per-day>.

¹⁰ NPRI, *Single Year Data Tables*, 2020 data.

¹¹ NPRI, *Single Year Data Tables*, 2021 data.

¹² NPRI, *Single Year Data Tables*, 2021 data.

¹³ Health Canada. *What is Fine Particulate Matter (PM2.5)?* (Ottawa: Government of Canada, 2021) <canada.ca/en/health-canada/services/publications/healthy-living/infographic-fine-particulate-matter.html>.

¹⁴ Thibault Laconde, "Fugitive Emissions: A Blind Spot in the Fight Against Climate Change." *Climate Change 2018 Annual Report* (Global Observatory on Non-State Climate Action, 2018), 106–16.

¹⁵ NPRI, *Single Year Data Tables*, 2021 data.

¹⁶ NPRI, *Single Year Data Tables*, 2021 data.

¹⁷ Alberta Environment. Air and Water Branch. Science and Standards Division, *Approaches to a Total (or Grouped) VOC Guideline: Final Report* (Edmonton: Government of Alberta, 2002).

¹⁸ NPRI dashboard search. Substance: (NA - M16) Volatile Organic Compounds (Total) and (Industry 324110) Petroleum Refineries, 2011-2021; (Ottawa: Environment and Natural Resources Canada, 2022) <canada.ca/en/environment-climate-change/services/national-pollutant-release-inventory/tools-resources-data/all-year-dashboard.html>.

¹⁹ Alberta Environment, *Approaches to a Total*.

-
- ²⁰ Cantox Environmental, *Assessment Report on Hexane for Developing Ambient Air Quality Objectives*. Prepared by Cantox Environmental Inc. in conjunction with RWDI West Inc. for Alberta Environment (Edmonton: Alberta Environment, 2004).
- ²¹ Alberta Ministry of Environment, *Alberta Ambient Air Quality Objectives: Toluene* (Edmonton: Government of Alberta, 2005).
- ²² Centers for Disease Control and Prevention, *Facts about Benzene* (Washington, DC: US Department of Health and Human Services, 2018).
- ²³ NPRI, *Single Year Data Tables*, 2020 data.
- ²⁴ NPRI, *Single Year Data Tables*, 2020 data.
- ²⁵ Saskatchewan Information and Privacy Commissioner, *Review Report 043-2015*, May 25, 2015.
- ²⁶ Environment Canada and Health Canada, *Screening Assessment for the Challenge: Vanadium Oxide (Vanadium Pentoxide)*, Chemical Abstracts Service Registry Number 1314-62-1 (Ottawa: Government of Canada, 2010) <ec.gc.ca/ese-ees/62A2DBA9-0636-4217-8D9B-36AFEB878179/batch9_1314-62-1_en.pdf>.
- ²⁷ Wascana Upper Qu'Appelle Watershed Association Taking Responsibility (WUQWATR), *Wascana Riparian Health Assessment Interim Report 2013* (Regina: WUQWATR, 2013).
- ²⁸ *Regina Leader-Post*, "Refinery Site East of City," January 9, 1935, 3 <news.google.com/newspapers?nid=w9EjUEod0xMC&dat=19350109&printsec=frontpage&hl=en>.
- ²⁹ *Regina Leader-Post*, "New Refinery Produces 500 Barrels Daily," June 15, 1935, 9.
- ³⁰ *Regina Leader-Post*, "Drilling Well for Refinery," January 12, 1935, 3.
- ³¹ *Regina Leader-Post*, "Dispute Over Water Charge May Be Issue," March 19, 1935, 3.
- ³² *Regina Leader-Post*, "100 Percent Surplus First Year Record of Co-operative Plant," December 9, 1936, 6.
- ³³ *An Act to Incorporate Consumers' Co-operative Refineries Limited*, SS 1936, c. 124 <canlii.ca/t/54lfp>.
- ³⁴ Bank of Canada, *Inflation Calculator* <bankofcanada.ca/rates/related/inflation-calculator>.
- ³⁵ *Regina Leader-Post*, "100 Percent Surplus."
- ³⁶ *Regina Leader-Post*, "Objections to Pleas to Free from Taxation," March 3, 1936, 3.
- ³⁷ Cited by *Regina Leader-Post*, "Objections to Pleas."
- ³⁸ *Act to Incorporate CCRL*, 1936.
- ³⁹ Cited by Jack McArthur, "Co-op Refinery Opens Huge Addition to Plant," *Regina Leader-Post*, August 25, 1951, 20.
- ⁴⁰ Cited by McArthur, "Co-op Refinery."
- ⁴¹ *Regina Leader-Post*, "City Approves Water, Sewer for Refinery," August 29, 1952, 8.
- ⁴² *Regina Leader-Post*, "Refinery Annexation Suggested," January 28, 1953, 3.
- ⁴³ *Regina Leader-Post*, "Regina Public School Ask Refinery Assessment," October 12, 1954, 8.
- ⁴⁴ *Regina Leader-Post*, "Behind Closed Doors Deal is Denounced," 26 March 26, 1958, 1.
- ⁴⁵ *Regina Leader-Post*, "\$1,300,000 Addition for Co-op Refinery," October 29, 1957, 1.
- ⁴⁶ *Regina Leader-Post*, "\$1,250,000 to be Spent, Beginning this Year: Co-op Refineries to Boost Capacity," March 4, 1961, 1.
- ⁴⁷ *Regina Leader-Post*, "Co-op Refinery in \$30 million Expansions," June 21, 1978, 31.
- ⁴⁸ *Regina Leader-Post*, "SEDCO Loans \$25 to Co-op Refinery," March 5, 1982, A11.

-
- ⁴⁹ Bud Dahlstrom, cited by New Grade Energy, “Mega-projects Involve Mega-challenges,” *Energy. Jobs. A Future: The Co-op Upgrader*, Regina Leader-Post advertising supplement, January 15, 1988, 7.
- ⁵⁰ *Agreement Between the City of Regina and Consumers’ Co-operative Refinery Limited and New Grade Energy Inc.*, November 18, 1988.
- ⁵¹ W.H. Smith, “The Co-op Upgrader: A Step Forward,” paper presented at the Technical Meeting/Petroleum Conference of the South Saskatchewan section, Regina, October 1987 <doi.org/10.2118/SS-87-20>.
- ⁵² New Grade Energy, “Environmental Safety a Top Priority at Upgrader,” *Energy. Jobs. A Future: The Co-op Upgrader. Regina Leader-Post* advertising supplement, January 15, 1988, 18.
- ⁵³ United States Agency for Toxic Substances and Disease Registry, “Medical Management Guidelines for Hydrogen Sulfide,” *Toxic Substances Portal*, 2014 <www.n.cdc.gov/TSP/MMG/MMGDetails.aspx?mmgid=385&toxid=67>.
- ⁵⁴ Cited by Bruce Johnstone, “Dahlstrom Says Only Few Problems Serious,” *Regina Leader-Post*, April 24, 1989, B1.
- ⁵⁵ Therese Macdonald, “Oil-belching Refinery Facing Charges,” *Regina Leader-Post*, April 5, 1989, A1.
- ⁵⁶ Cited by Donella Hoffman, “Nearby Businesses Want Alarm System,” *Regina Leader-Post*, June 27, 1989, A3.
- ⁵⁷ Cited by Gord Brock, “Regina Water in No Danger,” *Regina Leader-Post*, September 2, 1992, A1.
- ⁵⁸ Brock, “Regina Water in No Danger.”
- ⁵⁹ Neil Scott, “Upgrader’s Discharges Above Limit,” *Regina Leader-Post*, October 14, 1992, A3.
- ⁶⁰ Consumers’ Co-operative Refineries Ltd. (CCRL), *Co-op Refinery Complex 2020 Annual Environmental Report* (Regina: CCRL, 2021).
- ⁶¹ CCRL, *2020 Annual Environmental Report*.
- ⁶² City of Regina, *Statement of Claim*, Court of Queen’s Bench, May 6, 2022.
- ⁶³ NPRI, *Single Year Data Tables*, 2020 data.
- ⁶⁴ NPRI, *Single Year Data Tables*, 2021 data.
- ⁶⁵ EPCOR, *Spring 2019 Metals Investigation Report* (Regina: EPCOR, 2019), 12.
- ⁶⁶ Federated Co-operatives, Ltd., “Refinery Wins Global Water Award,” *News & Reports*, May 1, 2017 <fcl.crs/news-reports/news/article/refinery-wins-global-water-award>.
- ⁶⁷ Callum O’Reilly, “Co-op Refinery Complex Wins SUEZ Award,” *Hydrocarbon Engineering*, February 1, 2019 <hydrocarbonengineering.com/refining/01022019/co-op-refinery-complex-wins-suez-award/>.
- ⁶⁸ City of Regina, *Statement of Claim*, Court of Queen’s Bench, May 6, 2022.
- ⁶⁹ Alec Salloum, “Questions Linger about Notification, Impact of Refinery’s Oil Spill,” *Regina Leader-Post*, June 1, 2020 <leaderpost.com/news/local-news/questions-linger-about-notification-impact-of-refineries-oil-spill>.
- ⁷⁰ Sections 14(a)(d), 17(1)(d), and 21(a) of *The Local Authority Freedom of Information and Protection of Privacy Act* were cited on all redactions.
- ⁷¹ City of Regina, *Statement of Claim*, Court of Queen’s Bench, May 6, 2022, 12.
- ⁷² *Consumers’ Co-operative Refineries Limited and City of Regina*, Court of Queen’s Bench, 8 September 2022.

-
- ⁷³ EPCOR, *City of Regina Wastewater Treatment Plant Annual Operating Report 2018* (EPCOR, 2019), 10 <open.regina.ca/dataset/annual-report-wsa-foi-2020-014/resource/0a7f3a5f-4ac8-4f8a-8a81-57943bdb3d34>.
- ⁷⁴ Environment and Natural Resources, *Toxic Substances List: Vanadium Pentoxide*, n.d. (Ottawa: Government of Canada) <canada.ca/en/environment-climate-change/services/management-toxic-substances/list-canadian-environmental-protection-act/vanadium-pentoxide.html>.
- ⁷⁵ Rural Municipality of Sherwood, “City of Regina Waste Water Treatment Plant — Notice to Downstream Users,” July 10, 2020 <rmofsherwood.ca/city-of-regina-waste-water-treatment-plant-notice-to-downstream-users/>.
- ⁷⁶ Suren Kulshretha, Cecil Nagy and Ana Bogdan, *Present and Future Water Demand in the Qu’Appelle River Basin* (University of Saskatchewan: Department of Bioresource Policy, Business and Economics), 2012, 7–12.
- ⁷⁷ Roberta Bell, “Heavy Metal Used by Co-op Refinery Detected in Regina Wastewater,” *Global News*, July 10, 2020 <globalnews.ca/news/7163972/heavy-metal-co-op-refinery-regina-wastewater/>.
- ⁷⁸ NPRI, *Single Year Data Tables*, 2020 and 2019 data.
- ⁷⁹ Simon Constable, “Shell and AMG Planning Clean Tech Project with Chinese Oil Giant Shandong.” *Forbes*, October 26, 2020 <forbes.com/sites/simonconstable/2020/10/26/shell-and-amg-planning-clean-tech-project-with-chinese-oil-giant-shandong/?sh=4c522b7866ca>.
- ⁸⁰ EVRAZ, *Our Approach to Climate Change*, 2019, 4, 6. <evraz.com/upload/iblock/ce1/ce1e55ad49856e0fe2563b0599e3f073.pdf>
- ⁸¹ NPRI, *Single Year Data Tables*, 2019 data.
- ⁸² Environment Canada and Health Canada, *Screening Assessment for the Challenge: Vanadium Oxide (Vanadium Pentoxide)* (Ottawa: Government of Canada: 2010) <ec.gc.ca/ese-ees/62A2DBA9-0636-4217-8D9B-36AFEB878179/batch9_1314-62-1_en.pdf>.
- ⁸³ NPRI, *Substance Detail 2020*. Database search: CRC, Vanadium (and its compounds).
- ⁸⁴ Alec Salloum, “Co-op Refinery Pays City of Regina \$4.6M for 2020 ‘effluent’ spill.” *Regina Leader-Post*, January 18, 2023; NPRI, *Single Year Data Tables*, 2021.
- ⁸⁵ NPRI, *Single Year Data Tables*, 2021 data.
- ⁸⁶ Environment Canada and Health Canada. *Screening Assessment*.
- ⁸⁷ CCRL, *2020 Annual Environmental Report*.
- ⁸⁸ *Regina Leader-Post*, “Swan Says Fines Will Remedy Problem,” June 27, 1989, A3.
- ⁸⁹ Provincial Auditor of Saskatchewan, *2013 Report — Volume 1* (Regina: Office of the Provincial Auditor, 2013), 275.
- ⁹⁰ Environment, Health and Public Safety, *Air Zone Management* (Regina: Government of Saskatchewan) <saskatchewan.ca/residents/environment-public-health-and-safety/environmental-health/outdoor-air-quality/air-zones>.
- ⁹¹ Alison Tucker, *Air Quality Management in Saskatchewan — Transitioning From Facility Based Monitoring to Air Zone Management* [slide presentation] (Saskatchewan Ministry of Environment, n.d), slide 18.
- ⁹² Saskatchewan Ministry of Environment, *Saskatchewan Environmental Code: Moving Forward in Partnership*, SUMA Convention education session presentation, January 29, 2012, slide 2.
- ⁹³ CCRL, *Co-op Refinery Complex: Discharge Environmental Protection Plan* (Regina: CCRL, 2019), 4.

-
- ⁹⁴ CCRL, *Co-op Refinery Complex: Air Environmental Protection Plan* (Regina: CCRL, 2019), 3.
- ⁹⁵ Auditor General of Ontario, *Value for Money Audit: Hazardous Spills*, 2021, 35 <auditor.on.ca/en/content/annualreports/arreports/en21/ENV_HazardousSpills_en21.pdf>.
- ⁹⁶ Reuters, “UPDATE 1 — Canada’s Federated Finishes \$2.7 bln Refinery Expansion,” October 26, 2012 <reuters.com/article/consumers-refinery-idINL1E8LQERB20121026>.
- ⁹⁷ CCRL, *Project Proposal for Expansion Project: Section V & Revamps* (Regina: CCRL, 2007), 32 <environment.gov.sk.ca/2007-184EIA%28ProjectProposal%29>.
- ⁹⁸ Email correspondence re. “CCRL Expansion,” G. Mutch to H. Seguin, Saskatchewan Ministry of Environment, February 4, 2008.
- ⁹⁹ Saskatchewan Ministry of Environment, “Towards TRC for CCRL Expansion — for discussion February 4, 2008,” unpublished memo, February 4, 2022, 1.
- ¹⁰⁰ Email correspondence, “Comments on the Co-op Refinery Expansion Review,” G. Neiman, City of Regina to G. Mutch, Saskatchewan Ministry of Environment, February 22, 2008.
- ¹⁰¹ Email correspondence, “Technical Review Panel Meeting — CCRL,” R. Seguin to L. Quarshie and D. Phillips, June 27, 2008.
- ¹⁰² Intrinsic Review, cited in *Response to the Human Health Risk Assessment Peer Review*, unpublished report to Saskatchewan Ministry of Environment, July 2008, 51.
- ¹⁰³ *Response*, July 2008, 52.
- ¹⁰⁴ “Towards TRC for CCRL Expansion,” 1.
- ¹⁰⁵ Nancy Heppner, “Reasons for Decision: Ministerial Decisions Under the Environmental Assessment Act: Expansion of the Consumers’ Co-operative Refineries Limited Oil Refinery in Regina” (Regina: Ministry of Environment, September 8, 2008), 8. <environment.gov.sk.ca/2007-184ReasonsForDecision>.
- ¹⁰⁶ City of Regina, *Minutes of the Planning Commission*, February 13, 2013, 10.
- ¹⁰⁷ City of Regina, *Minutes*, 10.
- ¹⁰⁸ Jerry Flegel cited by Emma Graney, “Somerset Set for Council Despite Air Quality Concerns,” *Regina Leader-Post*, November 14, 2013, A1.
- ¹⁰⁹ Cited by Aaron Stuckel, “North Regina Residents Worry Little about Refinery Explosions,” *Regina Leader-Post*, December 30, 2013.
- ¹¹⁰ Clean Air Sarnia and Area, *CASA Air Monitoring Network Reporting* [web portal] <reporting.cleanairsarniaandarea.com/>.
- ¹¹¹ Troy Shantz, “About Those Warning Sirens that Blare Every Monday,” *The Sarnia Journal*, April 9, 2019 <thesarniajournal.ca/about-those-warning-sirens-that-blare-every-monday/>.
- ¹¹² Saskatchewan Ministry of Environment, *Discharge Cases Database*, Saskatchewan GeoHub, Case ID 2020-03-16T18:04:53.
- ¹¹³ Health Canada, *Human Health Risk Assessment for Sulphur Dioxide* (Ottawa: Government of Canada, 2016).
- ¹¹⁴ Wes Kotyk, assistant deputy minister, Saskatchewan Ministry of Environment, letter to Sean Tucker, University of Regina, June 18, 2020, 3.
- ¹¹⁵ Kotyk letter, 4.
- ¹¹⁶ Kotyk letter, 4.
- ¹¹⁷ Great Plains Air Zone, *Air Monitoring Annual Report 2021* (Saskatoon: Saskatchewan Research Council), 10.
- ¹¹⁸ Wayne Gibson, City of Regina Strategic Communications, email to Patricia Elliott, July 11, 2022.

-
- ¹¹⁹ NPRI, *Single Year Data Tables*, 2019 data.
- ¹²⁰ CCRL, *2020 Annual Environmental Report*, 50.
- ¹²¹ Canadian Centre for Occupational Health and Safety. *Chemical Profiles: Hydrogen Sulfide*. 2017 <[ccohs.ca/oshanswers/chemicals/chem_profiles/hydrogen_sulfide.html](https://www.ccohs.ca/oshanswers/chemicals/chem_profiles/hydrogen_sulfide.html)>.
- ¹²² Kotyk letter, 4.
- ¹²³ CCRL, *2020 Annual Environmental Report*: 71.
- ¹²⁴ Federated Co-operatives Limited, *Co-op Refinery Complex*, n.d. <<https://www.fcl.crs/our-business/refinery>>.
- ¹²⁵ United States Department of Energy, “Alternative Fuels Data Centre,” n.d. <afdc.energy.gov/fuels/emerging_hydrocarbon.html>.
- ¹²⁶ Saskatchewan Trade and Export Development, “Major Value-Added Agriculture Investment Announced in Saskatchewan,” *media release*, January 17, 2022.
- ¹²⁷ *Reduction in the Release of Volatile Organic Compounds Regulations (Petroleum Sector)*, SOR/2020-231, <<https://canlii.ca/t/55c67>>.
- ¹²⁸ *Canadian Environmental Protection Act, 1999*, SC 1999, c 33 <canlii.ca/t/54tsw>.
- ¹²⁹ Canadian Fuels Association, *Refinery Competitiveness and Climate Change Policies* [slide presentation], May 2018 <sencanada.ca/content/sen/committee/421/ENEV/Briefs/May1_CndFuelsAssociation_e.pdf>.
- ¹³⁰ Saskatchewan Agriculture, Natural Resources and Industry, *Saskatchewan Upstream Oil and Gas IRIS Incident Report, Incident #19399*.
- ¹³¹ Nan Wang, Keigo Akimoto, and Gregory Nemet, “What Went Wrong? Learning From Three Decades of Carbon Capture, Utilization and Sequestration (CCUS) Pilot and Demonstration Projects,” *Energy Policy*, 158 (2021).
- ¹³² Thibault Laconde, “Fugitive Emissions,” 106.
- ¹³³ Process Operator, “Caustic Work Environment,” August 29, 2020 <ca.indeed.com>.