

THE FIRST CENTURY OF THE INTERNATIONAL JOINT COMMISSION

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The International Joint Commission and Air Pollution: A Tale of Two Cases

Owen Temby and Don Munton

Over recent decades the International Joint Commission (IJC) has gradually but completely dropped out, or been pushed out, of the bilateral air pollution governance business. The only air pollution reference the commission received from the Canadian and American governments after 1975 assigned it a token bureaucratic role in the implementation of the 1991 Air Quality Agreement. The IJC's International Air Quality Advisory Board (IAQAB), which once managed an ongoing suite of tasks, became formally inactive in 2012.

To understand the demise of the IJC's role in air pollution during the past few decades we need to understand what it has done in the past and we need to understand its traditional functions. With the Boundary Waters Treaty (BWT) as its basis, the commission has five official functions: arbitral, administrative, quasijudicial, investigatory, and monitoring. Canada and United States have never requested the IJC to function as an arbitrator. They perhaps came close to doing so in one of the cases we consider here (the Trail smelter case). Most often, however, both governments have shown a preference for settling disputes through direct government-to-government negotiations. The IJC's administrative functions have always been minor in scope and importance. The "quasi-judicial"

function, under article viii of the BWT, has mostly been seen in the IJC's authority to pass upon cases (or "applications") involving "the use or obstruction or diversion" of waters along the boundary. Much, perhaps most, of the commission's work from its inception to approximately the Second World War involved its quasijudicial authority to approve applications for "remedial or protective works or any dams" affecting boundary waters.¹ These mostly concerned local boundary issues. Such tasks no longer occupy the bulk of the commissioners' time. The dams are mostly built.

The IJC also receives "references." Article ix of the BWT empowers the commission, on request by governments, to conduct investigations and develop recommendations to governments. In contrast to the IJC's applications work, the references have often involved major Canada-US issues, such as Columbia River development and Great Lakes water pollution. The Great Lakes reference became what former commissioner and Canadian cochair Arnold Heeney called "this greatest of the Commission undertakings"; it may have planted the seeds of the IJC's demise.²

A change in roles and government perceptions of the commission began in 1972 with the Great Lakes Water Quality Agreement (GLWQA) and the roughly concurrent formalization of the IAQAB. In the GLWQA, Canada and the United States mandated the IJC to act both as an independent "watch dog" and a facilitator in implementing the GLWQA, which the commission attempted to do, albeit with mixed success. These new roles proved contentious to elements in both governments and led to a growing political reluctance to give the IJC new air pollution references. The IJC's watch dog function in air pollution arguably reached an apex in November 1978, when both governments responded to the IJC's recommendation for a long-range air pollution transport research task force to examine the emerging problem of airborne deposition in the Great Lakes region. However, concerns about IJC overreach in air pollution matters had been developing. The governments opted to exclude the IJC from acid rain research and from any involvement with the Bilateral Research Consultation Group on the Long-Range Transport of Air Pollutants. After a decade of conflict between Canada and the United States over acid rain finally gave way to co-operation in the form of the 1991 Air Quality Agreement, the IJC was denied a meaningful role in its implementation.

Instead, Canada and the United States created an alternative, intergovernmental committee and gave the IJC only a token reporting role.

The cases we examine here, the Trail smelter and the Detroit and St. Clair River areas cases, represent the two major IJC investigations into air pollution issues since the commission's inception. Both resulted from references. The fact that no other major issues have been subject to references reflects the reluctance of the two countries to use the IJC to address transboundary air pollution. While the Trail case has received considerable attention from historians and legal scholars, much less has been paid to the politics of transboundary air pollution in the Detroit and St. Clair River areas. There are lessons to be learned from comparing the two cases.³ Doing so clarifies the limitations to, and potential benefits of, binational air pollution governance.

Case 1: Trail Smelter Dispute

The Trail smelter air pollution case grew out of complaints that sulphur dioxide emissions from a smelter in Trail, British Columbia were damaging farmlands and trees in the state of Washington. It arguably remains, after almost a century, the most widely known case worldwide of resolving an international environmental dispute. It is certainly one of the *loci classici* of international law, and a prominent part of the canon.⁴ It was also the first Canada-US air pollution problem the two governments handed the IJC. References to the case abound—but interpretations vary and, on closer examination, misunderstandings exist. We argue here that the IJC was more important to the resolution of the Trail case than most accounts suggest.

Non-ferrous smelters were first established in Trail and in nearby Northport, in Stevens County, Washington, in the mid-1890s.⁵ Both used ores from local mines and both were US-owned. The Northport facility operated for about a decade as a copper smelter. Then, after a short closure from 1908 to 1915, the facility briefly reopened to produce lead. Never a large or prosperous operation, it closed permanently in 1921. Its operation and its closure had substantial impacts on the local economy as well as agricultural production.

While in operation as a copper smelter, the Northport facility relied on open-air heap roasting, emitting approximately fifteen tons of sulphur dioxide per day.⁶ Local farmers took the smelter owners to court, claiming damages to crops and trees. In response, the company purchased “smoke easements” covering 8,000 acres from fifty farmers, thus implicitly acknowledging its liability. The affected farms were mostly in the immediate Northport area but extended north to the boundary with Canada.

In 1906, just before the Northport facility closed down for the first time, a new company purchased the existing smelter in Trail and various small nearby mines. The Consolidated Mining and Smelting Company (later, Cominco) soon set about expanding smelter operations, based in large part on the new and soon-to-be massive Sullivan Mine in Rossland, British Columbia.⁷ The Canadian Pacific Railway bought Consolidated shares and built a railway spur into Trail, thus promoting the Canadian smelter. Consolidated then developed an innovative process to recover its rich lead and zinc supplies. The zinc smelting process adopted involved first turning sulphide ores into zinc sulphate through roasting and then using electrolysis to create “slab zinc.”⁸ The overall process gave off sulphur dioxide and weak sulphuric acid.

The smelter itself was then, and is still, located in Trail, above the banks of the Columbia River, about seven miles “as the crow flies” from the fabled 49th parallel.⁹ It is only slightly further as the river waters flow, through a curving valley, into the United States. Barely nineteen miles by road southward from Trail lies Northport, Washington.¹⁰ From Trail to beyond the international border, the Columbia Valley is bounded by mountains up to 4,500 feet above sea level. The valley is thus in places more of a gorge. Under prevailing wind conditions, it effectively funnels smelter emissions southwards toward the boundary and then into Stevens County in Washington State. Bench lands line much of both sides of the Columbia River south of the boundary. In the early twentieth century, small farms occupied some of these deforested benches on the US side.

As did the emissions of its counterpart in Northport, sulphur dioxide from the Consolidated smelter originally led to local protests. The protests began around 1917, not coincidentally after the Trail plant significantly increased lead and zinc production to meet the growing demands of the First World War. Increased production, of course, led to more emissions

of sulphur dioxide and higher concentrations. Total emissions rose from about 10,000 tons of sulphur dioxide per month in 1916 to about 20,000 tons in 1926, a doubling in a decade.¹¹

The original Trail smelter smoke stacks were 150 feet high, not enough to disperse the fumes adequately to avoid local air pollution. As had its American counterpart, Consolidated offered financial compensation to those affected in the Trail area and purchased farmland in the Canadian part of the Columbia Valley. (In modern economic jargon, it was “internalizing” what was an “externality.”) In the mid-1920s, it also built two new, taller smokestacks, over 400 feet in height, in an effort to disperse the pollutants more “effectively.”¹²

Around 1925, a few years after the Washington State smelter had closed permanently and as the Canadian plant expanded, complaints over “fumes” and crop damage attributed to Trail began to mount in Northport. Some people in Stevens County came to blame the higher Consolidated smoke stacks for pushing the sulphur dioxide further down the Columbia.¹³ The company investigated and concluded the complaints were not without merit. Its response was to offer compensation to affected parties, and some American farmers accepted these offers. The company also looked into buying up farms in the area—as it had in British Columbia—but was prevented from doing so by Washington State laws against foreign ownership of land. Increasingly angered, Northport area farmers began organizing against the damage caused by the Trail smelter. Their group, the Citizens’ Protective Association, refused to take Consolidated’s limited compensation and the farmers soon gained the attention of state and national politicians.

International Joint Commission Reference, 1928–31

After receiving the “fumigation” complaints from the citizens and voters in Washington State, the American government pressed Canada for a joint IJC reference to investigate the problem, under article ix of the BWT.¹⁴ Ottawa concurred in 1928. Although the United States and Canada had asked the IJC to investigate boundary water pollution problems in 1912, the Trail case would be the first time they had involved the commission in a transboundary air pollution issue. It would not be the last.

The governments requested the IJC to examine and report on 1) the extent to which property in Washington State had been damaged by fumes from the Trail smelter; 2) the appropriate amount of compensation to American interests for these damages; and 3) the impact of future operations of the smelter. Notably, the governments did not explicitly seek recommendations on how to reduce emissions or how to prevent further damage. They did, however, invite the commission to make recommendations on other problems “arising from drifting of fumes” as the IJC deemed appropriate.

The investigation was deliberate and thorough. Given that the commission itself had a small staff and lacked air pollution expertise, the National Research Council of Canada (NRC) assisted the IJC investigation. The NRC made available scientists and other experts, including F. E. Lathe and Morris Katz. Lathe was an experienced metallurgist and knew smelters, having worked previously at facilities in Grand Forks, British Columbia and Sudbury, Ontario. By the early 1930s, he was the head of NRC’s research division. Katz was an engineer by training who was becoming an international expert on air pollution and sulphur dioxide emissions in particular. The Canadian federal government also assigned to the investigation A. W. McCallum, a forest pathologist with the Canadian Department of Agriculture. McCallum had assisted with some earlier Sudbury-area forest damage studies before turning to Trail.¹⁵ These and other scientists provided a range of sophisticated and innovative technical services. Regular ground-based air quality monitors were supplemented with atmospheric monitoring of sulphur dioxide concentrations through portable sampling devices carried by aircraft. Tree rings were studied to determine growth patterns, both inside and outside the possibly affected areas. Conifer needles were analyzed to provide a “history” of fumigations. And plants were grown under experimental conditions to assess the impact on them of varying levels of sulphur dioxide. Although McCallum, Katz, Lathe, and other Canadians would dispute some of the American claims for damages in the Trail case, they did ultimately agree the smelter fumes were having a significant impact on farms and trees in the Columbia River basin south of the international boundary and downwind from Trail smelter.¹⁶

The IJC commissioners held meetings in Northport in 1928 and Nelson, British Columbia, in 1929 at which they received various briefs. They also met twice in Washington, DC, to consider preliminary findings. In early 1930, they heard presentations on the scientific investigation and arguments about the claimed damages.

The IJC delivered its final report to the governments in February 1931, a remarkable feat given the complexity of the situation. The commission found the Trail smelter at fault for polluting American territory. It estimated past damages in the American part of the Columbia Valley and damages that would accrue up to the end of December 1931 at US\$350,000. This key decision was not so much a scientific finding as a political compromise. Northport-area farmers had been demanding \$750,000. Consolidated had acknowledged some liability but its preference was to pay minimal or no compensation. The amount awarded was thus strikingly close to the midpoint between American claims and the company's offer.

Not surprisingly, the farmers and others were unhappy with the recommendation. Estimating the extent of the damage that was due to the Trail smelter's emissions, and calculating the appropriate size of the indemnity, were, however, problematic. A 1913 report by the US Department of Agriculture had found that a significant portion of the land in the Columbia Valley was "unsuited for agricultural purposes, either because it is too stony, too rough, too steep, or a combination of these factors."¹⁷ The valley had also been hit by severe drought in late 1920s and a massive wildfire had nearly wiped out forests in the area. As one historian suggested, Northport citizens, who had lost their own smelter, had then "turned upon their hated rival to the north with a fury that bordered on paranoia."¹⁸ That some damage had been done by Trail smoke was certain, but there were also some disputable American claims.

With respect to the last question in the original reference to the IJC, the commissioners took it upon themselves to address the matter of remediation, albeit modestly. They recommended Consolidated be required to complete the control measures it was undertaking (as of 1931) or was planning to undertake to prevent further damage to the United States. The remedies ranged from dispersing smelter emissions through the use of high smokestacks, to collecting sulphur dioxide exhaust gases and extracting the elemental sulphur to produce sulphuric acid or fertilizer, to

varying smelter operations according to wind and weather conditions (that is, cutting production when wind and weather conditions were likely to exacerbate transboundary pollution). Ultimately all of these approaches came into effect in Trail.

Consolidated proceeded in good faith to lower emissions. It opened three sulphuric acid plants in 1931, as well as an ammonia and ammonium sulphate unit. The company began extracting steadily increasing amounts of elemental sulphur and sulphuric acid from its various processes. These changes had a dramatic impact. In the three years from 1930 to 1932 sulphur dioxide emissions declined by fully two-thirds.¹⁹ Although annual emissions increased briefly from 1933 to 1935, they declined again when additional facilities for capturing sulphur within the zinc smelter and various gases in the lead smelter started up in 1936–7. By 1939, the plant was capturing more sulphur than it was sending into the atmosphere and was emitting less sulphur dioxide than in 1932.

By 1934, Consolidated's Elephant Brand synthetic fertilizers were a commercially successful side venture. Harmful wastes had become saleable products. Indeed, fertilizers were soon more than merely profitable. After zinc prices dropped during the Depression, Consolidated's revenues from fertilizer sales and acid recovery exceeded revenues from zinc production.²⁰ Almost a century ago, it had learned that pollution control can be good for business. Consolidated had reason to thank its critics in beleaguered Northport, although it may never have taken the occasion to do so.

The Arbitration Convention, 1935

Under pressure from Washington State and its political allies in Congress, the US federal government rejected the IJC's proposed compensation figure. For Consolidated, that meant the proposed compensation deal was a dead letter. Ottawa attempted to move on. The State Department, too, may well have hoped the Trail dispute would blow away. Some top State Department officials had been generally in favour of accepting the 1931 IJC report.

New fumigation incidents in 1933 and 1934 then rekindled the protests from Stevens County. After President Franklin D. Roosevelt stepped in, the Canadian government relented. In early 1935 diplomats on both

sides drafted what became a formal international convention on how to resolve the conflict.²¹ The “Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail, BC” established a three-person arbitral tribunal and charged it with addressing the following questions:

1. Whether damage caused by the Trail Smelter in the State of Washington has occurred since the first day of January, 1932, and, if so, what indemnity should be paid therefor?
2. In the event of the answer to the first part of the preceding question being in the affirmative, whether the Trail Smelter should be required to refrain from causing damage in the State of Washington in the future and, if so, to what extent?
3. In the light of the answer to the preceding Question, what measures or régime, if any, should be adopted or maintained by the Trail Smelter?
4. What indemnity or compensation, if any, should be paid on account of any decision or decisions rendered by the Tribunal pursuant to the next two preceding Questions?²²

At least as notable as the issues to be addressed by the Trail tribunal were those not to be addressed. The two governments did not request the tribunal to revisit the questions originally given to the IJC in 1928 or take a second look at fume damage prior to 1932. In particular, they did not mandate that the tribunal reconsider the matter of the \$350,000 indemnity recommended by the commission. The first article of the bilateral convention merely required Canada to arrange payment of the \$350,000 indemnity. What that article did not explicitly acknowledge, but what it clearly showed, was that the United States had thereby belatedly accepted this key recommendation of the IJC report, the same one it had initially rejected. The Government of Canada, acting on behalf of the Trail smelter owners, forwarded the \$350,000 payment in late 1935.

The tribunal’s mandate focused almost entirely on damage that may have been caused by smelter fumes since January 1932 and on possible

compensation for this damage. The 1935 convention, therefore, did not permit the tribunal to consider events and conditions prior to January 1932 or to re-examine the IJC's earlier scientific findings for that period. And, needless to say, it did not do so. The 1931 IJC report was thus not at all passed over; *it was accepted* as the basis for the arbitration. Whether or not these crucial details were fully explained to the disgruntled residents of Stevens County is unclear. What is clear is that the US government officials soon secured not only their support for creating the tribunal but also their promise to support its conclusions.

Trail Smelter Arbitration, 1935–8

According to the 1935 convention, the arbitral tribunal was to comprise three “jurists of repute,” one selected by Canada, one by the United States, and one (who could be neither American nor Canadian) selected jointly by the two governments. Those selected could not have had any previous involvement with the Trail issue. That prohibition, of course, ruled out anyone involved in the IJC report. The convention also authorized each country to hire a scientist to assist the tribunal. Washington named Dr. Reginald Dean, a Missouri metallurgist who would later become the assistant director of the US Bureau of Mines. Ottawa chose Robert Swain, a chemistry professor at Stanford University in California who had previously studied cases of sulphur fumigation in the American West.

The two experts arranged for studies into recent fume damage. This research included monitoring of air pollution, meteorological conditions in the Columbia Valley and the atmospheric dispersion of pollutants, experiments on the impact of sulphur dioxide fumigations on crops, and summaries of existing knowledge of the effects of fumes on trees. The scientific work was, however, less extensive than that done under the IJC reference. Dean and Swain presented their evidence to the tribunal at a series of meetings during 1937.

In a 1938 preliminary report the tribunal assessed an additional indemnity totalling \$78,000 for damage to land and crops between January 1932 and October 1937. The award was not large and was once again much less than American farmers had sought. The tribunal rejected numerous other US claims, including those for tree damage, reduced real estate

values in Northport, and the costs of scientific research conducted since the IJC investigation. The tribunal also did not accept any US claims that depended on what was then called the “invisible injury” thesis—concerning plant damage that was not readily apparent from external observation. In the end, it was not persuaded by the limited evidence presented in support of this thesis.

The tribunal also rejected an American claim for interest on the \$350,000 settlement originally proposed by the IJC in 1931. Washington’s counsel argued interest payments were due because Canada had not paid the indemnity until 1935. The tribunal members presumably had not forgotten the US government had itself refused to approve the IJC report in 1931 and rejected the settlement amount as inadequate. Making a claim for interest due to the “late payment” of an award one had initially rejected would seem to be grounds for a counter charge of inciting irony.

Final Trail Smelter Arbitration Decision, 1941

The tribunal’s final decision in 1941 was lengthy, yet contained little that was new. It repeated much material from its own 1938 preliminary report. Large sections of the 1941 judgement also comprised carefully considered, fully referenced legal arguments as to why specific US claims were not accepted. For example, the three jurists devoted more than nine pages, including citations of numerous cases, to their reasons for denying a US request that the tribunal reconsider the compensation decision it had made in 1938. Their reasons were mostly legal and procedural rather than substantive. The overall decision was thus lengthy because of its many negative findings, not despite them. The tribunal may have felt the need to justify fully its rejection of so many American claims. Notably, the tribunal also concluded the United States had failed to provide adequate evidence of any fume damage to crops or trees between October 1937 and October 1940. That decision would effectively put an end to the matter of transboundary damages.²³

In 1938, the tribunal had ordered a strict operating regime on a three-year trial basis. It capped emissions from the Trail smelter during the agricultural growing season, from April through September, to 100 tons per day. The regime also required a special cap of 5 tons per hour during

growing season daylight hours, when sulphur dioxide concentrations downwind in the Columbia Valley exceeded 1 part per million. This cap was to be maintained until concentrations fell below 0.5 parts per million. The 1941 final report made this operating regime permanent.

The significant new feature of the 1941 tribunal decision was its statement of the principle of international environmental law that has ever since attracted so much attention to the case. Known as the “Trail smelter principle,” it declared that “no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.”²⁴ The principle made Canada “responsible in international law for the conduct of the Trail Smelter” and therefore Canada was required to ensure the smelter continue to “refrain from causing any damage through fumes in the State of Washington.”²⁵

The above account of the three stages of the Trail smelter case suggests two generalizations. First, the role of the international arbitral tribunal has been overstated in many existing accounts. Second, the role of the IJC has been understated. We will return to these points in the conclusion to this chapter.

Case 2: Detroit and St. Clair River Areas Air Pollution

The Detroit and St. Clair Rivers flow south, comprising a strait connecting Lake Huron and Lake Erie, and forming the US-Canadian border in the area (see Figure 10.1). Given the considerable industrial activity in “Motor City” (Detroit) and “Chemical Valley” (Sarnia), both rivers are heavily traversed and heavily polluted. The rivers also represent sites where air pollution leaves one national jurisdiction and regulatory regime and invades lungs and property of a neighbouring country. The IJC’s involvement in this area came from investigations resulting from three references of broadening scope and scale.

The first reference, which occurred in 1949, saw Canada and the United States ask the IJC to investigate the problem of smoke from steam

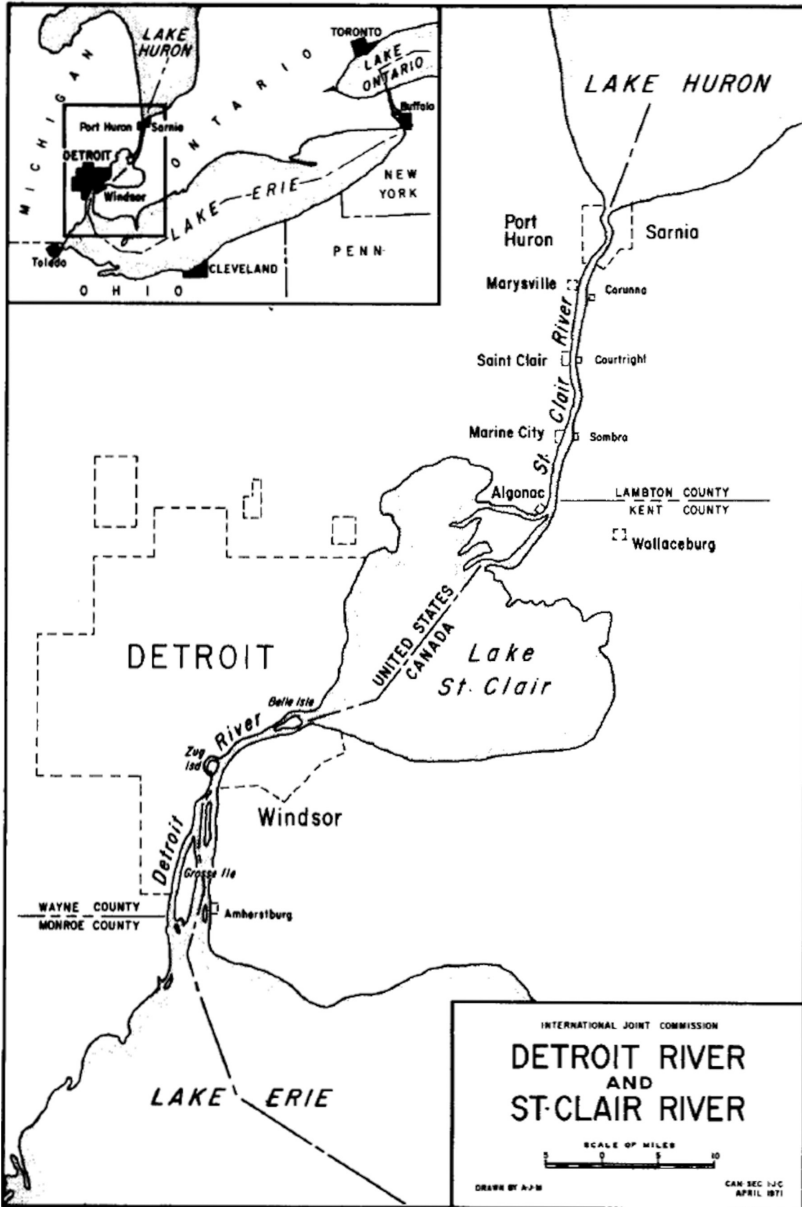


FIGURE 10.1. Detroit–St. Clair River area. IJC, *Transboundary Air Pollution: Detroit and St. Clair River Areas*, p. ii.

freighters plying the Detroit River.²⁶ For fifteen years, the Canadian government had complained about the dirty air from Detroit's industries. It even claimed that the maximum pollutant concentration on Canadian territory exceeded the maximum found in Northport during the Trail smelter dispute.²⁷ However, the reference's narrow terms limited the IJC to making recommendations to reduce pollution from the freighters only. In their 1952 interim report, the commissioners argued that the reference's terms diverted attention from the main air pollution sources, and they asked that it be amended to be more inclusive. No action was taken initially as a result of this request. The final 1960 report concluded that the transboundary air was heavily polluted from both sides of the boundary, and it singled out Detroit's Zug Island industrial area as an especially heavy source of particulates travelling across the river to Windsor. But the IJC merely recommended that the two governments adopt specific smoke emissions objectives for the freighters. The following year, in 1961, the governments authorized the IJC to maintain surveillance on these sources. Thanks to the switch from solid to liquid fuel occurring in the shipping industry at the time, the relevant authorities on both sides of the border were able to tighten standards throughout the decade. In 1966 the IJC asked the government for permission to end its work under the reference.²⁸ By then, the next reference, with a more appropriate scope, was underway.

1966 Reference on Detroit-Windsor and Port Huron-Sarnia Pollution

In the September 1966 reference on Detroit-Windsor and Port Huron-Sarnia air pollution, the governments posed the following questions:

1. Is the air over and in the vicinity of Port Huron-Sarnia and Detroit-Windsor being polluted on either side of the International Boundary by quantities of air contaminants that are detrimental to the public health, safety or general welfare of citizens or property on the other side of the International Boundary?
2. What sources are contributing to this pollution and to what extent?

3. What preventative or remedial measures would be most practicable from economic, sanitary, and other points of view?
4. What is the probable total cost of implementing the measures?²⁹

The air pollution issues in the two regions were more discrete than suggested by their close geographic proximity or the wording of the reference. The investigation was actually two separate inquiries, one for each of the two transboundary urban areas. Because the text of a reference submitted to the IJC is, by tradition, identical for the two countries, it is generally difficult to divine what led the governments to submit a given reference. In the case of the 1966 reference, it appears the decision to undertake investigations in each of the two urban areas was a compromise.

The US side of the Detroit River contained numerous metallurgical industries and large coal-fired power plants.³⁰ During the period of the IJC investigation, Metropolitan Detroit had more than 4,700 manufacturing firms and 35 per cent of the US automobile manufacturing industry. The prevailing winds transported the pollution from the Detroit area to Windsor. A 1963 study by the Canadian and Ontario governments seeking to determine the effects of transboundary pollution on the air quality on the Canadian side of the Detroit River found that the levels of iron concentrations were as high as the worst levels found in the United States. Particularly noteworthy was the sullied air in Windsor downwind of the Zug Island industrial area, home of Great Lakes Steel, the region's largest producer of airborne particulates.³¹ Windsor, with less than one-tenth the population of Detroit, yet with substantial industry nevertheless, was the overwhelming net recipient of pollution. In 1964, the city government of Windsor asked the Canadian government to take action to limit the flow.³² Given the disproportionate characteristics of the transboundary air pollution problem, it is no surprise that the previous reference was so limited. But the fact that Sarnia was beginning to receive attention for its bad air opened the door to a reference examining both areas, with one ostensive offender in each country.

Sarnia–Port Huron had many of the ingredients to become Trail II: a large industrial installation on the border producing an air pollution problem asymmetrically in relation to its neighbour. And Sarnia's bad air was unprecedented, like the size of the petrochemical complex producing much of it. The airborne pollution emitted by Sarnia's polluters, and the chemical waste they released into the St. Clair River, remains one of North America's greatest untold environmental disasters. To provide context for the reference, here is a brief overview.³³

Sarnia is located on the St. Clair River, at the southern tip of Lake Huron, directly across from Port Huron, Michigan, and south of Point Edward, Ontario. It was a picturesque site during the 1960s. Most of the city's professional buildings were located on two streets (Christina and Front) within two blocks of the shore. The city's 54,000 residents reaped a substantial economic benefit from its industry.³⁴ Sarnia's median income was \$101 per week in 1961, the highest in Ontario. By comparison, Toronto, then Canada's second largest urban area, had a median income of \$81. By 1967, Sarnia's weekly wage had risen further, to \$139 per week—the highest in Canada.

This wealthy population was sandwiched between two heavy polluters. Located on the southern end of Sarnia, Chemical Valley was one of a kind: there was no other petrochemical complex of its size and concentration in North America—a fact frequently repeated by industry representatives arguing that no other place could be used to benchmark Sarnia's pollution.³⁵ It consisted of ten firms at the beginning of the decade, twelve by the end, employing around 7,000 workers.³⁶ They included a Canadian Crown corporation (Polymer Corp.), multinational corporations (e.g., Dow Chemical, Shell), and privately held domestic firms. These companies experimented with and produced a variety of petrochemical products: solvents, ammonia, polyurethane, plastics (and its many antecedents, such as styrene), glycol, rubber, latex, chlorine, fiberglass, and others.³⁷ It was clear to all that they also produced a lot of air pollution. Dow released chlorine gas, for example, and might have released ammonia and chemicals involved in the manufacture of plastics (such as benzol and ethylene), but no statistics were made public on this.³⁸ The amount of energy needed to power these industrial facilities meant that coal-fired industrial boilers used by the firms also produced a lot of sulphur dioxide and dark smoke.³⁹

At the other end of the city, fewer than two miles north of Chemical Valley, was Holmes Foundry. This maker of engine casting blocks and brake linings was a family-owned enterprise that had been at its location for nearly fifty years. It was also one of Sarnia's heaviest polluters, releasing airborne smoke and soot derived from its manufacturing processes. Technically, because Holmes Foundry was on the northwest corner of Christina and Exmouth Streets, it was located in Point Edward. This small detail is mostly irrelevant, though. Holmes Foundry employed seven hundred people and was financially troubled. It struggled to survive after going into receivership in 1966. Neither town was going to burden Holmes Foundry's owners by requiring it to install expensive abatement equipment.⁴⁰

All research into the problem of industrial pollution in Sarnia was conducted by Chemical Valley's research arm, the St. Clair River Research Committee (SCRRC). It was created in 1952 by three Chemical Valley firms (Imperial Oil, Polymer Corporation, and Dow Chemical of Canada) to forestall regulatory measures toward air pollution then under consideration by the Sarnia government. By 1964 it counted eleven members—all of the Chemical Valley firms, plus Holmes Foundry.⁴¹ Each of these eleven firms represented one voting member on the SCRRC; the Ontario Department of Health (DOH) was the twelfth voting member and was privy to the SCRRC's proprietary data on the city's ambient pollution levels.⁴² The SCRRC's task was to study air and water pollution from the Chemical Valley companies, to "recommend to company management corrective action where warranted," and to "publicize all committee activities and thereby maintain good public relations for the benefit of the participating industries."⁴³ Thus, as Lorne Robb, SCRRC chairman and an executive at the Ethyl Corporation of Canada, explained in August 1965 to Sarnia's city council: "[The SCRRC's] terms of reference are to study and not to police member industries. This is being done on a voluntary basis. The industries take it upon themselves to correct their mistakes and they finance their efforts."⁴⁴

In practice, however, the SCRRC did not monitor air and water quality in Sarnia. It contracted this work to the Ontario Research Foundation (ORF), a private research firm.⁴⁵ The ORF maintained several pollution monitors throughout Sarnia and Chemical Valley, measuring ambient

levels of sulphur dioxide, hydrogen sulphide, particulate matter, and oxidants (e.g., nitrogen oxides, ground-level ozone, and chlorine). The fact that it did not measure emissions from polluting firms enabled the SCRRC to claim that the city's ambient pollution problems originated elsewhere. All data gathered by the ORF in Sarnia and paid for by the SCRCC was the SCRRC's intellectual property, even though it was reported to the DOH on a monthly basis.⁴⁶ Thus, the DOH knew the air quality measurements in Sarnia but could not share this information with the public, which received only that information disseminated by the SCRRC. Dr. E. R. Morton, a chemist at DuPont Canada who took over as the SCRRC chairman in 1966, explained that the industries' reason for secretiveness was that the information is "too prone to misinterpretation by the unsophisticated."⁴⁷ Before the IJC's investigation, the SCRRC and Lambton Industrial Society (its successor) maintained that, while air pollution was a problem in Sarnia, it was not a threat to public health since it was "essentially under control" and well within provincial guidelines for those chemicals for which guidelines were issued.⁴⁸

In August 1965, the mayor of Port Huron, Donald Wismer, publicly called for a joint committee to investigate the problem of air pollution from Sarnia.⁴⁹ The negative attention was sufficient for the SCRRC to release a lengthy press statement asserting that "industrial air pollution is not a cause for alarm in the Sarnia area," providing evidence and quotes from the director of the regional government public health agency backing this up, and explaining the organization's role in monitoring pollution. It claimed the press release was necessary due to "recent allegations that air pollution from industry in the Sarnia area is serious and poses a health hazard."⁵⁰ Yet Port Huron's residents continued complaining, as did its mayor, and by early-to-mid-1966, they received considerable press coverage.⁵¹ News of the IJC investigation arrived as an unpleasant surprise to Sarnia's city council and business leaders. They resolved to co-operate in the hope of improving the city's reputation, and with the stated intention of clearing the city's name.⁵²

To conduct the investigation, the IJC formed the St. Clair-Detroit Air Pollution Board, consisting of civil servants from federal, state (Michigan), and provincial (Ontario) governments. The board held public hearings in June 1967 in Windsor and Port Huron, and in March 1971 in Detroit and

Sarnia. As the investigation progressed, the board submitted semi-annual reports, with the near-complete January 1971 report serving as the basis for hearings the following March.⁵³ Afterwards, in 1972, the IJC produced and distributed its final report.

The report showed that sources in the Detroit area produced about ten times as much sulphur dioxide and particulate matter as those in the Windsor area. More importantly, it claimed to have found “unequivocal evidence that air contaminants originating in the industrial complex of Detroit do move across the International Boundary into the Windsor area.”⁵⁴ The evidence showed that pollution (particulates and sulphur dioxide) from Detroit exceeded Ontario’s ambient standards, while pollution travelling from Windsor to Detroit made up a small fraction of the allowed pollution in Michigan under the US Clean Air Act.

Sarnia–Port Huron was a different story. And the findings about pollution transport in that area revealed an important reason why Sarnia–Port Huron did not turn out to be Trail II. The predominant wind direction is north and south along the river (and the international border). The main meteorological problem worsening the area’s bad air was frequent temperature inversions, which held the pollution where it was produced. In other words, Chemical Valley’s main victims were Sarnians, not the habitants of Port Huron. The report noted this, saying, “the high level of pollution in Sarnia is, to a large extent, attributable to emissions originating in that jurisdiction.”⁵⁵ Port Huron received particulates, sulphur dioxide, and “odours” from Sarnia, but these were more than offset by the US production of pollution on the St. Clair River south of Port Huron and Sarnia (in Marysville and St. Clair) by coal-fired power plants. Sarnia’s contribution to Port Huron’s particulate levels, for example, in a region of eight and a half square miles, totalled only one-third of what was allowed under US ambient standards. Furthermore, the report stated that “outside of this section of Port Huron the transboundary flow of particulates from Canadian sources to the United States was rather insignificant.”⁵⁶

The IJC made two main recommendations. First, governments should establish binational ambient air quality objectives on sulphur dioxide, particulate matter, and odours for the two border zones covered by the reference. This was naive, but not particularly controversial. It was consistent with the contemporaneous trend of surrendering air pollution policy

to higher authorities. The six years after the reference was submitted was a period of substantial air pollution policy development. The 1970 US Clean Air Act created National Ambient Air Quality Standards and policy instruments for regulating polluters. In 1967, Ontario passed a statute giving the province the authority to regulate air pollution, and taking away from the cities the competency that had been given in an earlier statute. This was in response to industry lobbying the provincial government for provincial standards to prevent the further balkinization of air pollution regulations.⁵⁷ Plus, municipalites wanted to prevent industrial flight to air pollution havens. In 1967 Sarnia's elected leaders lobbied Ottawa for national emissions standards. The 1971 Canadian Clean Air Act eventually provided non-binding guidelines. Sarnia's mayor, Paul Blundy, specifically requested binational standards so that Sarnia would not need to fear losing industry if it faced increased scrutiny from provincial regulators.

Second, the IJC recommended that the governments create a binational air pollution board for the "coordination of surveillance, monitoring the implementation of programs, reporting and making recommendations to government . . . and such other duties related to the air quality in the vicinity of the Detroit River and St. Clair River areas as may be required."⁵⁸

Outcomes, and a Subsequent Detroit and St. Clair River Areas Reference

The regional air quality improvements following the early 1971 findings were substantial—for example, the total amount of suspended particulates in the two transboundary regions were reduced from more than 950,000 tons per year in 1971 to less than 440,000 in 1975.⁵⁹ Sarnia's unwanted experience in the limelight during the late 1960s appears to have provoked a series of modernizations at several Chemical Valley facilities.⁶⁰ Yet the transboundary region's overall reductions did not come close to achieving the IJC's recommended air quality objectives.

The more transparent outcome of the IJC investigation and recommendations was a binational resolution, passed at the August 1971 Governors and Premiers Great Lakes Conference, to create a Michigan-Ontario air pollution control committee for the purpose of formulating a binational control program. The Michigan-Ontario Transboundary Air

Pollution (MOTAP) Committee, formed in 1973, “included many of the working level air pollution specialists of jurisdictions in the Michigan-Ontario transboundary region who were compiling information and reporting continuously on the development of control strategies and state of compliance of pollution sources with emission limitations.”⁶¹ It produced a report that year detailing “the objectives and methods of cooperation.”⁶² The report led to the signing of a memorandum of understanding (MOU) by Michigan and Ontario, in November-December 1974, to achieve the IJC’s recommended ambient air quality objectives by the end of 1978. In the MOU, the governments of Michigan and Ontario pledged to work co-operatively through their newly created MOTAP Committee and, consistent with the second IJC recommendation above, suggested the two national governments “request the International Joint Commission to assume responsibility for monitoring progress of implementing programs for the control of air pollution in the transboundary area.”⁶³

The result of the MOU request was a third and final reference on air pollution in the Detroit and St. Clair River areas. The June-July 1975 reference directed the IJC to report annually on Michigan’s and Ontario’s progress in meeting the objectives of the 1974 MOU (namely, the IJC’s recommended air pollution objectives and the MOU’s deadline for achieving them). To do this, the IJC created the International Ontario-Michigan Air Pollution Board (IOMAPB) the following year.⁶⁴ Its annual reports used data mostly from the MOTAP Committee.

History has revealed that the air quality objectives set in the United States and Canada during the early 1970s were overly optimistic. The states in the American midwest, for example, remained out of compliance with the US Clean Air Act’s National Ambient Air Quality Standards for well over a decade. This was mirrored in the inability of Michigan and Ontario to adequately reduce their emissions. Suspended particulate levels in the transboundary region remained unchanged for the rest of the decade after the 1975 reference. The IJC’s ambient objectives—as well as Michigan’s federal air quality standards for particulates—were far out of reach.⁶⁵ In its 1979 report on Michigan-Ontario air pollution (which covered progress to the end of the MOU’s 1978 deadline) the IJC noted that particulates had “the highest levels concentrated in downtown Sarnia.”⁶⁶ This was tactful language describing an ongoing environmental disaster

only tenuously within the IJC's scope due to the meteorological conditions and wind patterns at play. In Lambton County (where Sarnia is located), sulphur dioxide emissions increased or stayed the same each year for the rest of the decade, through 1980.⁶⁷

In the early 1980s, however, the region was suffering deindustrialization. Many factories closed, especially old and inefficient ones. Energy consumption declined precipitously.⁶⁸ The IOMAPB reckoned that, when an economic rebound restored the region's manufacturing base, new facilities would be built according to modern pollution abatement regulations.⁶⁹ In a final report trumpeting its accomplishments in quickly bringing the region close to compliance with the ambient objectives, the IJC declared the board's work done and disbanded it in January 1984. Yet this final report also highlighted the need for additional work outside the narrow scope of the reference:

In the Commission's opinion, reporting on trends and programs for the original three pollutants in the Reference does not represent an adequate picture of the state of the atmospheric environment in the Michigan-Ontario trans-border region. Rather, they convey an incomplete picture of environmental quality. Reporting their successful control in isolation suggests that air pollution problems of international concern do not exist in the region. In fact there is a need to direct more attention to a wider range of air pollutants particularly toxic and hazardous substances.⁷⁰

In September 1988, purportedly in response to public outcry in Canada over the construction of a solid waste incinerator in Detroit, the United States and Canada requested that the 1975 reference be reactivated with a new focus on air toxics. The IJC formed a new regional air pollution board (the International Air Pollution Advisory Board for the Detroit-Windsor/Port Huron-Sarnia Region) to investigate. It conducted public hearings in March 1991, undertook a study examining the presence of a range of toxic chemicals (ones listed in US and Canadian air pollution statutes for which the board could find data), and produced a report, released in February 1992. The report's nineteen recommendations called, in essence, for more

monitoring of the presence of toxic chemicals and resulting health costs within the geographic scope of the reference.⁷¹ It was an anticlimactic and nebulous end to the Detroit and St. Clair River areas case, a succession of references that were at times ill-suited for the considerable problems that inspired them—initially for Detroit-Windsor, and later for Sarnia. More important, it was also the end of the two countries' use of the IJC to investigate and provide recommendations on transboundary air pollution.

The Case of Acid Rain, 1970s–91

Our foregoing “tale of two cases” conspicuously omits a third, more contemporary air pollution issue between Canada and the United States. Acid rain was the most prominent such issue during the late 1970s and '80s, especially in Canada. Scientists in both countries researched its effects, officials held bilateral talks, and the two governments eventually signed an agreement aimed at controlling emission sources. But the IJC played virtually no role in these efforts. Washington and Ottawa made sure of that.

The governments coordinated acid rain research during the late 1970s and '80s through an ad hoc Canada-US body, the Bilateral Research Consultation Group, not through the independent IJC. The governments made no formal reference to the commission for a report or recommendations. When they eventually concluded the bilateral Air Quality Agreement (AQA) in 1991, they created another intergovernmental body, the Canada-US Air Quality Committee (AQC) to coordinate and evaluate implementation of the AQA. They also gave the IJC not the task of assessing their efforts—as they had done in the earlier Great Lakes Water Quality Agreement—but the ignominious task of collecting and summarizing public comments on the AQC's biennial reports. It collected a total of four comments on the AQC's 2012 report and three comments, all emailed, on the 2014 report.

Why did the governments studiously ignore the IJC and keep it out of acid rain developments? As mentioned, the governments gave the IJC a watchdog role in the 1972 Great Lakes Water Quality Agreement—a sort of continuing formal reference. They also ensured the commission had adequate staff to undertake this new responsibility and supported the establishment of a regional office in the Great Lakes basin. Over the course of

the 1970s, however, an uneasy, even testy, relationship developed between the commissioners and government officials. It was evident in unusual public exchanges of letters over issues that were by themselves relatively unimportant and now long since forgotten—particularly the placement of an ice boom on the St. Mary's River and the procedures for notification concerning construction of a Saskatchewan power plant.⁷² The governments were in general concerned about the apparent activism the commission was showing and perhaps about it challenging the governments' prerogatives.

The IAQAB also engaged in several watchdog-type activities outside the Detroit and St. Clair River areas, leading the governments to conclude it, too, had overstepped its authority.⁷³ In one notable incident, the IAQAB conducted an investigation into pollution from an aluminum plant in upstate New York, and in particular its effects on the nearby cattle industry on tribal land that spans both sides of the border. After a public consultation meeting, the IAQAB recommended bilateral and domestic policy action to address the problem. In response, in October 1978, the governments compelled the IJC to limit strictly the IAQAB's role to one of alerting the governments about issues, not investigating those issues on the board's own initiative. But the damage to the IJC's reputation had already occurred.

In an edited volume on the acid rain dispute published in 1985, before the AQA negotiations began in earnest, Paul Kinscherff dismissed the IJC as a policy actor of much potential impact. He asserted the organization's perceived activism had undermined its credibility to such a great extent, at least within the two national governments, that both of them now opposed involving the commission in any politically sensitive environmental issues.⁷⁴

The intergovernmental nature of the AQC ensures, by its design, that it will exhibit no such activist tendencies. The result is that there is no independent review of the regular reports on the AQA's implementation. One of the authors of this chapter wrote, a decade ago, that the AQC reports reflected, not objective evaluations of governmental programs to meet the provisions of the AQA, but rather binational "collusion" between the environmental and other agencies of the two countries. The two governments wanted above all to avoid embarrassment over lagging policies

to meet commitments they themselves had made in the 1991 agreement.⁷⁵ The IJC had become a casualty of that concern.

Conclusion

The IJC's history as a binational organization important in air pollution policy is a tale of two cases. The Trail smelter dispute, and Detroit and St. Clair River areas air pollution are the cases for which it can be credibly argued that the IJC performed a substantial role in influencing institutional processes. Assessing the role of the IJC in the Trail smelter case requires that we recognize three independent, albeit related, stages in the dispute resolution process: the first stage comprising the IJC investigation and the commission's 1931 report, the second stage consisting of the negotiation and signing of the 1935 Canada-US convention, and the third stage involving the international tribunal and its two formal arbitration decisions (1938 and 1941).

There is a tendency in the historical and even more voluminous legal literature on the Trail smelter case to focus on the third of these three stages. It is the tribunal that is most often credited with finding that "Canada was responsible for damage in Washington State caused by [the smelter] fumes" and finding "the Canadian government liable for damages of \$350,000."⁷⁶ These notions are simply historically incorrect. They wrongly credit the tribunal with conclusions and proposals actually taken previously by the IJC, and relegate the IJC to a minor and perhaps negligible role in resolving the Trail conflict.

Contrary to common belief, the IJC commissioners, not the international tribunal, first found Canada responsible for environmental damage caused by Trail smelter fumes. The commissioners also established the initial and larger indemnity (\$350,000) of the two financial settlements that Canada eventually came to pay for its pollution. As noted above, both were key recommendations of the IJC's 1931 report to the governments. Moreover, both Canada and the United States explicitly agreed in 1935 that Canada was liable for damages and agreed on an indemnity, the amount of which was exactly what the IJC had recommended four years earlier. These points became the key substantive provisions of the bilateral convention that created the international tribunal. Canada had already

paid the \$350,000 settlement before the tribunal even got underway.⁷⁷ The additional, relatively small damage claims from Americans later approved by the tribunal itself covered only small fumigation incidents after 1932. The tribunal also notably rejected most of the US claims for further compensation. The role of the arbitral tribunal in deciding Trail compensation issues was thus a relatively minor one.

As our examination of the three stages shows, the 1935 bilateral Canada-US agreement on the 1931 IJC recommendations was the key to resolving the Trail smelter dispute. The role of the well-known arbitral tribunal was secondary. We would argue, in fact, that the Trail case was one of the major success stories of the IJC during its first century of operation.

The Detroit and St. Clair River areas case provides another example (albeit, less commonly studied) of the IJC's influence in air pollution policy. Although the IJC subsequently claimed that its 1972 report (and findings, released the previous year) spurred the governments in both transboundary regions to apply pressure for pollution reductions, it is difficult to disentangle the IJC's influence from regulatory processes already underway, such as the programs under the 1970 US Clean Air Act.⁷⁸ To the extent these pollution-reducing changes were in response to bad press (as opposed to changes that were underway anyway), the IJC investigation was one among several sources applying pressure. Toronto's two major newspapers and the Canadian Broadcasting Corporation fed the flames with their own investigations condemning Chemical Valley.⁷⁹ The IJC's role in spotlighting the problem with quantitative data probably helped. Thanks to the study, the Michigan and Ontario governments had vastly better data with which to design pollution abatement programs than did other heavily polluted areas in the two countries. It was the first report on the region's pollution to accurately describe the extent of the problem, its sources, the patterns of transboundary transport, and to contextualize these findings in terms of each country's air pollution standards. It broke the grip that the SCRRC had on information about the problem, and thus one of the organization's main forms of control.

Less clear is the effectiveness of the 1970s binational air control program aimed at achieving the IJC's recommended air quality objectives, including the third Detroit and St. Clair River areas air pollution reference and activities of the IOMAPB. Plausibly, the IJC's influence in bringing

about air pollution relief was outweighed by the effects of the region's economic upheaval during the early 1980s. At least the IOMAPB coordinated the dissemination of reliable data to track progress. At any rate, by the time the IJC's work under the 1975 Detroit-Windsor and Port Huron-Sarnia reference ended in 1984, the IJC had effectively run its course as an important player in air pollution policy debates addressing transboundary air pollutants.

The way the governments dealt with the acid rain case, by working around the IJC, evidences the commission's diminished role in binational air pollution governance. Even its institutional alternative, the AQC, shows little recent activity, despite being tasked with implementing a binational treaty. The AQA's last annex (for ground-level ozone) occurred twenty years ago. Its long-discussed annex on particulates has not been completed and appears shelved. As of summer 2019, the AQC has not released its 2018 biennial progress report, despite the requirement under article viii of the AQA that it do so. Thus, the diminution of the IJC's importance in transboundary air pollution issues has occurred within the context of a general decline in support for binational air pollution governance. Given that each country's air is much cleaner than in the past (thanks mostly to domestic regulations and technological advancements in polluting industries), and the evident lack of demand for binational institutions, it is possible that US-Canada air pollution governance has mostly run its course for the foreseeable future.

Notes

- 1 For discussions of the law and practice of the quasi-judicial aspect of the commission's work, see Robert A. MacKay, "The International Joint Commission between The United States and Canada," *American Journal of International Law* 22, no. 2 (1928): 292–318; Louis Mortimer Bloomfield and Gerald Francis FitzGerald, *Boundary Waters Problems of Canada and the United States: The International Joint Commission 1912–1958* (Toronto: Carswell, 1958); and Charles B. Bourne, "Canada and the Law of International Drainage Basins," in *Perspectives on International Law and Organization*, ed. R. St. J. Macdonald, G. L. Morris, and D. M. Johnston (Toronto: University of Toronto Press, 1974), 468–99.
- 2 Arnold D. P. Heeney, "Pollution in Boundary Waters" (Address to the Canadian Institute on Pollution Control meeting, Ottawa, ON, 25 October 1965).

- 3 For a recent overview of the air pollution references (albeit neither an in-depth nor critical one) see Jason Buhi and Lin Feng, "The International Joint Commission's Role in the United States-Canada Transboundary Air Pollution Control Regime: A Century of Experience to Guide the Future," *Vermont Journal of Environmental Law* 11, no. 1 (2009): 107–44.
- 4 See, for example, Cesare Romano, "International Dispute Settlement," in *The Oxford Handbook of International Environmental Law*, ed. Daniel Bodansky, Jutta Brunnée, and Ellen Hey (Oxford: Oxford University Press, 2007), 1036–56. The Trail Smelter case is the second-most-often cited legal case in the *Oxford Handbook*.
- 5 The background information in this section is largely obtained from the authoritative history provided by the Trail Smelter Arbitral Tribunal in its 16 April 1938 decision report, pages 1913–19, available in United Nations, *Reports of International Arbitral Awards: Trail smelter case, Volume III* (2006), http://legal.un.org/riaa/cases/vol_III/1905-1982.pdf.
- 6 Heap roasting, or roast yards, involved burning off some of the sulphur in raw ores piled up in open pits, ignited by setting logs on fire. The process took weeks and the burning ore put massive amounts of sulphur dioxide fumes into the local air shed. The same technique was employed for decades by the nickel smelters outside Sudbury, Ontario, and used there long after European smelters had abandoned the harmful practice.
- 7 The Sullivan Mine eventually closed in 2001, almost a century after it first began production. The ore for the Trail Smelter now comes by ship and rail from Alaska—a testament to the extent of the sunk investment in the Trail operation and its efficiency. The current owner of the Trail Smelter is Teck Resources, following a merger with Cominco in 2001. Teck recently waged an unsuccessful takeover bid for INCO, owner of the Sudbury smelter, losing out to Vale, a subsidiary of a Brazilian mining company, CRVD.
- 8 See "Zinc smelting," at https://en.wikipedia.org/wiki/Zinc_smelting. The main use of zinc is coating steel products in order to protect against rust and corrosion.
- 9 One of the most important references to the IJC from Canada and the United States, in 1944, concerned possible binational development of the Columbia River for flood control and hydroelectric production. The result was the Columbia River Treaty and subsequent developments. See Neil A. Swainson, *Conflict Over the Columbia: The Canadian Background to an Historic Treaty* (Montreal: McGill-Queens University Press, 1979).
- 10 About 270 miles south of Northport lies the immense Hanford nuclear station, originally part of the Second World War-era Manhattan Project, in an area highly contaminated by nuclear waste.
- 11 Reginald S. Dean and Robert E. Swain, "Report Submitted to the Trail Smelter Arbitral Tribunal," in US Department of Interior, *Bulletin* 453 (Washington, DC: US Government Printing Office, 1944), Figure 2, p. 19, available at <https://digital.library.unt.edu/ark:/67531/metadc12613/>. Two tons of sulphur dioxide is equivalent to one ton of elemental sulphur.

- 12 Likely the main effect, and perhaps the main purpose, of the taller stacks was to improve local ambient air quality in Trail itself, not to reduce transboundary pollution flows.
- 13 Meteorological studies done later of Trail emissions and of the INCO “superstack” in Sudbury suggest blaming taller stacks was likely a valid conjecture. Putting emissions higher into the atmosphere facilitated their longer-range transport.
- 14 Article ix stipulates in part that the parties “further agree that *any other questions or matters of difference* arising between them involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along the common frontier between the United States and the Dominion of Canada, shall be referred from time to time to the International Joint Commission for examination and report” (emphasis added). See <https://www.ijc.org/en/who/mission/bwt>.
- 15 Don Munton, “Forests, Fumes and Further Studies: Environmental Science and Policy Inaction in Ontario,” *Journal of Canadian Studies* 37, no. 2 (2002): 130–63.
- 16 Morris Katz and F. E. Lathe, “Summary,” in National Research Council of Canada, *Effect of Sulfur Dioxide on Vegetation*, No. 815 (Ottawa, ON: National Research Council, 1939), 429–47.
- 17 Quoted by the Trail Smelter Arbitral Tribunal in “Decision,” *The American Journal of International Law* 35, no. 4 (1941): 691–2.
- 18 Keith A. Murray, “The Trail Smelter Case: International Air Pollution in the Columbia Valley,” *BC Studies* 15 (1972): 73.
- 19 Trail Smelter Arbitral Tribunal, “Decision.”
- 20 Murray, “The Trail Smelter Case: International Air Pollution in the Columbia Valley.”
- 21 The 1935 convention contained as many articles as the entire Boundary Waters Treaty—fourteen in all. Fully eleven of the articles dealt, in great detail, with the procedures by which the tribunal should operate. The text of the convention was, in other words, short on substance (with one significant exception) and long on process. Once approved by the US Senate, the convention became a formal treaty under American law.
- 22 Article iii of “Canada-United States: Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail, B. C.,” *The American Journal of International Law* 30, no. 4 (1936): 163–67, doi:10.2307/2213437.
- 23 Trail Smelter Arbitral Tribunal, “Decision,” 708–9.
- 24 Trail Smelter Arbitral Tribunal, “Decision,” 716. The novelty of this principle lay only in it being applied here for the first time at the international level. The principle was already part of American domestic law. Legal scholars have subsequently pointed to the limitations of the principle given that the case must be “of serious consequence” and the injury be “established by clear and convincing evidence.”
- 25 Trail Smelter Arbitral Tribunal, “Decision,” 684.
- 26 Letter, R. A. Lovett and Louis St. Laurent to IJC, air pollution reference, 12 January 1949, <https://www.ijc.org/en/docket-61-air-pollution-reference-can-1949-01-12pdf>.

- 27 See IJC, *Transboundary Air Pollution: Detroit and St. Clair River Areas* (Washington, DC: US Government Printing Office, 1973), <https://www.ijc.org/sites/default/files/Docket%2085%201972%20Report%20to%20Gov..pdf>.
- 28 IJC, *Termination of Commission Activities on Vessel Smoke Surveillance in the Detroit River Area under the 1949 Air Pollution Reference*, 1 March 1967, <https://www.ijc.org/en/docket-61-air-pollution-final-report-1967pdf>.
- 29 Letter, John M. Leddy and Paul Martin to IJC, air pollution reference, 23 September 1966, <https://www.ijc.org/en/docket-85-port-huron-sarnia-detroit-windsor-air-pollution-can-reference-1966-09-23pdf> (Canadian version), and <https://www.ijc.org/en/docket-85-port-huron-sarnia-detroit-windsor-air-pollution-reference-uspdf> (US version).
- 30 IJC, *Transboundary Air Pollution: Detroit and St. Clair River Areas*.
- 31 Ibid., ch. 7.
- 32 Testimony of W. B. Drowley at the IJC public hearings in Sarnia on joint air pollution study of Sarnia–Port Huron, 10 March 1971, Docket 85, box 118, folder 85-2-2:1, IJC, Ottawa.
- 33 For a lengthier account of air pollution politics in Sarnia, see Owen Temby, “Control and Suppression in Sarnia’s Chemical Valley during the 1960s,” *Enterprise & Society* (forthcoming).
- 34 Walter Stewart, “Profile of a City with Poisoned Air,” *Star Weekly Magazine*, 27 January 1968.
- 35 Marcella Brown, “Air Pollution Said Under Control Here: Research Committee’s Data Reveals Area ‘On the Good Side of Things,’ ” *Sarnia Observer*, 17 April 1967.
- 36 The *Globe and Mail* called Sarnia “the most stable labour force in Canada.” See Ralph Hyman, “Sarnia’s Generous Giants,” *Globe and Mail* (Toronto), 22 July 1961.
- 37 Ibid.; Coal Producers Committee for Smoke Abatement, *Report of Survey in Sarnia, Ontario*, July 1953. Box 19JA-G, Conservation and Pollution, Lambton County Archives (hereafter, LCA).
- 38 Stewart, “Profile of a City with Poisoned Air.” The Coal Producers Committee’s 1953 survey and report admitted that its brief survey was insufficient to determine the extent to which chemicals were emitted into atmosphere. At Polymer, for example, it observed “fumes and odors,” and said that the “extent of air pollution from this source [is] impossible to determine without elaborate collection equipment and analysis.” Coal Producers Committee for Smoke Abatement, *Report of Survey in Sarnia*.
- 39 Ibid.
- 40 Terrance Wills, “Sarnia Air Pollution: Outside Invention or Local Conspiracy?” *Globe and Mail* (Toronto), 3 January 1967.
- 41 The eleven firms in the SCRR in 1964 were Cabot Carbon of Canada, Dow Chemical of Canada, Dupont of Canada, Ethyl Corporation of Canada, Fiberglass Canada, Holmes Foundry, Imperial Oil Enterprise, Allied Chemical, Polymer Corporation, Shell Canada, and Sun Oil Company. C. M. Finigan, “The St. Clair River Research

- Committee: A Co-Operative Approach to Pollution Abatement,” in *11th Ontario Industrial Waste Conference, Proceedings*, vol. 11 (presented at the Ontario Industrial Waste Conference, Lake of Bays, Ontario: Queen’s Printer for Ontario, 1964).
- 42 Ibid.; Wills, “Sarnia Air Pollution.”
- 43 Finigan, “The St. Clair River Research Committee,” 75.
- 44 Sarnia City Council, council chamber minutes, 30 August 1965, Minute Book 38, Sarnia City Hall (hereafter SCH).
- 45 For an explanation of the ORF’s relationship to the SCRRC, see H. G. McAdie (project director of the ORF’s air pollution survey in Sarnia) to G. A. M. Thomas, 2 April 1965, loc. C500-21, roll 880, City of Sarnia Correspondence, Sarnia City Hall (hereafter CSC).
- 46 SCRRC press release, 13 August 1965, loc. C500-11, roll 882, CSC.
- 47 Wills, “Sarnia Air Pollution,” 1.
- 48 SCRRC, *Review of Air Pollution at Sarnia*, 1966. Box 19JA-G, Conservation and Pollution, LCA.
- 49 H. T. Ross to R. G. Given, 27 August 1965, loc. C500-24, roll 882, CSC; “Port Huron May Join Sarnia Pollution Check,” *Windsor Star*, 26 August 1965.
- 50 SCRRC press release, 13 August 1965.
- 51 See Ron Lowman, “When you Walk in Sarnia, Smog Gets in your Eyes,” *Toronto Daily Star*, 7 May 1966.
- 52 Sarnia City Council, council chamber minutes, 3 January 1967, Minute Book 40, SCH.
- 53 See IJC, *Joint Air Pollution Study of St. Clair–Detroit River Areas for International Joint Commission Canada and the United States* (Washington, DC: US Environmental Protection Agency, 1971), available at <https://nepis.epa.gov>.
- 54 IJC, *Transboundary Air Pollution: Detroit and St. Clair River Areas*, 33.
- 55 Ibid., 56.
- 56 Ibid., 44.
- 57 See Owen Temby, “Policy Symbolism and Air Pollution in Toronto and Ontario, 1963–1967,” *Planning Perspectives* 30, no. 2 (2015): 271–84.
- 58 IJC, *Transboundary Air Pollution: Detroit and St. Clair River Areas*, 60–1.
- 59 IJC, *First Annual Report on Ontario-Michigan Air Pollution*, 1976, <http://www.ijc.org/files/publications/ID567.pdf>. The second annual report indicates that, by 1977, 118 of the 122 major point sources identified by the IJC in January 1971 implemented “compliance measures acceptable to the local jurisdictions.” IJC, *Second Annual Report on Michigan-Ontario Air Pollution*, 1977, p. 7, <http://www.ijc.org/files/publications/ID571.pdf>.
- 60 Notably, Polymer Corporation’s conversion from coal to natural gas, and the use of low-sulphur coal at Dow Chemical, both occurring in 1969 or 1970. These were discussed in Lorne Robb’s 10 March 1971 testimony to the IJC in Sarnia, Docket 85, box 118, folder

- 85-2-2:1, IJC, Ottawa. Robb was the chairman of the Lambton Industrial Society's technical committee, the SCRRC's successor.
- 61 IJC, *Final Report Pursuant to the July 8, 1975 Reference on the State of Air Quality in the Detroit-Windsor and Port Huron-Sarnia Areas*, 1984, 2, <https://legacyfiles.ijc.org/publications/ID566.pdf>. See also *First Annual Report on Ontario-Michigan Air Pollution*.
 - 62 IJC, *First Annual Report on Ontario-Michigan Air Pollution*, 22.
 - 63 "Memorandum of Understanding on Transboundary Air Pollution Control in Southwestern Ontario-Southeastern Michigan Area," 1974, in IJC, *First Annual Report on Ontario-Michigan Air Pollution*, appendix A, 29.
 - 64 IJC, "Directive to International Ontario-Michigan Air Pollution Board," 3 February 1976, in *First Annual Report on Ontario-Michigan Air Pollution*, 13–17. The IOMAPB should not be confused with the St. Clair–Detroit Air Pollution Board or the International Air Quality Advisory Board.
 - 65 IJC, *Fourth Annual Report on Michigan-Ontario Air Pollution*, 1979, 1, <http://www.ijc.org/files/publications/ID568.pdf>.
 - 66 IJC, *Fourth Annual Report*, 4.
 - 67 IJC, *Annual Report on Michigan-Ontario Air Pollution*, 1982, <http://www.ijc.org/files/publications/ID565.pdf>.
 - 68 For example, petroleum consumption in Michigan alone declined from over 221 million barrels in 1978 to under 139 million barrels in 1982, the lowest consumption since 1963. It never recovered to previous high points. See US Energy Information Administration, "Energy Consumption Estimates for Major Energy Sources in Physical Units, 1960–2016, Michigan," https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/total/use_tot_MIa.html&sid=MI.
 - 69 IJC, *Final Report Pursuant to the July 8, 1975 Reference*.
 - 70 Ibid., 4. The IJC did not produce an IOMAPB annual report in 1980. Its next progress report was released late, in 1982. Similarly, it released no report in 1983. The 1982 report noted the changed political-economic context, notably reduced financial support by government for monitoring activities and lower industrial production in the region, which was beginning to reduce particulate emissions, although not appreciably.
 - 71 IJC, *Air Quality in the Detroit-Windsor/Port Huron-Sarnia Region: A Report to the Governments of Canada and the United States Pursuant to the Reference of July 8, 1975 and letters from the Governments of September 30, 1988 (1992)*, <https://ijc.org/sites/default/files/Docket%2099%20Final%20Report%201992.pdf>
 - 72 The exchanges over these issues are discussed in Don Munton, "Paradoxes and Prospects," in *The International Joint Commission Seventy Years On*, ed. Robert Spencer, John Kirton, and Kim Richard Nossal (Toronto: Center for International Studies, 1981), 60–97.
 - 73 For an overview of the IAQAB's activities during this period, see the IJC's *The Annual Report 1976, 1977*, p. 21, available at <http://www.ijc.org/files/publications/ID1001.pdf>.

- 74 Paul Kinscherff, “The International Joint Commission: The Role It Might Play,” in *Acid Rain and Friendly Neighbors: The Policy Dispute between Canada and the United States*, ed. Jurgen Schmandt and Hilliard Roderick (Durham, NC: Duke University Press, 1985), 174–92.
- 75 Don Munton, “Acid Rain Politics in North America: Conflict to Cooperation to Collusion,” in *Acid in the Environment: Lessons Learned and Future Prospects*, ed. G. R. Visgilio and D. M. Whitelaw (New York: Springer, 2007), 175–201.
- 76 Steven Bernstein, *The Compromise of Liberal Environmentalism* (New York: Columbia University Press, 2001), 47; and Lynton Caldwell, *International Environmental Policy* (Durham, NC: Duke University Press, 1984), 151. See also Andrew Morriss, “Supporting Structures for Resolving Environmental Disputes among Friendly Neighbors,” in *Acid Rain and Friendly Neighbors: The Policy Dispute between Canada and the United States*, ed. Jurgen Schmandt and Hilliard Roderick (Durham, NC: Duke University Press, 1985), 211–45; Norman J. Vig, “Introduction: Governing the International Environment,” in *The Global Environment: Institutions, Law, and Policy*, ed. Norman J. Vig and Regina S. Axelrod (London: Earthscan, 1999), 15.
- 77 Trail Smelter Arbitral Tribunal, “Decision,” 694.
- 78 Air pollution reduction efforts in the transboundary area covered by the 1967 reference were evaluated annually, beginning 1976, in reports mandated under the 1975 reference. In general, these reports credited the IJC’s work and government programs with air pollution reductions in the transboundary region, while diverting blame—occasionally incorrectly—for shortfalls to purportedly lax domestic regulations.
- 79 Ryan O’Connor, *The First Green Wave: Pollution Probe and the Origins of Environmental Activism in Ontario* (Vancouver: UBC Press, 2015); Temby, “Policy Symbolism and Air Pollution.”

