

Fourth Draft - for Discussion and Comment

MMT, A Risk Management Masquerade

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The following statement, describing a program aired on *The National Magazine* in late 1998, appears on the CBC website.¹

Canada is one of the few countries using a controversial gasoline additive: MMT, a known neurotoxin. MMT has been replacing lead in gasoline since the 1970s in Canada. Canada is one of the few countries using this product. In 1995 the Canadian government proposed banning the trade of MMT to protect health and the environment. However, minister of the environment, Sergio Marchi, the MP advocating the ban of MMT was warned his action would bring him into a NAFTA challenge he would be unlikely to win. The Canadian government eventually withdrew its ban on the import of MMT and paid Ethyl, the company selling it to Canada, millions of dollars in settlement. Proving the negative effects of manganese [the by product of the combustion of MMT] on the brain is difficult. However, studies do show that increasing exposure to manganese does result in decreased coordination and memory -- symptoms similar to the aging process. Twenty-one different car makers have also lobbied the federal government based on their claims that MMT affects their cars' pollution reduction systems. In the United States, the sale of MMT was banned until 1995, when Ethyl took the government to court. Ethyl won on a technicality. In this case, Canada has fewer rights than the state of California which was able to ban MMT. Ethyl's successful use of the threat of a \$250 million suit against the Canadian government illustrates that a foreign corporation had the power to overrule our own government due to the provisions of the NAFTA trade agreement.

Prelude

In April 1991 then Opposition Leader Jean Chrétien penned a series of letters about the dangers of a manganese-based fuel additive to various federal ministers in the Mulroney government. For example, Mr. Chrétien wrote to Doug Lewis, the Minister of Transport: “Two of Canada’s top neurotoxic scientists, Dr. John Donaldson and Dr. Frank Labella, have been speaking out on this for several years, and I have letters of warning from the Medical School of Boston University and the University of Pittsburgh, as well as other institutions warning of the continued use of this insidious toxic heavy metal. I respectfully request that the government ban this substance,...”² Most likely the PM-in-waiting could not have known that he had been given a minor part to play in the staging of a modern Canadian fairy tale, soon to be peopled with an evil agent (an American corporation), noble saviours of the people (Liberal environment ministers), and other ingredients — indeed, all save the most important one, namely a happy ending.

The Opposition Leader’s letter was constructed so as to give the impression of a consensus among medical science researchers, first, that all uses of manganese should be discontinued, because it is so hazardous that Canadians ought not to be exposed to it at all, and second, that MMT (not identified by name) is the source of unacceptable levels of exposure to that metal. The first such contention, had it been more widely broadcast, would have come as something of a shock to the mining and steel industries in Canada, which for a long time have produced and used rather large quantities of this useful metal. The second is just patently false, based on a series of risk assessments completed by the federal government from the late 1970s onwards. These awkward intrusions of reality never happened, and the tale was allowed to become further embellished, and eventually to be substituted for reality, as is shown in the story line of the

CBC’s television program segment, broadcast on *The National Magazine* in late 1998, “Running on MMT.”

By the time that program was broadcast the accumulated confusions were quite extraordinary. The program summary for “Running on MMT,” cited at the head of this chapter (which appears on the CBC’s website), after stating that MMT is a “known neurotoxin,” goes on to observe: “Proving the negative effects of manganese ... [produced by the combustion of MMT] on the brain is difficult.”³ On the contrary, it is well established that excessive exposure to manganese leads to the neurological disorder called “manganism.” The program summary also claims that Ethyl Corporation, the sole manufacturer of MMT, won a 1995 court case against the U. S. government “on a technicality”; we believe that an unbiased reading of the documentary evidence, which is summarized later in our chapter, shows this to be a fanciful construction. Finally, the program reiterates what is now firmly part of Canadian lore, the idea that NAFTA allowed Ethyl to unfairly bully the Canadian government into submission: This carries the astonishing implication that, not only did our national government capitulate hurriedly to a rather small U. S. corporation, well before even going to trial, but that Ottawa also lied to the Canadian public about why it agreed to an out-of-court settlement in the statement it issued at the time!

Alas, although the reasons actually given in the government statement do not make as good a tale, they do point towards the truth of the matter (as often happens when a \$20 million compensation payment is being made). There is no foreign villain in this story. In our view the evidence presented below provides sufficient warrant to represent this not as tragedy but as farce, or more accurately as a masquerade: Under the disguise of a disingenuous risk management argument another agenda entirely was played out by the North American automobile manufacturers, an agenda that to this day is not entirely clear in terms of its strategy and

objectives. There is bullying in this story indeed, but not by Ethyl; Canada’s national government was in fact bullied shamelessly by the auto industry into passing legislation so shoddy and ill-considered that only a complete recantation of it would settle the matter. What other example is there in living memory of a piece of federal legislation effectively withdrawn in its entirety barely one year after its passage?

The sources of this farce are many, but among them is our inability to put our trust in the process of doing credible health and environmental risk assessments and then having the courage to manage the risks in question in the light of them. The greatest irony in this tale is that a federal department (Health Canada) had done such a competent assessment, in 1994, which was then blithely ignored as the other agenda played itself out. Thus the hapless Canadian taxpayer was twice dunned, once for doing the risk assessment and the second time for ignoring it (when Ethyl had to be compensated). We ought to stop doing this to ourselves.

The Substance in Question

MMT (methylcyclopentadienyl manganese tricarbonyl) has been used as a fuel additive in unleaded gasoline in Canada since 1976, and the use of MMT increased as lead was phased out as a gasoline additive.⁴ Small amounts – in Canada up to 18 milligrams per litre [mg/L] but with an average level around 8 mg/L – are added to unleaded gasoline to raise its octane level between 0.5-1.0 units. The sole producer of MMT in North America is Ethyl Corporation at its facilities in Orangeburg, South Carolina; Ethyl imports MMT into Canada where it is blended at its Corunna, Ontario facility. About 40 people are employed at the Canadian plant and MMT represents approximately 50 per cent of Ethyl Canada’s total sales revenue, around \$25 million per year. But in the U. S. MMT could not be used in unleaded gasoline until 1995, when a long battle between Ethyl and the Environmental Protection Agency [EPA] culminated in a series of

court rulings won by Ethyl that forced the EPA to permit its use. In the meantime, desired octane requirements in the U. S. have been achieved by refinery technology upgrades, and also by the use of other oxygenated fuels or additives (e.g., MTBE and ethanol).⁵ However, MMT is less expensive than the alternatives in raising octane levels in gasoline.

MMT contains the metallic element manganese (Mn), and at sufficiently high levels manganese can cause difficulties with the central nervous system. “Manganism” is the term given to the symptoms displayed by workers and others exposed to excessively high levels of manganese; it is characterised by “various psychiatric and movement disorders, with some general resemblance to Parkinson’s disease in terms of difficulties in the fine control of some movements, lack of facial expression, and [other neurological factors].”⁶ Although manganese is toxic at high levels, there is still much scientific debate surrounding the health significance of long-term, low-level inhalation exposure. The toxicity of manganese varies depending on how people are exposed to it, for when it is swallowed or ingested, manganese is not as toxic as when it is inhaled. Manganese is in fact considered an essential trace nutrient required by the body (by comparison, lead has no nutritional value). Manganese does not occur as a free metal, but rather in one of a number of oxidation states; when gasoline with MMT is burned, the main emission products have long been thought to be mostly manganese oxides, but recent studies suggest they are primarily manganese phosphates and sulphates, with only a small amount of manganese oxides.⁷

One of the most important parts of our story, important because of how little was made of it throughout the evolution of the MMT saga, has to do with the range of sources of airborne manganese in the Canadian environment. The principle anthropogenic emissions of manganese to the environment have been from metallurgical processing (47% in 1984) and steel and iron

manufacturing (28% in 1984), part of industrial operations located primarily in Ontario and Québec. Still, the combustion of MMT represented the third largest source on a nationwide basis (17% in 1984), but it is the major source of environmental manganese in all those provinces that do not have industrial sources. In addition, vehicle emissions pose different exposure concerns than do single point-source industrial emissions, due to their wide spatial distribution and concentration in urban areas.⁸ Although these numbers are somewhat outdated, as no detailed manganese emissions inventory has been conducted since 1984, a comprehensive 1998 study in Toronto presented some further evidence that sources other than MMT create more serious manganese risks. This study found no correlation between the concentration of MMT in gasoline and personal manganese exposure; the highest concentrations of manganese were found in the subway lines (perhaps from the grinding of the steel rails), where levels were up to 44 times greater than in outdoor areas and in other indoor environments (likely from re-suspended dust).⁹ Health Canada estimated in 1994 that use of MMT added 122 tonnes of manganese to the environment in the previous year.

The main players involved in the MMT debate over the past eight years include Ethyl, the automobile manufacturers, the oil industry, the U. S. and Canadian governments (both federal and provincial), and environmental groups. The substance of the debate had three different themes: (1) the direct effect of MMT on vehicle emissions exhaust, (2) the effect of MMT on emission control systems and the on-board diagnostic systems designed to make sure those systems are working properly, and (3) the effects of manganese from MMT on the environment and human health. Environmentalists, who were mostly concerned that manganese would create health problems similar to lead, sided with the automobile manufacturers in wanting to ban MMT. However, Ethyl, who was conducting its own series of emission and health studies in order to gain an EPA waiver to allow the use of MMT, had been arguing that, not only was its product

“safe” from the standpoint of human health, but that it was also actually good for the environment, because it reduced nitrogen oxide (NO_x) emissions in automobile exhausts. In the meantime, the oil industry remained unconvinced by the car manufacturer’s claims about MMT and maintained that it should be kept in gasoline, at least until there was sound evidence that it did cause problems with emission control systems.

Each player had specific interests in the MMT issue. For Ethyl, these were obvious: MMT represented a profitable product line for almost 20 years in Canada that was poised to expand if the U. S. EPA allowed its product to be sold there (it was expected that many other countries would follow the EPA action). Obviously Ethyl’s credibility could be expected to be somewhat dubious in the public eye, in that it had been the primary manufacturer of tetraethyl lead for gasoline. The oil industry, on the other hand, was looking for a relatively cheap way of raising octane; if MMT were banned, many older refineries (mostly in eastern Canada) would need to be upgraded or closed and producers would need to switch to other, more expensive, fuel additives such as MTBE or ethanol. The cost to the Canadian oil industry of replacing MMT was estimated by Kilborn Engineering at \$115 million for one-time capital upgrades and \$69 million annually for increased operating costs.¹⁰¹¹

Whereas it is clear that both Ethyl and the oil industry had something to lose, it appeared that automobile manufacturers did not stand to gain directly from getting rid of MMT. They were seen as an impartial party in this dispute, one whose primary interest was in ensuring that the emission control systems on their vehicles could protect the environment. Because of this perceived lack of bias, their credibility was higher than that of the oil industry, particularly once environmentalists and health advocates took their side (although environmentalists were primarily concerned with the health risks associated with low-level manganese exposure and not with any

potential emission control problems). Elizabeth May of the Sierra Club of Canada illustrated these sentiments about the automobile manufacturers at the Senate Hearings on the MMT bill: “The car manufacturers have been adamant that MMT gums up the diagnostic systems of their products,... Ethyl Corp[oration] claims that their product does not have these impacts in their studies. In such a clash of experts and studies, it is useful to ask which party stands to gain or lose in the dispute. Obviously, the automobile manufacturers have no reason to be concerned about MMT unless it does, as they say, compromise the efficacy of the on-board diagnostic systems, including the pollution control devices. On the other hand, Ethyl’s interest in promoting contrary studies is obvious.”¹² However, as we shall see, the car manufacturers perhaps were not after all the innocent bystanders they were perceived to be.

To recap: The automobile industry claimed that MMT fouled the emission control systems on their vehicles, whereas the oil industry wanted MMT to provide relatively inexpensive increases in octane and to avoid expensive refinery upgrades that would otherwise be required. As regulatory requirements for vehicle emissions became more stringent, the battle between the oil industry and the automobile manufacturers intensified. From a public policy standpoint, the goal was cleaner, healthier air from reduced auto exhaust emissions, and there are two technological strategies for achieving this, namely changing the vehicles or the fuel. Emissions can, and have been, reduced through improvements in the catalytic conversion of smog precursors while continuous, on-board monitoring of performance ensures that underperforming catalytic converters can be fixed. On the other hand, fuel composition also has an impact on hydrocarbon, carbon monoxide, and nitrogen oxide emissions, and reformulated fuel could further reduce them. The big questions are: What technologies will best achieve the desired levels of emission reductions, and who will be stuck with the tab for them?

The three different issues in the MMT debate overlapped somewhat and the distinctions among them were sometimes blurred. We will repeat the most important differences before taking up the chronological account of events, so that the reader can keep them in mind as the story unfolds. First, there were concerns that exposures to manganese released to the environment upon combustion of MMT might cause neurological and other health impacts. Second, there were persistent allegations that MMT causes problems with emission control systems and on-board diagnostic [OBD] systems that measure the effectiveness of the emission control systems. Finally, there is the impact that MMT in gasoline has on the actual emissions of smog precursors such as hydrocarbons, carbon monoxide, and nitrogen oxides.

Some researchers, environmentalists, and public health advocates worried about MMT's direct impact on human health and the environment. But there was an “official” Canadian government position on the matter, based on a detailed 1994 scientific review by Health Canada, and that position was (and still is) that MMT in gasoline does not pose an unacceptable risk to the health of Canadians.¹³ As it usually does with its risk assessments, Health Canada continues to monitor new studies that might cause its officials to reconsider their position.¹⁴ Meanwhile, as we shall see, the U. S. EPA sought to deny Ethyl's 1994 application to permit MMT in fuel because, it was argued, there was a “reasonable basis for concern about the effects on public health that could result if EPA were to approve use of MMT in unleaded gasoline.”¹⁵ EPA ultimately failed in this attempt because it tried to use a specific type of administrative action – denial of a waiver under the *Clean Air Act* based on health concerns –, and a U. S. Court of Appeals ruled that this *Act* did not give EPA the authority to do so, which is the “technicality” referred to earlier in the CBC program summary. (It should be noted that the EPA still has authority under other sections of the *Clean Air Act* to ban a fuel additive that it believes to be harmful.¹⁶) Although both

government agencies used the same epidemiological studies to arrive at a safe level of manganese in the air, they used different methods and assumptions to estimate exposure levels.

Automobile manufacturers have long claimed that MMT clogged up and fouled emission control systems in vehicles causing higher emissions of smog-causing hydrocarbon and carbon monoxide (CO). They have contended that manganese oxide deposits accumulate on catalysts and spark plugs, as well as on the oxygen sensors that are used to monitor the effectiveness of the catalyst (the OBD systems). According to the Canadian government, the basis for its MMT legislation stemmed strictly from concerns about MMT’s effect on emission control systems: If MMT indeed kept the emission control systems from working properly, there would be higher emissions of carbon monoxide (CO) and hydrocarbons. Ethyl Corporation, through studies it conducted for its EPA waiver applications, claimed that MMT does not affect hydrocarbon and carbon monoxide emissions and actually reduces emissions of nitrogen oxides (NO_x).¹⁷

The plot thickens when we realize that, *well before Canada’s then Minister of the Environment, Sheila Copps, brought her draft legislation to Parliament* – the legislation based squarely on the concerns about MMT’s effect on emission control systems –, EPA had already issued a decision (in November 1993) which contained the results of its own technical assessment on this matter, stating that the “use of HiTEC 3000 [the product name for MMT] at the specified concentration [8.26 mg/L] will not cause or contribute to a failure of any emission control device or system to achieve compliance by the vehicle with the emission standards.”¹⁸ On the matter of OBD II systems, the EPA noted that it was “continuing to investigate the question of the potential impact of use of MMT in unleaded gasoline on OBD systems. If after further investigation EPA concludes that the concerns expressed by the vehicle manufacturers are warranted, EPA intends to initiate an appropriate rulemaking under Section 211(c).”¹⁹ In essence, the EPA affirmed that

it did not have sufficient evidence to reject the waiver application based on MMT’s effect on OBD II, while reserving its right to make a different judgement on the matter if new evidence emerged. As of the date of writing no such judgement has been made.

Chronology of Events: The American Case

Changes made in the United States during 1977 to the *Clean Air Act* were the beginning of the battle between Ethyl and the automobile manufacturers over MMT. The EPA acted as a fair, although not always unbiased, referee in this long-running fight.

Section 211(f)(1) of the *Clean Air Act* made it unlawful, effective September 15, 1978, to use additives in unleaded fuel that were not “significantly similar” to those previously certified. Although MMT had been used in leaded fuel, Ethyl was required to apply to the EPA for a waiver under section 211(f)(4) in order to have MMT permitted for use in unleaded fuel. When a waiver application is filed, the EPA has 180 days either to make a decision or to grant a *de facto* waiver. In essence, the onus was on Ethyl to prove to the EPA that MMT did not harm the emission control systems.

Ethyl applied to the EPA for such waivers for MMT in both March 1978²⁰ and May 1981.²¹ In both cases the applications were denied because of stated concerns that MMT could damage catalytic convertors and increase hydrocarbon emissions. In 1988 Ethyl began a new series of discussions with EPA staff to determine a program for developing the necessary data to support a waiver. In May 1990 Ethyl filed its third waiver application, but upon EPA’s suggestion Ethyl withdrew this application in November 1990 before the 180-day deadline for a decision had passed. It turns out that the EPA had conducted studies at an Ann Arbor, Michigan test facility that contradicted Ethyl’s own data; but it was subsequently demonstrated that EPA

had conducted their tests incorrectly and that contaminated fuel had caused erroneous results. As might be expected, this sequence of events did not create feelings of goodwill between EPA and Ethyl. In July 1991 Ethyl resubmitted its waiver, essentially the same application as the one prepared over a year earlier.

EPA denied the resubmitted waiver application on 8 January 1992. Although Ethyl's tests with a statistically relevant sample of 1988 model-year vehicles demonstrated that MMT did not cause increased hydrocarbon emissions, the EPA denied the waiver based on some different testing submitted by the Ford Motor Company. Using a small sample of 1991 Escorts and Explorers under driving cycle conditions different from those carried out in the Ethyl tests (i.e., higher driving speeds), Ford's results showed increased hydrocarbon emissions. The EPA considered the Ford results to be a significant enough data subset to justify denying the application. At the time the EPA also was considering the promulgation of more stringent future emission standards that would take effect for model year 1994 vehicles (around September 1993). In addition the EPA was concerned about the health effects of increased airborne manganese and the lack of knowledge in this area, although this was not the basis for the waiver denial. As a result, the EPA began to study the health issues related to MMT, including jointly sponsoring an international workshop with the National Institute of Environmental Health Sciences in March 1991 to discuss research requirements.

Ethyl filed a petition for review of the waiver denial in the U. S. Court of Appeals for the District of Columbia Circuit and continued to conduct further emissions testing to attempt to resolve the questions surrounding the Ford data. (Why did the Escorts and Explorers show higher emissions? Did the driving cycle have a significant effect on hydrocarbon emissions over the life of the vehicle? What was the effect of the close-coupled catalysts used in the Escorts?) Ethyl

conducted further tests with EPA’s agreement on six 1991 Escorts and six 1988 Escorts. Based on the data from these tests, the EPA determined that “driving cycle does not contribute significantly to MMT-induced increases in hydrocarbon emissions. However, in addition to addressing the issue of driving cycle, the Ethyl data appeared to confirm the finding by Ford that 1991 Escorts experienced a much higher MMT-induced hydrocarbon increase than that observed in other models tested. The agency was concerned that certain engine and emission control system configurations were more vulnerable to ... emissions increase irrespective of driving cycle.”²²

The EPA required Ethyl to conduct significant further testing surrounding their concerns with the Escorts, which Ethyl did. (Looking forward in time to 8 June 1998, we learn that the EPA reprimanded Ford over emission problems with 1991-1995 Escorts, noting that Ford had failed to report changes it made to 1991-1995 model year Escorts to improve fuel efficiency. The EPA alleged that Ford used an inappropriate-managed fuel-air “enleanment” strategy that caused an increase in smog-producing emissions. Ford was required to purchase and permanently retire 2,500 tons of NO_x credits as part of the settlement package making up the consent order.^{23,24} Obviously, knowing that the Ford Escort emission control systems were non-compliant dramatically affects the credibility attached to allegations that MMT was causing emissions problems with those vehicles.) On 6 April 1993 the Court of Appeals ordered the EPA to re-evaluate the waiver application within 180 days and take into consideration any new data received since the 8 January 1992 denial.

Based on the new Ethyl data, the EPA changed its mind and concluded that MMT “would not cause or contribute to a failure of any emission control device or system.”²⁵ However, the EPA had just established a new Reference Concentration or safe upper limit for manganese in air

which Ethyl also disputed. The EPA requested that Ethyl resubmit its application to allow further public consultation on the health effects of MMT. The EPA and Ethyl agreed to extend the 180-day deadline to July 1994 in order to allow further discussions on the health effects. On 13 July 1994 the EPA, having already ruled that MMT did not cause or contribute to a failure to meet emission standards, denied Ethyl’s waiver application based on “unresolved concerns regarding the potential impact of manganese emission resulting from MMT use on public health.”²⁶ The EPA decision also referred to the potential problem MMT might pose for OBD II systems in 1994 and later model years, but did not actually state that there was sufficient evidence for a decision, reserving judgement on this point. Ethyl promptly filed again with the Court of Appeals, arguing that the EPA did not have the ability under the *Clean Air Act*, section 211 (f)(4), to deny a waiver based on health concerns.

On 14 April 1995 the Court agreed with Ethyl that section 211(f)(4) only allows the EPA to consider emission control effects in waiver applications. The court ordered the EPA to “grant Ethyl’s request for a waiver,” which was finally granted on July 11, 1995. The lawful sale of MMT, however, requires not only an f(4) waiver but *registration* of the additive under section 211(b) of the *Clean Air Act*. New testing requirements for additive registrations had been adopted on 27 May 1994 and the EPA claimed that Ethyl had not met them. And so the legal battle continued.

In November 1995 Ethyl filed for a second time with the Court of Appeal for the District of Columbia to seek registration for MMT. Ethyl claimed that MMT was already registered with the EPA (because its use in leaded fuel was legal) since 1970. The Court ruled that, had the EPA granted the waiver on 30 November 1993, as it should have given its own finding that MMT did not cause or contribute to emission control failure, the registration of MMT would have

proceeded. (It had already determined that the EPA had no legal basis to delay the waiver application because of health concerns.) The court ordered the EPA to register MMT for use as an additive in unleaded gasoline.

The EPA issued a press release on 3 July 1996 after an Ethyl advertisement had appeared, touting the benefits of MMT as a fuel additive. The Ethyl ad cites the EPA as conceding that “it has no data showing MMT to be a [health] threat at low levels of exposure.” The EPA Administrator replied that, “while it is true that EPA does not have data showing MMT to be a threat, the lack of data is exactly the problem. EPA does not have data proving MMT is not a threat ... EPA believes that the American public should not be used as a laboratory to test the safety of MMT. EPA believes more testing should be done before cars across the country begin emitting in the air this additive – which contains the heavy metal manganese.”²⁷

Section 211(c) of the *Clean Air Act* still allows the EPA to take action to control or prohibit fuel additives that “may reasonably be anticipated to endanger the public health or welfare.” Despite this legislative ability, the EPA has taken no action to ban MMT based on concerns that it may interfere with OBD II systems. According to the EPA, the automobile manufacturers have not submitted any further evidence since the 1994 Ford test to back up their claims that MMT prevents the proper functioning OBD II.²⁸ This, despite the fact that the American Automobile Manufacturers Association (AAMA) is apparently conducting a major study of eighty 1996 and 1997 vehicles to evaluate MMT’s effects on OBD II, vehicle emissions, and performance. Meanwhile, as an EPA requirement, Ethyl is currently sponsoring a series of extensive emission characteristic and health studies, to further determine the health and environmental consequences of using MMT in unleaded gasoline.²⁹

Chronology of Events: The Canadian Case

1. Health Aspects of Manganese

The effects of high levels of manganese on the central nervous system have been well documented. While other organs can also be affected, the central nervous system appears to be the critical target organ, where manganese in excess levels can create symptoms similar to Parkinson’s disease. However, research results to date have been insufficient to characterize satisfactorily any potential long-term effects at low levels of exposure.

In 1978 the federal Department of Health and Welfare published a review of the potential human health impacts from the expected increase of MMT use as the phase-out of lead in gasoline progressed. The Department concluded then that there “was no evidence at present to indicate that expected ambient manganese concentrations would constitute a hazard to human health.”³⁰ The Royal Society of Canada’s Commission on Lead in the Environment reached a similar conclusion when it examined manganese and MMT in 1986.³¹ In November 1992 Health and Welfare Canada’s Health Protection Branch published a three-page document for general circulation, “MMT – Gasoline Additive,” in its *Issues* series. It states:

In 1978, Health and Welfare did a thorough study of MMT and concluded that its use in gasoline would not raise airborne manganese levels enough to jeopardize our health. And it hasn’t... Based on current evidence, experts at Health and Welfare are confident that the risk to human health from MMT-derived manganese is extremely small; there is clearly a wide margin of safety between the current intake of manganese from MMT and the lowest concentrations of airborne manganese known to cause any adverse health effects.³²

Health Canada conducted the most recent and comprehensive federal review of manganese from MMT in 1994, which again concluded “the combustion products of MMT in gasoline do not represent an added health risk to the Canadian population.”³³ The November 1994 Health Canada study was very important from a legal and well as a health policy standpoint, for as a result of its finding that manganese emissions from MMT did not pose an unacceptable threat to health, the federal government was in effect precluded from taking steps to ban MMT under the “CEPA-toxic” provisions of the *Canadian Environmental Protection Act*.³⁴ However, recall that the EPA had denied Ethyl’s MMT waiver application in July of 1994 because of unresolved health concerns. What was the basis for the apparent difference in the regulatory risk assessments between the two countries?

In determining the risk of a substance like manganese two things must be determined, a threshold level of safe exposure (often called a health effects assessment) and the levels of exposure that people typically experience (often called an exposure assessment). In this case, the difference in findings arose from the exposure assessment. Both the Canadian and U. S. evaluations developed upper limits for manganese in air using the same recently-published epidemiological study, which had compared 92 Belgian battery plant workers with a control group of 101 workers in a nearby polymer plant.³⁵ Based on this study’s findings the upper limit for Canada was set at 0.11 µg Mn/m³, while the U. S. set a similar upper limit range of 0.09 to 0.2 µg Mn/m³. The EPA gave a “medium confidence” rating to this assessment since there were unresolved questions about the health effects of manganese on special populations, namely the very young and very old (the workers surveyed in the epidemiological study were predominantly healthy working-age males). In its exposure assessment, Health Canada used personal exposure studies of office workers, garage mechanics, and taxi drivers in Toronto and Montréal. Although it was conceded that these studies were “not robust in terms of sample size, time frame, or

statistical representativeness,”³⁶ they were used by Health Canada in its overall risk assessment because the repeated measures of relatively low exposure from a number of studies gave added significance to the calculations. The most important point was stated clearly: The Health Canada review “indicated that 98 to 99 per cent of the population exposures would be below [the] reference value.”³⁷

The EPA dismissed the Canadian studies and instead used a much larger personal exposure study conducted in California to develop its exposure assessment. However, since the use of MMT was restricted to the small amounts of leaded fuel sold in California (as was legal under the *Clean Air Act*), the EPA had to make a number of assumptions in order to predict the personal exposure to manganese associated with MMT in gasoline. Having done so, it concluded that “the exposure estimates ... are in the range of or exceed some candidate Reference Concentration [threshold level] estimates.”³⁸ This left enough uncertainty in the air so that EPA could use it as a basis for rejecting Ethyl’s waiver application.

One of the most interesting findings to emerge from Health Canada’s risk assessment was that most of the manganese in the atmosphere comes, not from gasoline, but from industrial steel sites (Hamilton and Sault Sainte Marie, for example, have ambient manganese levels much higher than other areas in Canada do). In fact, the risk assessment states in its conclusion: “For cities in which there are major manganese-emitting industries (for example steel mills), average respirable manganese exposure of the population is at or above the tolerable level at which it has been calculated that the risk of adverse health effects may begin to increase. This was deemed to be unrelated to the combustion of MMT in gasoline.”³⁹

Before she made the decision to ban MMT, Minister Coppins was aware of this finding, because Environment Canada officials had briefed her about the levels of airborne manganese stemming from steel mills in advance of a meeting with the oil industry.⁴⁰ Why did the Minister not take action on this threat to the health of some Canadians, which had been established by a thorough scientific review undertaken in another federal department — especially since some of those at elevated risk were very likely to be her own constituents? At least some members of the Senate Standing Committee on Environment were concerned enough to think action was warranted when they later heard about elevated levels of manganese from industrial steel mills: “Perhaps we should have legislation there instead of here [MMT],” stated Senator Ron Ghitter. And Senator Colin Kenny added: “We could issue a warning today, a news flash.”⁴¹ No such “news flash” ever emanated from Ottawa.

The Senators had heard extensive testimony at their hearings on the *Manganese-Based Fuel Additives Act* from Dr. Daniel Krewski, then Acting Chief of Health Canada’s Bureau of Chemical Hazards and one of the leading risk assessment authorities in the world. We give generous excerpts from this testimony, even though it restates the earlier material, because the unsupported claim of adverse health effects goes on and on, down to the present day.⁴² This is a great mystery in Canadian public policy: When we have (as we do) world-class scientific expertise, housed in an agency of government charged with protecting the health of Canadians, and when this agency’s scientists report consistently *over a period of twenty years* that they have investigated the matter thoroughly, in four separate assessments, and find no basis for concern, why will many of us – including some of our wisest and most experienced politicians – not believe them?⁴³ Referring to the 1994 risk assessment, Dr. Krewski told the Committee:

As with most risk assessments, a conservative approach was taken to both the establishment of the toxicological reference level and the exposure assessment. A very

conservative reference level of 0.1 micrograms per cubic metre of air was selected,... The World Health Organization, in a very recent assessment of the same data, has selected a somewhat higher reference value of 0.15 micrograms per cubic metre as the basis for their air quality guidelines. This gives us increased confidence in the conservative nature of our selected reference criteria....

Much of the opposition to MMT on health grounds is based on the fear that manganese from MMT will prove to be like lead from gasoline in the 1970s and 1980s. However, there are several critical differences between them. Lead is toxic at all concentrations while manganese is an essential element required in small amounts by cells in the body. Lead is toxic by ingestion as well as by inhalation, while manganese is not toxic when ingested even in quite large amounts... In conclusion, the Health Canada assessment, based on a conservative assessment of the scientific data, concludes that the health risks associated with manganese emissions resulting from the use of MMT in Canadian gasoline are negligible.⁴⁴

Throughout the controversy the concern about manganese's neurotoxicity always remained in the background, so far as the public was concerned, even though the government finally enacted its legislation on completely different grounds (as discussed in the following section), in part because of the public's familiarity with the story of another gasoline additive, namely lead. What the public did not know was that, when Opposition Leader Chrétien fired the opening political salvo in this epic struggle in his April 1991 missives, warning Tory federal ministers against allowing the continued use of this "insidious toxic heavy metal," his colleagues had another agenda entirely up their sleeves. One of these letters went to The Honourable Don Mazankowski and read in part as follows:⁴⁵

Given the fact that Canadian crude and oil reserves are being rapidly depleted and the government had promised on two occasions ... to bring in Environmentally Friendly ethanol blended fuels since 1984, will you take the necessary action to require that all automotive gasoline based fuels contain 3.2% oxygen content. Such a move would create a market for between 5,000,000 to 8,000,000 bushels of grain, and the by-products can be utilized either as an animal feed or human food that is particularly suited for persons needing a diet of low calories, high fibre and protein ... I respectfully request that you take immediate action on this issue to provide a new market for Canadian Grain Growers, to cut the level of hydro-carbon emissions, and to ban the use of MMT in Canada that will eliminate the use of a substance that threatens the health of millions of Canadians, particularly our children.

One can think of few initiatives in the entirety of Canadian legislative history that could promise to deliver so many valuable benefits at a single stroke of the pen. The minister also was asked to support Bill C-333, a private member's bill put forward by Liberal MP Ralph Ferguson, that would mandate a minimum level of oxygen content in gasoline, thereby encouraging the use of ethanol as an octane enhancer. Three years later, as the Liberal government's legislation banning MMT was being moved relentlessly through the policy process, there was an announcement of a proposed new \$170 million corn-to-ethanol plant to be built in Chatham, Ontario (Ferguson's home area) by Commercial Fuels of Brampton.⁴⁶

The campaign for using ethanol as an octane enhancer in gasoline heated up as soon as the Liberals came to power in the Spring of 1993. In early May the Liberal Party issued a press release, "Liberals announce agriculture policies," containing a section on ethanol: "For example, if 50 percent of all gasoline sold in Canada contained 10 percent ethanol, its production would require roughly 5 million tonnes of grain per year, which is equivalent to the amount Canada

exports annually to our largest export customer... Liberals are committed to banning the use of MMT in Canadian automotive fuels.”⁴⁷ One imagines that Canadian prairie farmers, who are of necessity a hard-bitten lot, did not get too starry-eyed over these prospects. But at least the ethanol-in-gasoline theme, which became part of an agricultural policy designed to develop new markets for grain and thus improve the economic lot of farmers, provides a rational – if woefully misguided – basis for the federal Liberal Party’s campaign against MMT. A close examination of the documentary files, however, reveals that it is much harder to pin down the basis for the very different, and ultimately politically persuasive, campaign waged by the combined Canadian and United States auto industry against this product.

2. Emission Control System Aspects

In July 1990 John Buccini, then Director of the Commercial Chemicals Branch for Environment Canada, wrote a letter to the U. S. EPA responding to EPA’s request for a comment on Canada’s experience with using MMT, in the context of Ethyl Corporation’s waiver application at that time. Among other things Buccini noted the following:

We have had concerns about MMT plugging catalysts. However, while it is certain that some catalysts plug with MMT, we have concluded the number is relatively small. Transport Canada has made repeated requests for data on the incidence of catalyst plugging but no manufacturer has yet submitted any data. Also, examination of the manufacturer’s warranty claims did not reveal any abnormal incidence of plugging.⁴⁸

This theme is a consistent thread in the Canadian controversy over MMT use, and its most colorful segment is undoubtedly the astonishing letter written by the President of General Motors Canada, Maureen Kempston Darkes, to the federal Minister of the Environment, Sheila Copps, on February 17, 1995: “It is with deep regret that I must inform you of the decision we have made to disconnect [emission system] warning lights on our products for the 1996 model year.” The

reason she gave was that the MMT in gasoline disrupted the normal functioning of that equipment.⁴⁹ What could have happened to bring things to such a pass?

The Canadian federal government had set up a collaborative process for making policy decisions about the relative contributions of fuel improvements and emission control technologies to vehicle emissions reductions. Between June 1993 and September 1994 a series of five meetings on MMT took place between government and industry under the auspices of a group called *The Joint Government-Industry Committee on Transportation Fuels and Motor Vehicle Control Technologies*, with attendees from various federal departments (Environment Canada, Transport Canada, Health Canada, Natural Resources Canada, Canadian General Standards Board), the Canadian Petroleum Products Institute (CPPI), the Motor Vehicle Manufacturers Association (MVMA) representing domestic automobile manufacturers, and the Association of International Automobile Manufacturers of Canada (AIAMC) representing foreign-based manufacturers. This Joint Committee, which also had other issues on its plate, was tasked with arriving at a solution to the technical debate surrounding MMT and vehicle emissions.

The first meeting of this government-industry committee took place on 21 June 1993, and the minutes indicate a belief that the fate of MMT in gasoline needed to be resolved by the spring of 1994. The federal government stated for the record that little data existed to substantiate the vehicle manufacturer claims that MMT might adversely affect the new generation of onboard diagnostic equipment (OBD II). However, the minutes also note that Ford was conducting new tests on OBD II equipment which would be submitted to the EPA in September 1993 as part of the Ethyl waiver application process. To increase the credibility of these tests, the MVMA agreed to approach Ford about allowing the participation of Canadian government and CPPI observers, but we found no documentation showing any future involvement of the government or the CPPI in Ford's test program. In their attempt to establish a fair and transparent process,

federal government participants agreed to develop a paper outlining the technical information that they would be required to make a decision on MMT and to “clearly enunciate all the factors that [would] enter into the decision.”⁵⁰

In the meantime the oil and automobile industries wanted to make sure they had their ducks in order for these government meetings. On 30 June 1993 the MVMA and CPPI executives, meeting without government representatives, agreed on the urgency of a decision about MMT but not on what that decision should be. Since the matter was being presented as a technical disagreement, it was decided that a joint group of CPPI and MVMA technical representatives would be best suited to resolve the issue, although senior executives from Imperial Oil and Ford planned on being there to ensure that strategic business considerations were kept in mind.⁵¹ The MVMA-CPPI technical committee met on 9 August and 1 September 1993 and proceeded to initiate a life-cycle estimate of the environmental impact of banning MMT. This technical committee decided that the CPPI Fuels Group would work with Ford to see what type of practical test program could be carried out to resolve outstanding technical issues, either in Canada or the U.S., within a one to two year time frame. Ford and Imperial Oil were to meet with federal government officials to convey this plan and ask for an extension of the Memorandum of Understanding between Transport Canada and the vehicle manufacturers which would be required in order to acquire this test data. The CPPI had stated that if the technical disagreements were resolved in the MVMA’s favour, they would remove MMT. Unfortunately, this deal to design a study of MMT’s effects fell apart, for when Ford’s representative went back to the MVMA Board of Directors, they rejected it. The CPPI Board accepted it.

At the second meeting of the Joint Committee on 17 August 1993 Transport Canada presented the federal government paper “MMT and Motor Vehicle Emissions” that outlined the

information that the government felt it needed to make a decision on MMT. Key questions that the government wanted to resolve included why the subset of 1991 Ford Escorts (from the 1992 Ethyl waiver application) were particularly susceptible to emission increases, and what effect MMT might have on-board diagnostic systems. At this government meeting, it was reported that the MVMA-CPPI executive and technical committees were meeting in an attempt to work through their technical differences. The joint technical committee was examining two options for Canada: (1) lowering MMT level from 18 to 8.26 mg/L, and (2) phasing out MMT entirely. (8.26 mg/L was the level specified by Ethyl in seeking a waiver in the U. S., while 18 mg/L was the level approved for Canadian gasoline, although a CPPI study had shown that actual levels averaged 9 mg/L). The MVMA and CPPI were not in agreement about the effects of MMT on emission control systems. However, everyone agreed that the expected 30 November 1993 EPA decision on the Ethyl waiver application would be a pivotal event. The technical committee was to continue discussion to resolve the issue and provide recommendations at the next meeting. As you will recall, the technical committee, despite their best efforts, was stymied by the MVMA Board's rejection of their plan.

The minutes of the third meeting of the Joint Committee (10 December 1993) show that the 30 November 1993 EPA decision – wherein EPA ruled that MMT did not cause or contribute to a failure of existing emission control systems – did not settle anything for the Canadian debate.⁵² The vehicle manufacturers continued to press their case: Toyota made a presentation on how MMT negatively impacted its OBD II system and Ford also tabled research that showed a detrimental affect on OBD II. The MVMA stated that despite the recent EPA ruling, they felt MMT would be banned in the future because of OBD II problems (recall that the EPA had not made a formal ruling on MMT's effect on OBD II). In the spirit of collaboration, Ethyl and Toyota agreed to get together to discuss the results of their various test programs.

At the fifth meeting on 9 September 1994 Toyota and Ethyl reported that they had met to discuss the differences in their data.⁵³ The main difference appeared to result from the speed at which the mileage was accumulated in the two programs (i.e., the driving cycle). No consensus was reached as to which was superior, despite the existence of EPA’s July ruling that Ethyl’s test showed the driving cycle did not affect MMT-induced impacts on hydrocarbon emissions. Environment Canada provided a brief summary of the 13 July 1994 waiver decision by the EPA (denied because of concerns around health impacts). Health Canada summarized its most recent risk assessment with the conclusion that MMT did not represent an unacceptable health risk to Canadians. Ethyl presented extensive test data from its own recent research that led to considerable discussion about potential effects of MMT on OBD II systems, whereas GM tabled preliminary findings on the prospect of increased warranty claims that might be caused by MMT use.

The upshot was unusual, to say the least: It was decided that the technical aspects of MMT’s impact on emission control systems *could not be resolved!* CPPI representatives suggested an independent, third-party review of the technical data:

The [CPPI] Task Force has concluded that it cannot reconcile the very strongly held views of the OEMs [original equipment manufacturers] and Ethyl based on the information currently available. While it cannot be argued that the data from either side is inherently wrong, the programs used to develop the data have been designed differently, have been conducted in different ways, under differing conditions and with varying degrees of rigour.... To help resolve the controversy, the Task Force has identified what it believes are key questions that need to be answered. It is proposed that CPPI, the associations representing the OEMs (MVMA and AIAMC), Ethyl,

Government and a third party independent technical resource cooperate on a two level program to develop the information needed to reach a sound and proper decision on MMT. The proposed program would combine laboratory work with controlled fleet testing and field warranty monitoring to answer the key questions about potential MMT effects. If initiated promptly, this program could be completed by the end of 1995 at the latest...⁵⁴

There is a great deal of precedent for using independent expert panels to resolve points of contention in scientific and technological disputes; in the United States, the National Academy of Sciences and affiliated institutions have issued such well-regarded panel reports literally by the dozens for many years now, and a comparable capacity exists under the auspices of The Royal Society of Canada.⁵⁵ However, the MVMA replied that such a review would likely not determine anything new and might delay action on MMT.

As the clock ticked away towards the introduction of legislation in Parliament, the CPPI made a series of proposals to the government to provide some resolution of the issue short of a ban on MMT. As noted, it offered to submit all technical matters in dispute to independent panels and committed to accepting in advance to removing MMT if that is what such panels recommended; in addition, it offered to cut in half the allowable upper limit of the percentage of MMT in gasoline (average amounts already were at that level, as noted earlier). None of these proposals were accepted. Instead the issue was thrown into the laps of the five federal ministers who had some responsibility for this file (Ministers of Environment, Transport, Natural Resources, Industry, and Health), who were obliged finally to “bite the bullet” and take a political decision on the fate of MMT.

At this point any pretence of collaboration broke down, to be replaced by classical political lobbying. The federal ministers truly were caught between a rock and a hard place, for over the next few years they faced one of the worst political nightmares imaginable, a zero-sum game, as platoons of solemn executives and their hired lobbyists, representing two of the most influential industry sectors in the Canadian economy, trooped through their offices with diametrically opposed messages nestled within varied prophecies of doom. From the standpoint of public policy, a good escape mechanism was even then at hand, although it went unused, the same solution that is now being applied in a different fashion, too late to avoid both the acute political humiliation and monetary cost of the federal government’s subsequent settlement with Ethyl Corporation. That solution was to entrust a thorough re-examination of the two outstanding issues (the health and environmental risk assessment, on the one hand, and the performance of auto emissions/OBD equipment on the other) to independent expert panels whose reports would be public documents. With such reviews in hand the government might have been able to act responsibly in the matter of MMT, on the basis of credible science and sound risk management principles.

3. A Fully Politicized Process.

On 12 September 1994 the vehicle manufacturer executives met with then Environment Minister Sheila Copps, informing the Minister that if MMT were still around in August 1995, “they would raise prices by \$3000 per vehicle, void parts of their warranties, or close down some Canadian manufacturing units.”⁵⁶ The bullying had begun. Copps referred to this \$3000 figure at different times subsequently (e.g., the press conference for the introduction of Bill C-94), but as might be expected federal officials never were given the slightest hint by the industry as to what was the basis on which that number had been calculated. In early October the CPPI sent a letter to Minister Copps requesting an urgent meeting with her in the belief that the CPPI deserved the

same opportunity as the MVMA had had to present its case. Apparently they were too late. By 12 October 1994 Minister Copps had told a Canadian Press reporter that unless the petroleum industry removed MMT from gasoline, the government would ban it: “I am moving specifically on MMT because we’ve had complaints from the automotive industry that it could void warranties on Canadian cars,” she was quoted as saying.⁵⁷

There is no evidence of how the federal ministers responsible for the MMT file reached this policy decision but the outcome was clear. Up to this point, the automobile manufacturers and the oil industry had been negotiating on even ground in their technical dispute over MMT and emission control systems. But as soon as Minister Copps let everyone know that MMT was going to be banned, if the two industry sectors could not reach a “voluntary agreement” to discontinue its use, the automobile manufacturers had no incentive to continue negotiating with the oil industry. They had won and only had to throw their support behind the government’s decision to ban MMT. The CPPI, trying to gain some even footing in the debate, again suggested again an independent assessment and review of the science.⁵⁸ They offered once more to voluntarily remove MMT from gasoline if an independent review concluded that there were problems with it.

The problem was that the full data set used to substantiate the car manufacturer’s claims on emission control impacts had not been made available to the CPPI and certainly not to the public. This was ostensibly necessary to protect commercially confidential information such as warranty comparisons between Canada and the U. S. Unfortunately, it made the data and research methods impossible for anyone outside of government to review and certainly did not contribute to the transparency of the decision-making process. Further, there were at least some federal

officials who had doubts about the quality of the “scientific” evidence being provided to them by the car manufacturers.

A 31 October 1994 CPPI internal memo to its Board members reflects some of their frustration with recent developments in the federal process. Regarding the recent meeting between CPPI executives and the Minister, the memo contends that Minister Copps informed them “that [the] environmental benefits were not of material consequence in the debate, i.e., the sum game was more or less zero.” Further, the federal government made it clear it would not support the creation of an independent scientific panel.⁵⁹ According to the government, any further investigation into the issue would only serve to delay a decision. Moreover, the government apparently still thought that a negotiated settlement around MMT could be reached, for on 18 November 1994 Minister Copps wrote letters to oil and automobile industry executives requesting that the two industries address the issue of *eliminating* MMT in Canadian gasoline and submit a proposed resolution to her by the end of the year.

A month later CPPI and MVMA executives met to share each other’s plan to address the MMT issue. The CPPI again proposed that an independent panel be struck to resolve the scientific debate surrounding MMT and emission control systems.⁶⁰ The MVMA presented its latest information about MMT’s alleged effects on emission control systems, which had been presented to federal officials the week before. At least some government officials present at this session were not convinced by the MVMA/AIMA information package. According to an internal government e-mail message circulated shortly thereafter, serious problems were noted with respect to the auto manufacturers’ submission:⁶¹

... [The MVMA] presentation, which focussed on the impact of MMT on OBD II effectiveness and vehicle performance, did not make a convincing case. Much of the

content was based on confidential warranty repair records and returned components such as catalytic converters and spark plugs (‘real world’ problems). Not much data was presented. Bar and line charts depicting differences between U.S. and Canadian experiences did not have quantitative scales on the chart axes so the significance of the observations could not be assessed. Experience-based suggestions of cause-effect relationships were not supported by scientific analysis. The weight of the presentation was anecdotal and circumstantial information. If there is ‘hard data’ beyond the individual cases, it was not being made available.

Note that this derisory assessment of the auto manufacturers’ own case is made after years of wrangling, and years of their conducting, at least ostensibly, “research” on these problems.

Minister Copps extended her deadline for a settlement until 31 January 1995. Although the CPPI continued to push for an independent panel review and in fact approached the Royal Society of Canada about conducting such a review, it became clear that no voluntary settlement would emerge. The vehicle manufacturers dug their heels in deeper: “We didn’t see the need for wasting time and money on a problem that was already well-documented,” claimed a VP from General Motors.⁶²

The documentary files we have examined are littered with complaints from federal officials, members of the Senate who opposed the legislation, the provincial premiers who launched the successful action against the federal government, and representatives of the oil and gas industry, protesting the absence of reliable information to support the auto manufacturers’ claims about the effect of MMT on OBD and emissions control systems. As indicated, the absence of reliable evidence is noted as early as 1990, in the letter from Environment Canada’s John Buccini to EPA, and it continued down to the point when Bill C-29 became law and even thereafter. The best single overview of this aspect of the MMT controversy is to be found in the

Minority Opinion by four Senators (Buchanan, Cochrane, Ghitter, and Kinsella) from the Standing Senate Committee on Energy, Environment and Natural Resources, which had conducted hearings on the Bill.⁶³ The Senate Committee had elicited under questioning some of the only evidence on the public record that might explain the real source of the automotive manufacturers' problems with MMT. The testimony is by Mr. Doug Bethune, an automotive technology instructor at Nova Scotia Community College:

Mr. Bethune: I work on the front lines and I have seen no devastating effects from MMT residue in catalytic converters, spark plugs or elsewhere.... The question is always whether MMT is really the problem. In 33 years as a technician, I have never seen General Motors be less than very cautious with their science. The manufacturers in general have been very cautious with their science. However, for some strange reason, on every avenue that I pursue to find the science behind these problems with MMT I come to a dead end. As everyone in my area knows, I am a proponent of GM. In my opinion, the MMT issue was raised when General Motors began putting a base metal in their catalytic converter called cerium, which has the unique property of absorbing oxygen when it is in plentiful supply and giving up oxygen when it is deficient. This is when the concern arose for MMT. It is not what MMT has that is the problem, it is what it does not have [i.e., oxygen]....

Senator Kenny: How do you explain that 21 vehicle manufacturers have told this Committee that they have a problem with MMT?

Mr. Bethune: As has been mentioned here, there are two giants in this country; the oil companies and the auto manufacturers. They are at each other on this MMT issue. These two giants are have been pushed to the wall by a greater giant, and that giant is EPA. The manufacturers are being forced to meet emission levels ... that are now starting to approach a threshold of unattainable goals.⁶⁴

There are clearly some interesting issues tabled here, ones that would have benefited from a rigorous and independent examination. Remember that, at the time (early 1995) when the CPPI was pushing the government hard to send the issues to an independent expert panel for their evaluation, this particular part of the MMT dispute had been simmering for at least five years. Towards the end, as the federal government, pushed harder and harder by the auto industry until its back was firmly up against the wall, moved towards the legislative ban, a number of provincial governments became active players, because refineries in their jurisdictions would feel the most immediate impact (they would be forced to make substantial capital investments or close down).

Perhaps because they were pressured so heavily by a powerful industry sector, the federal politicians never appeared to focus very much on the provincial complaints, thus setting up a nice irony in the outcome, because it was the provincial government complaint to the Internal Trade Secretariat that brought the house of cards represented by Bill C-29 tumbling down. Everyone except the auto industry was looking for an “out,” and submission of the technical issues in dispute to an independent panel appeared to all of them to be the best avenue towards resolution. As the legislative process dragged on into early 1997, this option was repeatedly put on the table. For example, James Ogilvy of Alberta’s Ministry of Federal and Intergovernmental Affairs was asked in the Senate Committee hearings by Senator Kinsella:

Is there an environmental issue here? What is the data? Is there a health issue? Does MMT gum up the OBD-Iis [sic]? I think that this committee can answer the first two questions with not much difficulty, but to answer the third question, where the evidence is so contradictory, I wonder what your government would think, building upon what your minister has said,... of the idea that, if this committee, in meeting its requirement from the Senate to produce an interim report concerning the question of whether or not

MMT gums up OBDs, were to submit the data that we have to a group like the Royal Society of Canada so that they would become the objective arbiters?

Dr. Ogilvy replied that “the government of Alberta would, in my view, support that type of process.”⁶⁵

The opportunity was never seized, because the federal cabinet had decided to capitulate to the unbearable pressure from the vehicle manufacturers. The February 17, 1995 letter from Maureen Kempston Darkes, President of General Motors Canada, to Minister Copps, quoted at the beginning of this section, saying that GM would not honour warranties for emission control systems in the 1996 model year if the ban on MMT was not in effect soon, apparently was instrumental in persuading the rest of the federal cabinet to agree with the ban on MMT, particularly Minister of Natural Resources Minister Anne McLellan, who until then had been opposing it.

Thus the federal government had no choice but to examine its legislative options for banning MMT. Since Health Canada had stated there was no unacceptable health threat from manganese emissions from MMT, the government could not use the toxic-substance provisions of the *Canadian Environmental Protection Act*. Further, since direct emissions data showed that MMT did not affect hydrocarbon or carbon monoxide emissions and actually reduced NO_x emissions, the government could not act under the *Motor Vehicle Safety Act*. Finally, on 19 May 1995, Bill C-94, *The Manganese-based Fuel Additives Act* was introduced in the House of Commons by Minister Copps. The bill banned importation and interprovincial trade of MMT. This legislation was functionally similar to the manner in which the *Motor Vehicle Safety Act* regulates emissions: No vehicle can be imported into Canada or across provincial borders for sale without complying with emission requirements.⁶⁶ Although the direct evidence is limited, it

appears that the government felt that using the device of banning not the substance itself (MMT), but only interprovincial trade in that substance, it would satisfy the NAFTA requirement of treating international firms the same as Canadian companies.⁶⁷

Of course the price the federal authorities paid for being so apparently clever in their choice of legal authority was to seriously antagonize many provincial governments, who had in their jurisdictions the oil refineries producing gasoline, some of which were threatened with closure by their owners due to the projected capital costs of equipment changes. Over the next few months, political lobbying became increasingly intense from both industries. And at each legislative stage (i.e., first reading, second reading, House committee review, third reading, Senate review), opposition members supported with documents provided by Ethyl and the CPPI challenged the bill.⁶⁸ The House Environment Committee, and particularly its chairman Charles Caccia, resented the way in which Ethyl was challenging the government, referring to the corporation as “bullies in the manner in which they presented themselves and advanced their arguments.”⁶⁹

The political battle dragged on until 2 February 1996 when the House of Commons was prorogued. Bill C-94 had not yet passed third reading and so died on the order paper; if the government wanted to ban MMT, it would have to reintroduce the legislation in the next session. During the political battle in Canada, the U. S. Court of Appeal finally ordered the EPA in November 1995 to grant Ethyl a waiver for MMT. The car manufacturers were going to have MMT in the gasoline tanks of their American cars, and the Canadian government’s argument that banning MMT worked toward harmonizing U. S. and Canadian fuel standards was greatly weakened. February 1996 also saw a cabinet shuffle with Sergio Marchi replacing Sheila Copps as Minister of the Environment.

Early in his tenure Environment Minister Marchi received a letter dated 23 February 1996 from Minister of Trade Arthur Eggleton warning about possible trade implications of a ban on the importation and interprovincial trade of MMT: “Let me stress my department’s belief that Bill C-94 should not be reintroduced as it could have many adverse implications for Canadian trade, without compensating benefits.”⁷⁰ Despite this warning, Minister Marchi reintroduced Bill C-94 as Bill C-29 in the new session of Parliament. Speaking in defense of the bill at third reading in April 1996, Marchi said: “In taking this decision about what has been a controversial, complex issue, I have consulted widely among representatives of auto manufacturers, the petroleum industry, environmental groups, and caucus colleagues. The bottom line for me ... is the potential negative effect on the health of Canadians caused by possible interference of MMT on automobile computer systems which monitor tailpipe emissions.”⁷¹ The underlying logic in this subtle conflation of what had been heretofore two quite separate issues (health and emissions equipment) was never explicated by the new Minister. Bill C-29 did not pass third reading before Parliament’s summer recess, which gave the government time to pause and reconsider the merits of their plan. On 31 June 1996 Prime Minister Chrétien wrote a letter to the Ministers of Environment, Trade, Industry, and Natural Resources, asking them to jointly review the Bill and report back to him in the Fall: “This is to advise that, with Bill C-29 not having moved forward before Parliament’s recess, it is my view that the issues raised by the Bill should be reviewed in the time available over the summer. I have written to Minister Marchi, asking him to undertake this review ... and to report back to me in the fall.”⁷² There is no evidence of what was included in this review, or for that matter, whether it was conducted at all. Bill C-29 was given third reading in the House of Commons on 16 September 1996 and was passed in December.

Bill C-29 became law on 25 April 1997, just two days before Prime Minister Chrétien called a federal election, and was brought into force in June of that year.⁷³ In April 1997 Ethyl Corporation launched a \$250-million NAFTA trade challenge and followed this salvo in June with a lawsuit filed in an Ontario court. Alberta – supported by Québec, Saskatchewan, and Nova Scotia – launched a challenge under the federal-provincial *Agreement on Internal Trade* (AIT) in December of 1997. The AIT Panel was the first of these bodies to issue a judgement, and in June of 1998 found that the bill represented an internal barrier to trade that failed to demonstrate any legitimate objective recognized by the *Agreement*. It found that the federal government failed to demonstrate “that there existed a matter of such urgency or a risk so widespread as to warrant such comprehensive restrictions as the *Act* provides on internal trade.” It also stated: “It is clear from the submissions that it was the automobile manufacturers who were the driving force behind the elimination of MMT. They claimed that the on-board monitoring equipment in new vehicles would be impaired by the use of MMT-enhanced gasoline. The evidence as to the impact of MMT on the environment is, at best, inconclusive.”⁷⁴ The report included a dissenting opinion stating that, given the circumstances, the government had acted appropriately.

After the AIT ruling the government reconsidered its options, and the Prime Minister asked Deputy Prime Minister Herb Gray to negotiate a settlement between the government and Ethyl.⁷⁵ On 20 July 1998 the government announced that it would lift restrictions on interprovincial trade and the importing of MMT. The federal government’s press release included the following remarks:⁷⁶

The [AIT] panel noted that the Government’s legislation was based on representations by the automobile industry in Canada. The industry maintained that MMT adversely affected automobile on-board diagnostic systems (OBDs). A malfunctioning OBD

could fail to detect that a car is emitting higher levels of pollutants into the air.

The current scientific information fails to demonstrate that MMT impairs the proper functioning of OBDs. The Government remains committed to protecting the health of Canadians and the environment, and will continue to assess the need for further action as a result of health or environmental concerns. Studies in Canada and the U.S. are proceeding on the impact of MMT and other fuel additives on health and automobile tailpipe emissions. When the results of these studies are made available to the Government of Canada, they will be reviewed by an independent, third party in consultation with stakeholders and provinces. If subsequent federal government action is warranted, it will act, using the Canadian Environmental Protection Act. In light of the Government’s response to the panel’s recommendation, it has moved to resolve other challenges to the legislation, launched by Ethyl Corporation under the NAFTA and by Ethyl Canada in Ontario Court. The Government has agreed to a payment of \$13 million (US) to Ethyl representing its reasonable costs and lost profit in Canada, subject to independent verification. Ethyl will terminate its legal actions. The Government believes this is in the best interests of Canadians because it avoids long, protracted and expensive legal proceedings.

Induced by a powerful Canadian industry sector into embarking on an unwise and illegal course of action, unwilling to trust the good scientific work of its own officials in Health Canada on the health risk assessment (always the most critical factor in public concerns about MMT), and having refused (until after its humiliating capitulation) to engage in an eminently sensible process of independent expert review, Canada’s federal government had no chips left to play with in the little poker game it had called together — unless we remember the marker left at the table in the form of the compensation payment to Ethyl by the long-suffering Canadian taxpayers.

Post mortem

Why was this allowed to happen? The government repeatedly stated that MMT’s effect on emission control systems was the basis for its legislation, but there was clear evidence in its possession that the case to back up these claims was at best weak. The final decision to ban MMT was made in the Fall of 1994, just after the EPA had denied Ethyl’s waiver request on the basis of health concerns. The *Globe and Mail* quotes Minister Copps as saying at the time, “I’ve seen the evidence,” referring to the vehicle manufacturer’s claims, to explain her own position.⁷⁷ Why did this technical evidence on OBD equipment not cast sufficient doubt in the EPA’s minds to deny the waiver and not have to worry about making a decision on the health concerns? If the federal government did not accept the EPA ruling, why was the evidence in their possession not subjected to some independent and more transparent review?

The allegations about emission control problems became harder to fathom as the industry battle over MMT went on and on. The government thought that it was up against a deadline to ensure that the new OBD II systems worked properly for the model year 1996, and the threats from the car industry to void warranties for new vehicles in Canada were not taken lightly. The North American automobile industry possessed a great deal of inherent credibility on this issue, since it was perceived to be “neutral” by many parties, and it certainly carried a big stick in terms of its privileged place in the Canadian economy. The magic number of adding \$3000 per car to vehicle prices, or alternatively the voiding of all new car warranties, certainly impressed the federal cabinet. The oil industry estimated the cost of replacing MMT at around \$5 per year for each vehicle, a mere pittance compared with the alarming number from the auto industry. How could the latter not win out? Finally, these 1994 developments must also be arrayed alongside the Liberal Party’s longstanding commitment to the banning of MMT, originating in Jean Chrétien’s letters supporting a liberal opposition bill to replace MMT with corn-derived ethanol and

continuing with the 1993 election campaign “Red Book” to carry out this promise if the party formed a new government.

Given the uncertainty surrounding MMT’s impact on the environment, why did the government not approach the policy issue as a risk management problem rather than as an all-or-nothing choice? Instead of asking whether MMT should be allowed in gasoline or not, policy makers could have asked how the potentially harmful effects of MMT, such as they are or might be, could be reduced (for example, by lowering the allowable concentration of the additive in gasoline, as the oil industry proposed). At one point in 1993 the CPPI thought that this would be the eventual outcome of the MMT debate and polled its members to see how many would support an upper limit reduction from 18 mg/L to 8.26 mg/L.⁷⁸ A second risk reduction strategy would have been to improve fuel economy standards, thereby releasing less manganese into the atmosphere, although this would have been politically difficult. In the meantime, the government could have continued to support research to better understand the environmental and health consequences of manganese. More importantly, the government could also have addressed the other, higher risk, anthropogenic sources of manganese, including steel making and metal processing operations. In Canada, manganese exposures are routinely above Health Canada’s recommended maximum levels in Hamilton, Sault Sainte Marie and the subways of Toronto.

From a procedural aspect, the federal government could have ensured the provinces were satisfied by addressing MMT as part of a more comprehensive solution to vehicle emissions. At the same time the federal government was planning the ban on MMT, the Canadian Council of Ministers of the Environment had established a Task Force on Cleaner Vehicles and Fuels. Yet despite the obvious appropriateness of this task force as a means of handling the MMT issue, the group was told to avoid it.

In the end, the protracted and utterly pointless “politicization” of MMT took time, energy and attention away from a far more important task — namely, the scientific risk assessment of manganese in the environment, originating from any and all sources, and the making of informed risk management decisions based thereon, the pursuit of which, for the protection of human health and natural habitats, is the proper business of government.

Had the government agreed to undertake some form of independent expert panel review in late 1994 or early 1995, a panel’s report might have been able to offer a substantive and broadly acceptable basis for such a decision, whatever it may have been. There is a lesson in all this: If one has been dragged into a contentious and protracted dispute between two other parties (as the federal government was), and one of those parties – in this case, CPPI – offers a way out, promising to abide by the judgement of an independent and credible tribunal, one ought to take up such an offer forthwith. The rejoinder that there was “not enough time left” to pursue that option is absurd, given the size of the stakes: The issue had been “on the table” since the late 1980s, CPPI’s formal offer for expert panel adjudication was made in late 1994, and the government’s bill did not pass the House until the end of 1996.

The federal government was blindsided, in a way, by the way in which the MMT case unfolded. It all began with the ethanol caper, and only after that gambit had started to play out, culminating in the Red Book pledge to ban MMT, did an entirely different and unexpected twist emerge, namely the encounter between the auto and oil industries over MMT’s alleged effects on equipment. It seems as if the government just could not sort through the many dimensions of this case and focus squarely on what its own responsibilities were. Here is in retrospect how such a focussing might have been done:

1. Start with the health and environmental risk issues, and get them off the table:

- First, Recognize that the health risk assessment has been done competently by Health Canada, defend that assessment, and state clearly that this is not an issue;
- Second, recognize that EPA has passed a competent judgement on environmental issue #1, namely, hydrocarbon emissions (MMT does not exacerbate this problem), and state clearly that this is not an issue;
- Third, with respect to environmental issue #2, recognize that there is credible evidence to the effect that use of MMT yields a benefit on NO_x emissions, state this clearly, and present it as an offset to the environmental burden (not unacceptable risk, however) of increased airborne manganese.

2. Then confront the equipment issue separately:

- First, state that the equipment issues are primarily a matter for the two industries to resolve, and help them do this by agreeing to a thorough review of all outstanding issues by competent, independent expert panels.
- Second, follow up the panel report by calling together the two industries and giving direction on how the report's recommendations should be implemented.

3. Then define how the government will discharge its own responsibilities:

- First, state that, if the panels find good evidence of MMT causing problems with OBD II systems that lead to unacceptable levels of warranty claims for auto manufacturers, the government will take steps to ensure at least the availability of MMT-free fuel in Canada.
- Second, state that the government will seek to do this first by negotiation with the gasoline providers, and failing that, by legislative or regulatory fiat.

Only by getting rid of the distraction posed by the risk issues could the government have focussed clearly on its main outstanding responsibility, as of 1994, which was to *adjudicate* the dispute between two very important Canadian industry sectors — not, as it did, arbitrarily come down on one side of the dispute. Instead, the risk issues were left to fester in the background, as they had been ever since the then Opposition Leader wrote his 1991 letters. In essence the way in which these issues, especially the human health (neurotoxicity) one, were allowed to function in the MMT case — and still function in the frequent references to MMT now — marks a classic instance of the confusion between hazard and risk, something which bedevils almost every risk controversy as well as our legislative instruments (see Chapter 4 on CEPA). Yes, manganese is “dangerous,” i.e., hazardous, if we are exposed to excessive amounts of it, especially by inhalation, but not at any level of exposure — indeed, it is not only beneficial to us (by ingestion) in small doses, but is an essential nutrient for humans, so that a dietary deficiency of manganese would be deleterious.⁷⁹ The Health Canada risk assessments, over a period of twenty years, stated repeatedly that Canadians are not and have not been exposed to excessive amounts by inhalation, except perhaps in Hamilton, Sault Sainte Marie and the subways of Toronto, where the source of the excessive exposure is not MMT. But the federal authorities in charge of the MMT file outside Health Canada never said this, clearly, understandably, and unequivocally.

Environmental and health public-interest groups supported the ban on MMT on grounds of unacceptable exposure, but without credibly countering the Health Canada risk assessment. They also played the “hazard card” on every occasion, talking about the inherent dangers of manganese, by which they meant (or should have meant) the dangers of excessive exposure, if that exposure were found to exist. They never once mentioned, so far as we know, the existence of other sources of exposure to airborne manganese in Canada, or the fact that it is an

indispensable ingredient in the making of steel. As contributing producers of this charade about hazard and risk they participated without shame in the scaremongering over health risks, the only upshot of which is to confuse members of the public about the difference between what they should worry about, where their health is concerned, and what they do not need to worry about. This posturing over public health not only does not serve any useful purpose in the end, but also is actually detrimental to its ostensible objective, because it does not allow the public to see clearly the right priorities for risk reduction.

The outcome of the government’s own failures to separate risk issues from the others was the surrender of its strategic advantage in issue management. Instead, as things turned out, the furious lobbying and extended political debate only trapped the government in a zero-sum game without an exit strategy. If by some miracle we Canadians and our governments could learn from the MMT debacle not to follow such a crooked trail again, but rather to walk the comparatively straight and narrow path of risk management, the \$20 million and change we paid out to Ethyl Corporation for the lesson would have been well spent.

Endnotes

¹ CBC Television, *The National Magazine*: November 2, 1998 (Host: Leslie Mackinnon), Summary 981027 (www.tv.cbc.ca/national/). The text of the parenthetical remark in the seventh sentence in the original – “(the by product of burnt of MMT)” – is obviously incorrect and I have substituted what I believe is correct wording.

² Letter from Leader of the Opposition Jean Chrétien to The Honourable Doug Lewis, Minister of Transport, 17 April 1991.

³ See note 1.

⁴ There is a story worth telling the reader about our assembly of documentation for this case study. We first approached Environment Canada, the lead federal department in the MMT affair, for assistance; after some preliminary discussions we were advised that to get what we wanted we would have to file formal access-to-information (ATI) requests. Those who have some experience in such matters know that this route is a long and agonizing one, necessitating the filing of repeated requests as each batch of information yields new leads. As an alternative we asked for and were provided access to a set of documents made public through ATI requests by Ethyl Canada Inc. We also received valuable documentary materials from the Canadian Petroleum Products Institute. We wish to also thank Mark Nantais of the Canadian Vehicle Manufacturers Association for assisting us with an interview and documentation. We are grateful to Marika Egyed of Health Canada for her responsiveness to our questions, and to Morrie Kirshenblatt of Environment Canada for the small amount of assistance he was permitted to extend to us. We have circulated drafts of this chapter to knowledgeable persons in industry and government, asking to be advised of any errors or omissions in our account. We assume complete responsibility for the interpretation of the case that is presented here. The authors are maintaining a file of reference materials used in this chapter which can be made available to others for research purposes.

⁵ MTBE is methyl tertiary butyl ether and it is a Canadian product, derived from methanol, which like MMT is an octane-enhancing additive for gasoline; its producer, Methanex Corp. of Vancouver, is suing the State of California for \$900 million over the state’s proposed ban on MTBE. There is a lovely irony in all this, because Methanex is using some of the same legal framework (international trade agreements) to bring its action as Ethyl Corporation did in its fight against the Canadian government’s ban on MMT. Not only that, Methanex is embroiled in a dispute with the U. S. EPA at the same time, because the EPA has called for reductions in the use of MTBE on environmental protection grounds which, Methanex claims, is inconsistent with the findings and recommendations of a panel report on the subject commissioned by EPA. See the Canadian Press story, “Methanex calls EPA move ‘misguided’,” *The Globe and Mail*, 3 August 1999, p. B14.

⁶ U. S. *Federal Register*, 17 August 1994 (59 FR 42227). One of the April 1991 “Chrétien letters” (addressed to Robert de Cotret, then Minister of the Environment) notes “the fact that the first cases of manganese poisoning by inhalation were reported in 1837,…” (!)

⁷ Colmenares, C., S. Deutsch, C. Evans, A.J. Nelson, L.J. Terminello, J.G. Reynolds, J.W. Roos, I.L. Smith. 1999. “Analysis of manganese particulates from automotive decomposition of MMT.” *Applied Surface Science*, in press.

⁸ A. P. Jaques, *National Inventory of Sources and Emissions of Manganese (1984)*, Environment Canada Report EPS 5/MM/1. 1987; cited in Wood and Egyed, *Risk Assessment for the Combustion Products of Methylcyclopentadienyl Manganese Tricarbonyl (MMT) in Gasoline*.

⁹ Pellizzari, E.D., R. E. Mason, C.A. Clayton, K.W. Thomas, S. Cooper, L. Piper, C. Rodes, M. Goldberg, J. Roberds, and L. Michael. “Executive Summary: Manganese Exposure Study (Toronto).” Prepared by Analytical and Chemical Services, Research Triangle Institute, Research Triangle Park, North Carolina (RTI/6312/02-01F), 24pages, 30 June 1998.

¹⁰ Robert Routs, President, Shell Canada Products Ltd., before the Standing Senate Committee on Energy, the Environment and Natural Resources, Evidence, 4 February 1997, 0800-23.

¹¹ A second, and perhaps less obvious, motivation for the oil industry was to help set the terms of reference for the debate on sulphur levels in gasoline. In an interview with the authors, Mark Nantais of the Canadian Vehicle Manufacturer’s Association confirmed that, “although the costs for removing MMT were not trivial, the real motivation for the CPPI’s position on MMT may have been to establish a favourable procedure and frame the future debate over the much bigger item of sulphur, potentially a billion dollar cost for the oil industry.” Even the oil industry suggested this motive in their appearances before the Senate Standing Committee on Energy, Environment and Natural Resources, although their concerns were different. Alain Perez, President of the CPPI, when asked about whether MMT was a financial or technical issue stated: “It is a financial issue. It is not huge, like sulphur or others would be, but it is significant for some refiners, particularly the small ones. It is not an overwhelming financial issue; it is money wasted. It is a technical issue because we cannot get the answers. More importantly, it is legislation which creates a precedent. Instead of letting the two industries negotiate... the Government of Canada has clearly taken sides. It has interrupted a negotiating process which was not going well, I agree, and removed any motivation for the auto industry to continue negotiating with us. What truly terrifies us... is that the precedent will then be used on other components of gasoline. The real issue for us is whether we will be footing the next \$5 billion of environmental bills without a chance for study, without a chance for rationale, and without any chance for negotiating because a precedent has been set.

¹² Elizabeth May, Executive Director, Sierra Club of Canada, before the Standing Senate Committee on Energy, the Environment and Natural Resources, Evidence, 5 February 1997, 1940-63. Most of Ms. May’s remarks dealt with health risk issues.

¹³ Grace Wood and Marika Egyed, 1994, *Risk Assessment for the Combustion Products of Methylcyclopentadienyl Manganese Tricarbonyl (MMT) in Gasoline*. Environmental Health Directorate, Health Canada, December. Cited hereafter as *Risk Assessment of MMT*.

¹⁴ Personal communication from Marika Egyed, Health Canada, February 1999.

¹⁵ U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

¹⁶ U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

¹⁷ The U. S. EPA reviewed and accepted data submitted by Ethyl showing that MMT in unleaded gasoline reduced nitrogen oxide emissions between 5 and 20 per cent, depending on how the reductions were calculated. In any case, this represented a significant direct reduction in emissions with accompanying environmental benefits. For more information see the U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

¹⁸ U. S. *Federal Register*, 17 August 1994 (59 FR 42227). It should be noted that although the EPA decided that MMT did not cause or contribute to emission control system failure, some reservations about this decision remained. In particular, the EPA felt that the statistical tests used to substantiate the “cause or contribute” requirement might not represent sufficiently stringent criteria, and shift the burden of proof away from the waiver applicant. The EPA was revisiting these statistical tests but did not think it was appropriate or fair to require Ethyl to resubmit their data under these new criteria.

¹⁹ U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

²⁰ U. S. *Federal Register*, 18 September 1978 (43 FR 41424).

²¹ U. S. *Federal Register*, 1 December 1981 (46 FR 58360).

²² U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

²³ Martha Hamilton, *The Washington Post*, 9 June 1998, p. F1: “Honda Settles Suit on Pollution Control; Ford Also Agrees to Pay Government Fine.”

²⁴ *United States of America v. Ford Motor Company*. U. S. District Court for the District of Columbia, Consent Decree (Judge Royce C. Lamberth), 8 June 1998.

²⁵ U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

²⁶ U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

²⁷ EPA Press Release, *Statement by EPA Administrator Carol M Browner regarding Advertisement by Ethyl Corporation*, 3 July 1996.

²⁸ Personal communication from Joe Sopata, Office of Air and Radiation, U. S. Environmental Protection Agency, March 1999.

²⁹ U. S. *Federal Register*, 9 February 1999 (64 FR 6294). See also www.epa.gov/OMSWWW for full notification, “Statement of Alternative Tier II testing requirements by EPA,” January 1999.

³⁰ Health and Welfare Canada, *Methylcyclopentadienyl manganese tricarbonyl (MMT): An assessment of the human health implication of its use as a gasoline additive*. Cited in Wood and Egyed, *Risk Assessment of MMT*, p. i.

³¹ Holtz, Marcus.C.B. 1986. *Alternatives to Lead in Gasoline: A Technical Appraisal*. The Royal Society of Canada. The Commission on Lead in the Environment.

³² Health Protection Branch, Health and Welfare Canada, “Issues: MMT – Gasoline Additive,” 27 November 1992, p. 3.

³³ Wood and Egyed. *Risk Assessment of MMT*, p. 69.

³⁴ For a discussion of “CEPA-toxic” see Chapter 4.

³⁵ Roels, H.A., P. Ghyselen, J.P Buchet, E. Ceulemans, R.R. Lauwerys, “Assessment of the permissible exposure level to manganese in workers exposed to manganese dioxide dust,” *British Journal of Industrial Medicine*, 49:25-34 (1992).

³⁶ Wood and Egyed. *Risk Assessment of MMT*, p. 45.

³⁷ Dr. Daniel Krewski, Acting Director, Bureau of Chemical Hazards, Health Canada, before the Standing Senate Committee on Energy, Environment and Natural Resources, Evidence, 6 February 1997, 1020- 2.

³⁸ U. S. *Federal Register*, 17 August 1994 (59 FR 42227).

³⁹ Wood and Egyed, *Risk Assessment of MMT*, p. 64.

⁴⁰ Frank Vena and Chandra Prakash, Industrial Sectors Branch, Environment Canada. Internal Briefing (Advice to the Minister for Anticipated November meeting with CPPI Board), “Removal of MMT from Canadian Gasoline,” 24 October 1994.

⁴¹ Remarks made by Senators Ron Ghitter and Colin Kenny, the Standing Senate Committee on Energy, the Environment and Natural Resources, Evidence, 6 February 1997, 1020-13.

⁴² When an Ethyl Corporation official wrote to a newspaper complaining of the confusion between MMT and MTBE, MP Clifford Lincoln (Lac-Saint-Louis), who is widely respected for his commitment to environmental protection, could not resist returning to the previous battle: “Count me among the large majority of Canadians, including credible scientists..., who believe ... that manganese is bad for us and that therefore we should stop using MMT. And the sooner the better.” *The Globe and Mail*, 6 July 1999, p. B2.

⁴³ To be sure no agency is always right. The point here is there is a consistent record of scientific assessment over a long period of time that remains publicly uncontradicted by any other expert body of similar repute.

⁴⁴ The Standing Senate Committee on Energy, the Environment and Natural Resources, Evidence, 6 February 1997, 1020- 3.

⁴⁵ Letter from Leader of the Opposition Jean Chrétien to The Honourable Don Mazankowski, Deputy Prime Minister, 17 April 1991.

⁴⁶ Barrie McKenna, *The Globe and Mail*, 3 October 1994, B1: “Ethanol plan sees cash in corn: Proposal to build \$170-million plant awaits Ottawa’s guarantee.”

⁴⁷ Liberal Party of Canada, “Liberals announce agriculture policies,” 10 May 1993, “Backgrounder.” The ethanol part of the story remained an ongoing sub-text thereafter; for example, as the draft legislation banning MMT was nearing completion in 1994, MP Julian Reed

(Halton – Peel) and the “Ethanol Task Force” peppered Minister Copps with arguments for using ethanol instead of MMT. (Ethyl Corporation said that both could be used advantageously together.) A nice twist on the current controversy over MTBE is that in the same correspondence Reed was busily attacking this Canadian product as well as MMT, since MTBE competes with ethanol-derived ETBE (ethyl tertiary butyl ether); Reed referred to comments in the U. S., including a resolution of the American Medical Association, that portray continued use of MTBE as representing unacceptable health and environmental risks.

⁴⁸ J. A. Buccini to the U. S. Environmental Protection Agency, 17 July 1990. This is the earliest-dated correspondence we have seen in the documents on MMT that we have examined.

⁴⁹ Quoted in Shawn McCarthy, “Gas war: the fall and rise of MMT,” *The Globe and Mail*, 24 July 1998, p. A1.

⁵⁰ Minutes of the 21 June 1993 meeting of the Joint Government-Industry Committee on Transportation Fuels and Motor Vehicle Control Technologies.

⁵¹ Minutes of the 30 June 1993 Meeting of MVMA and CPPI executives, compiled by MVMA President Norman A. Clark.

⁵² Minutes of the 10 December 1993 meeting of the Joint Government-Industry Committee on Transportation Fuels and Motor Vehicle Control Technologies.

⁵³ Minutes of the 9 September 1994 meeting of the Joint Government-Industry Committee on Transportation Fuels and Motor Vehicle Control Technologies. During the Senate hearings much was made of a Transport Canada memo of 19 July 1994 dealing with Toyota’s study, which concluded: “Toyota did not find any evidence that false detections made by the catalyst monitoring system occurred as a result of using MMT.” (Reprinted in part in Submission by the Complaining Party, The Government of Alberta, under the *Agreement on Internal Trade*, in the matter of a Dispute Regarding the *Manganese-based Fuel Additives Act*, filed 1 December 1997: Supporting Documents, Volume 2, tab 21.) However, the President of Toyota Canada, testifying before the Committee, stated: “Since then, we have also conducted additional research which confirmed that, in fact, it is a serious problem.” The Standing Senate Committee on Energy, Environment and Natural Resources, Evidence, 4 February 1997, 32324- 40.

⁵⁴ CPPI Technical Task Force Report, “Review of MMT Claims made by MVMA, AIAMC, and Ethyl,” Ottawa, 28 February 1995. This document contains an extensive summary of all of the technical aspects of the dispute about the emissions control systems. A similar albeit opposing document was prepared by the MVMA titled “The Impact of Manganese-Based Fuel Additives on Vehicle Emission Control Technology in Canada,” 24 October 1995 and submitted to the House of Commons Standing Committee on Environment and Sustainable Development.

⁵⁵ See Chapter 10 for a full discussion of expert panels. The CPPI first approached The Royal Society of Canada with this request in November 1994, and the Society agreed to undertake the project pending a final agreement, which never occurred when both the auto industry and the federal government refused to participate.

⁵⁶ Dan Westwell, “Additive fuels Big Three drive,” *The Globe and Mail*, 29 October 1994, p. A6.

⁵⁷ Jack Knox, *Canadian Press* article, 13 October 1994: “Fuel Industry warned to stop using additive.”

⁵⁸ CPPI Press Release, 27 October 1994.

⁵⁹ Internal Memo to CPPI Board of Directors, 31 October 1994.

⁶⁰ As noted above, the CPPI approached the Royal Society of Canada for this purpose. As is detailed more fully in Chapter 10, the Society’s procedures require that the panel be chosen and operate in complete independence from the sponsors, which have no control over the selection of panel members and cannot see or comment on the panel’s report before it is released to the public.

⁶¹ Internal government e-mail message by Michael Caplan, 14 December 1994: Submission by the Complaining Party, The Government of Alberta, under the *Agreement on Internal Trade*, in the matter of a Dispute Regarding the *Manganese-based Fuel Additives Act*, filed 1 December 1997: Supporting Documents, Volume 1, tab 14. Representatives of all five concerned federal departments were present at the December 1994 meeting.

⁶² Jenefer Curtis, “Big Oil vs. Big Auto,” *The Report on Business Magazine*, March 1999, pp. 62-71.

⁶³ The Senate of Canada, “Interim Report concerning Bill C-29,” 4 March 1997, pp. 21-49.

⁶⁴ The Standing Senate Committee on Energy, Environment and Natural Resources, Evidence, 11 February 1997, 900- 11 to 900- 12. A Transport Canada ministerial briefing note dated 1 March 1995 contains the following statement: “The GM strategy seems designed to protect GM from warranty claims whether attributable to MMT or not.” Submission by the Complaining Party, The Government of Alberta, under the *Agreement on Internal Trade*, in the matter of a Dispute Regarding the *Manganese-based Fuel Additives Act*, filed 1 December 1997: Supporting Documents, Volume 2, tab 22.

⁶⁵ The Standing Senate Committee on Energy, Environment and Natural Resources, Evidence, 11 February 1997, 900- 25 to 900- 26.

⁶⁶ Nicole Pageot, Director General, Road Safety and Motor Vehicle Regulations, Transport Canada before the Standing Senate Committee on Energy, Environment and Natural Resources, Evidence, 6 February 1997, 1020- 15 and following.

⁶⁷ In government documents obtained through the *Access to Information Act* and made available to us, the large majority of references to the legal justifications behind the bill were deleted pursuant to the *Act*.

⁶⁸ Jenefer Curtis, “Big Oil vs. Big Auto,” *The Report on Business Magazine*, March 1999, pp. 62-71.

⁶⁹ Jenefer Curtis, “Big Oil vs. Big Auto,” *The Report on Business Magazine*, March 1999, pp. 62-71.

⁷⁰ Letter from Arthur Eggleton, Minister for International Trade to Sergio Marchi, Minister of the Environment, 23 February 1996.

⁷¹ Environment Canada, News Release, “Government Reintroduces MMT Bill C-94,” 18 April 1996.

⁷² Letter from Prime Minister Jean Chrétien to John Manley, Minister of Industry. 31 June 1996.

⁷² Environment Canada, News Release, “Government Reintroduces MMT Bill C-94,” 18 April 1996.

⁷³ 45-46 Elizabeth II, c. 11, “An act to regulate interprovincial trade in and the importation for commercial purposes of certain manganese-based substances,” authorizes control over any substance specified in the Schedule to the *Act*, and MMT is the only substance so specified.

⁷⁴ The Agreement on Internal Trade, “Report of the Article 1704 Panel concerning a dispute between Alberta and Canada regarding the *Manganese-based Fuel Additives Act*,” Winnipeg, 12 June 1998, pp. 9, 8.

⁷⁵ Shawn McCarthy, “Gas War,” *The Globe and Mail*, 24 July 1998, p. A1.

⁷⁶ Environment Canada, New Release, “Government to act on Agreement on Internal Trade (AIT) panel report on MMT,” July 20, 1998 (available at www.ec.gc.ca/press/mmt98_n_e.htm). In order to give legal effect to the settlement, all the government had to do was to remove MMT from the Schedule of the *Manganese-based Fuel Additives Act*; although it became at that point an empty shell, since MMT was ever the lonely occupant of that Schedule, the *Act* itself remains on the books, mute but enduring testimony to a colossal failure in Canadian public policy.

⁷⁷ Dan Westwell, “Additive fuels Big Three drive,” *The Globe and Mail*, 29 October 1994, p. A6.

⁷⁸ Internal CPPI Memo to Board Members, requesting their views on a reduction in the Canadian maximum concentration of MMT in gasoline, 27 July 1993.

⁷⁹ One can find anywhere from 2.5 to 5mg of manganese sulfate as an ingredient in common multi-vitamin preparations sold in Canada. Such preparations also include other metals such as zinc and selenium, all of which would be toxic at sufficiently high doses.