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POLITICAL ACCEPTANCE OF DANGEROUS TECHNOLOGY: THE EXAMPLE OF LEADED PETROL THROUGH THE CASE STUDY OF SWITZERLAND (1921–1970)

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ABSTRACT

In 1921, General Motors chemists decided to add tetraethyl, a highly toxic lead additive, into petrol to reduce ‘knock’ or ‘pinging’ in internal combustion engines. Despite the opposition from health authorities, the lead additive would come to dominate the global market, particularly during the Great Acceleration (1950–2000). Before the progressive elimination of its use, many voices in the USA and in Europe spoke out against using this additive. How was such acceptance of widespread poisoning possible? We analyse the case of Switzerland to explain the acceptance of lead poisoning. Our aim is to show how concerns over health and environmental impacts from toxic lead were not publicised and how corporate interests trumped concerns over the wellbeing of the community, despite known human risks.

KEYWORDS

Pollution, lead, environmental history, history of the automobile

Introduction

The history of the introduction of highly toxic tetraethyl lead (TEL) into fuel is now well known. In the 1920s, chemist Thomas Midgley, working for the General Motors (GM) research laboratory, developed a petrol additive to reduce ‘knock’ in internal combustion engines and increase the engine power. There were alternatives, but this lead-based technique – patentable and marketable – had the advantage of promising great profit to its discoverers. Despite a contested start and after several fatal accidents linked to the manufacture of the mixture, the American health authorities finally decided to tolerate its marketing by the Ethyl Gasoline Corporation. This company was founded by General Motors, together with DuPont and Standard Oil of New Jersey. Several countries banned the use of TEL for a few months in the 1920s because of its poisonous nature, but they soon saw the economic potential of this new technology and overturned this decision. In Switzerland, in contrast, leaded petrol was banned for a long period of time, between 1925 and 1947. However, due to the late political acceptance of leaded petrol, there were many debates around its use in the Swiss political arena. These debates provide rich source material to explore the acceptance of a dangerous technology by national authorities, beyond the Swiss case and beyond the specific question of lead additives.

TEL additive is toxic in two ways: immediate toxicity by direct contact and lasting toxicity from regular inhalation or ingestion of lead-contaminated products, cumulatively in small doses. Exposure to lead early in life can result in metabolic damage, neuropsychological deficits, hearing loss, and growth retardation.¹ Besides, lead exposure affects cardiovascular and reproductive functions.²

¹ J.O. Nriagu, ‘The rise and fall of leaded gasoline’, *Science of The Total Environment* 92 (1990): 21–22.

² R. Slama, *Le mal du dehors: L'influence de l'environnement sur la santé* (Paris, Éditions Quae, 2017), p. 242.

Exposure to lead was even determined to have contributed to an increase in crime in the post-war period.³ Contamination became massive and global, particularly during the Great Acceleration (1950–2000). As with many toxic substances, TEL benefited from the work of some people whom historian Naomi Oreskes has called the ‘merchants of doubt’.⁴ Toxicologist Robert Kehoe played a major role as merchant of doubt by asserting for almost forty years, in studies financially supported by the Ethyl Corporation, DuPont and the Lead Industries Association, that the use of this additive was harmless. In 1969, the geochemist Clair Patterson was able to demonstrate the main bias of Kehoe’s research: his control groups, whose lead levels were considered normal, actually showed high levels of it.⁵ Thanks to the activism of Patterson and other committed scientists, a policy of de-leading fuel was implemented worldwide, firstly in the United States, in the wake of laws against air pollution from 1975 on. This was mainly because lead hindered the proper functioning of the catalytic converter, which made it possible to reduce harmful emissions of carbon monoxide and nitrogen oxides. As of the 1980s, leaded petrol was gradually replaced by unleaded petrol until its use was finally abolished first in the USA, then in Europe in the 2000s.⁶ The last country marketing leaded petrol, Algeria, banned its sale in 2021.⁷

While the disastrous consequences of the massive use of TEL have been very well documented⁸ and the history of its advent and elimination is now well known, historical studies on its dissemination outside the USA remain isolated and incomplete with a few exceptions.⁹ Judith Rainhorn’s study on the history of another toxic lead substance – the ceruse used for white paint – is an important milestone in the research about the political acceptance of the presence of toxic lead in everyday life. Even if the period covered is different, it points up an important issue: the ‘chaotic’ and non-progressive nature of the chronology of spreading and treatment of toxic lead during the nineteenth century. The study highlights the concerns of some states, which in certain contexts could be expressed through strong actions such as bans. Ceruse could have disappeared in the middle of the nineteenth century in France because of the state regulation, but finally survived because of the power of the lead industry. Rainhorn’s research shows that the acceptance of lead paint by decision-makers during the nineteenth century oscillates between fatalism and confidence in the idea that industrial progress is capable of solving the new problems it brings.¹⁰ This analysis can be applied to many other cases of toxic substances used in western societies in the nineteenth and the twentieth centuries.

Through the case of Switzerland, my contribution aims to shed light on the acceptance of toxic lead as a fuel additive beyond the USA during the twentieth century. The incorporation of lead into fuel is

³ F. Curci and F. Masera, ‘Flight from urban blight: Lead poisoning, crime and suburbanization’, *Institut d’Economica de Barcelona Working Paper* 9 (2018). <https://ssrn.com/abstract=3245090>.

⁴ N. Oreskes and E. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (London, Bloomsbury Press, 2010).

⁵ G. Markowitz and D. Rosner, ‘A “gift of God”? The public health controversy over leaded gasoline during the 1920s’, *American Journal of Public Health* 75 (4) (1985): 344–52. <https://doi.org/10.2105/ajph.75.4.344>; G. Markowitz and D. Rosner, *Deceit and Denial: The Deadly Politics of Industrial Pollution* (Berkeley, Los Angeles/London, University of California Press, 2002); J.L. Kitman, ‘The secret history of lead’, *The Nation* (2 March 2000): <https://www.thenation.com/article/archive/secret-history-lead/>; Nriagu, ‘The rise and fall of leaded gasoline’; S. Amter and B. Ross, *The Polluters. The Making of our Chemically Altered Environment*, New York/Oxford, Oxford University Press, 2012); C. Warren, *Brush with Death: A Social History of Lead Poisoning* (Baltimore, MD, Johns Hopkins University Press, 2000).

⁶ Kitman, ‘The secret history of lead’.

⁷ ‘Leaded petrol era “officially over” as Algeria ends pump sales’, *The Guardian*, 30 Aug. 2021.

⁸ See above, n. 6.

⁹ D. Wilson, *The Lead Scandal: The Fight to Save Children from Damage by Lead in Petrol* (London / Exeter, NH: Heinemann Educational, 1983).

¹⁰ J. Rainhorn, *Blanc de plomb. Histoire d’un poison légal* (Paris, Presses de Sciences Po, 2019).

often considered as an inevitable technical step in history.¹¹ Actually, such ‘mistakes’ in the history of technical progress are often more deliberate and/or aware than is commonly recognised. In short, the destruction of the environment and the creation of health risks by polluting industries and the leaders who supported them did not occur accidentally.¹²

The use of lead in petrol was an environmental health scourge. The risks to human health from the massive spread of burnt lead were constantly debated, but it took some time until the consequences were obvious. From the mid-1970s, increasing studies and public awareness in the USA put the decision-makers under pressure to reduce or eliminate automotive lead pollution.¹³

Although the use of lead as an additive is now banned worldwide, this story remains relevant today. It is estimated that modern man’s lead exposure is 300 to 500 times greater than background or natural levels. In 1983, a British official survey concluded that ‘it is doubtful whether any part of the earth’s surface or any form of life remains uncontaminated by anthropogenic lead’.¹⁴ Soils are contaminated by odourless, colourless and tasteless lead, particularly along roadsides and in urban areas.¹⁵ All over the world, in playgrounds and in city gardens, public authorities regularly detect the presence of lead, which is particularly difficult to clean up.¹⁶

How is acceptance of such widespread poisoning possible? How did corporate interests trump concerns about the wellbeing of the community even though the decision-makers knew the threats? Which contexts promote or prevent critical voices on the use of lead in petrol? This contribution aims to understand the mechanisms of emergence, or rather non-emergence, of the problem of leaded petrol, in order to better understand the general phenomenon of the acceptance of poisons in western societies before the 1970s, when political ecology emerged. It also aims to understand, through this example, how and why the state mostly served as a ‘staunch ally of automobile companies’¹⁷ through the twentieth century and thus contributed to increasing the massive use of cars. The emergence of the automotive society is a part of what J.R. McNeil called ‘a gigantic uncontrolled experiment’,¹⁸ leading to air pollution, environmental and health issues, and a major contributor to climate change.

¹¹ For example, the German Wikipedia page repeats the idea of the lead industry that tetraethyl is the most effective anti-knock agent: ‘Tetraethylblei’: <https://de.wikipedia.org/wiki/Tetraethylblei>

¹² C. Bonneuil and J.-B. Fressoz, *The Shock of the Anthropocene: The Earth, History and Us* (London/New York, Verso, 2016).

¹³ Nriagu, ‘The rise and fall of leaded gasoline’, pp. 21–22.

¹⁴ Quoted by Kitman ‘The secret history of lead’.

¹⁵ See, for example, K. Gruber, ‘Lead contamination across Australia’, *Particle*, 22 March 2018: <https://particle.scitech.org.au/earth/lead-here-there-and-everywhere/> (accessed 8 Dec. 2022) ; ‘Bleibelastung: Schweres Erbe in Gärten und auf Spielplätzen’, Bundesamt für Umwelt BAFU / Office fédéral de l’environnement OFEV / Ufficio federale dell’ambiente, UFAM:

<https://www.bafu.admin.ch/bafu/de/home/themen/atlasten/dossiers/bleibelastung-schweres-erbe-in-gaerten-und-auf-spielplaetzen.html> (accessed 8 Dec. 2022).

¹⁶ D. Bouquet, *Gestion in situ des sols de jardins potagers modérément contaminés en plomb* (Ph.D. Thesis, University of Nantes, 2018).

¹⁷ H.A. Baer, *Motor Vehicles, the Environment, and the Human Condition: Driving to Extinction* (Lanham: Rowman & Littlefield, 2019), p. 4; M. Paterson, *Automobile Politics: Ecology and Cultural Political Economy* (Cambridge; New York: Cambridge University Press, 2007), pp. 92 and 115.

¹⁸ J.R. McNeill, *Something New Under the Sun: An Environmental History of the Twentieth-Century World*, New-York: W.W. Norton & Company, 2001), p. 4.

Structure, method and sources

Similarly to other sources of lead pollution,¹⁹ controversies accompanied the development and use of leaded petrol during the twentieth century. My article aims to explain the choice of lead in petrol through two episodes that correspond to two political decisions about lead in Switzerland: its banning in 1925 and its introduction in 1947. In 1925, the decision to ban leaded petrol was made in a context of suspicion of lead. The context was very different in 1947. With Switzerland the last motorised country not to authorise the blend, Swiss promoters of lead asserted that the country was one step behind technical advances compared to other European countries.²⁰ Meanwhile, the American company Ethyl Export, based in England since 1930, exported the lead product to Europe. Its main goal was to spread the use of leaded fuel in the world by integrating in its capital companies like BP, Esso and Shell. This worked well.²¹ The study of these two episodes (1925 and 1947) provides understanding of the reasons for the success of resistance against lead in 1925, and of why these exceptions did not ultimately endure. It also examines the pro and contra arguments for lead, in order to analyse the acceptance of poison, as well as the confinement²² of opponents' voices.

For several decades, social sciences have studied the emergence of public policies affecting health and the environment in a constructivist perspective. The visibility of controversies often influences their placement on the political agenda and thus their treatment by public authorities.²³ In contrast, or rather complementary to these approaches to analysing the emergence of controversies and their political handling, several researchers have recently been interested in explaining how problems do *not* emerge in the media and consequently are not dealt with.²⁴ In other words, they study elements that prevent an actual problem from being considered as such. The political scientist Emmanuel Henry proposes a reading based on the vast literature on this subject. His approach defines the methodological framework of my study. Henry highlights three processes that block the community's treatment of a problem: invisibilisation; 'manufactured' ignorance; political inaction.²⁵

In the first process – invisibilisation – one question is central: what explains poor public attention to a problem? The second process – 'manufactured' ignorance (coined by the historian Naomi Oreskes) – asks how scientific research, especially its goals and funding, can delay the emergence of a problem. And the final process – political inaction – deals with how political inaction can be explained. Why and in what contexts do leaders fail to act or strive to maintain the status quo?

The current analysis halts in the 1970s because, by that time, the lead problem had achieved 'publicity' and was progressively addressed, until the European ban in the 2000s. This research focuses on the political and societal acceptance of a poison like lead and not on political regulation of this problem.

¹⁹ M. Eklund, B. Bergback and U. Lohm, 'Historical cadmium and lead pollution studied in growth rings of oak wood', *Environment and History* 2 (3) (1996): 347–57.

²⁰ *Der Bund*, 1 June 1947.

²¹ Kitman, 'The secret history of lead'.

²² Rainhorn, *Blanc de plomb*, p. 14 ; Claude Gilbert and Emmanuel Henry, 'La définition des problèmes publics : entre publicité et discrétion', *Revue française de sociologie* 53 (1) (2012): 35–59.

²³ W. Felstiner, R.L. Abel and A. Sarat, 'Emergence and transformation of disputes: Naming, blaming, claiming', *Law & Society Review* 15 (3/4) (1980): 631–54.

²⁴ E. Henry, *La fabrique des non-problèmes. Ou comment éviter que la politique s'en mêle* (Paris, Presses de Sciences Po, 2021) ; C. Robert, *Confiner la démocratie: les dépolitisations de l'action publique* (Villeneuve-d'Ascq: Presses universitaires du Septentrion, 2021).

²⁵ Henry, *La fabrique des non-problèmes*.

My qualitative analysis of the political acceptance of leaded petrol in Switzerland is based on public and private archives. I chose to stay in the political and the media ‘arenas’,²⁶ understood here as places that enable the publicisation of phenomena like the toxicity of lead TEL in petrol. The federal archives are particularly useful for retracing the parliamentary debates, highlighting the tensions between advocates and opponents of lead and understanding the establishment of safety commissions. The special interests of the automobile lobby and its influence strategies are analysed through its specialised press.²⁷ Newspaper clippings are also used to document awareness of the lead problem and the warnings issued to the authorities.²⁸ These various internal documents thus provide an insight into the political processes and an understanding of the tolerance towards a poison.

Besides, the personal archives of toxicologist Heinrich Zangger and the archives of the International Labour Office (ILO) document the commitment of Zangger and the acceptance of leaded petrol in the 1920s on the international scale.

A gift of God? The introduction of tetraethyl lead in the USA and the subsequent banning in Switzerland (1925)

As aforementioned, the global lead contamination that accompanied the introduction of TEL into fuel did not happen accidentally or inevitably. In the 1920s in the USA, two opposing conceptions arose. These two conceptions appeared clearly during a conference organised in Washington by the surgeon general of the US Public Health Service in 1925, after a series of accidents ensued from the production of TEL. The conference was composed of representatives of the industry-entrusted US Bureau of Mines, Ethyl Corporation, labour unions and scientists (toxicologists and health physicians). On the one hand, supporters of TEL presented it as the essential ‘vitamin’ for the proper functioning of a car. At that time, it was not established that oil would be the fuel of the twentieth century: GM developed TEL in a context of competition with Ford, though they also offered different kinds of fuels. While the model Ford T had low compression engines, GM tended for high compression motors which demanded high octane and the use of additives to increase the octane rating. In close cooperation with DuPont and Standard Oil of New Jersey, GM advanced TEL to patent and profit from it.²⁹ During the conference in Washington, the Vice President of Ethyl Corporation, Frank Howard, presented TEL as akin to a ‘gift of God’ and insisted that petrol – linked with TEL – was the only option for the future: ‘Our continued development of motor fuels is essential in our civilization.’³⁰ By saying this, he made the opponents of TEL appear reactionary. On the other hand, the arguments of opponents showed a completely different conception. Among these, Alice Hamilton and Yandel Henderson were conscious that the use of TEL would soon be global and believed that contamination would have dramatic consequences for public health. At the end of the Washington conference, Ethyl gasoline corporation

²⁶ S. Hilgartner and C.L. Bosk, ‘The rise and fall of social problems: A public arenas model’, *American Journal of Sociology* 94 (1) (1988): 53–78, quoted by Henry, *La fabrique des non-problèmes*, p. 25.

²⁷ I have also systematically consulted Touring, the organ of the Touring Club Suisse, the main association for the defence of motoring, for the years 1947, 1955, 1964, 1969, 1973, 1977, chosen because these years correspond to political measures concerning leaded petrol. Archives representing the interest of the oil, car and lead industries in Switzerland have been excluded. By analysing the position of the specialist automotive press, I’ve already had sufficient input on the interests of these three sectors.

²⁸ For the selection of the corpus, I conducted keyword searches in the digital archives of the *Journal de Genève*, a French-speaking liberal daily newspaper read beyond the Swiss borders, and the Bernese newspaper *Der Bund* to have an example of a newspaper focused on local and Swiss news. Occasionally, I used other newspapers.

²⁹ Markowitz and Rosner, *Deceit and Denial*, pp. 17–18; B. Kovarik, ‘Henry Ford, Charles Kettering and the fuel of the future’, *Automotive History Review* 32 (1998): 7–27; A. P. Loeb, ‘Birth of the Kettering doctrine: Fordism, Sloanism and the discovery of tetraethyl lead’, *Business and Economic History* 24 (1) (1995): 72–87;

³⁰ Quoted by Markowitz and Rosner, *Deceit and Denial*, p. 26.

announced a suspension of the production and sale of leaded petrol until public health issues were resolved. The TEL opponents' sense of victory only lasted a short period. The conference established a blue-ribbon committee which worked for seven months.³¹ Its conclusions suggested that more studies needed to be pursued, which never were. The research about leaded petrol was to be conducted from laboratories and scientists endorsed by Ethyl Corporation and General Motors over the next forty years. The Public Health Service did not supervise these studies as the committee had recommended. The historians Markowitz and Rosner describe the chosen option well: 'This is an unfortunate testament to the power of industry's conception that a valuable (profitable) product should continue to be used until it was proven to be hazardous to consumers.'³²

In the 1920s in Europe, unlike in the USA, motoring wasn't general yet. In some regions, there was even a strong resistance to this mode of transport. For example, in the Grison canton of Switzerland, automobile traffic was completely banned during the emergence of leaded petrol, from 1900 to 1925. The European and Swiss newspapers reported accidents caused by the new leaded blend as early as 1924. Articles clearly called this blend 'poisonous petrol'³³ and spoke about it as an 'extremely toxic substance'.³⁴ The use of leaded petrol was discussed simultaneously at the international conference of International Labour Organization (ILO). A Swiss toxicologist and director of legal medicine at the University of Zurich, Heinrich Zangger, alerted Luigi Carozzi, head of the Industrial Hygiene Section of ILO about the danger.³⁵ In 1925, the annual conference of ILO concluded by admitting concern about the consequences of exporting TEL but didn't conduct further research.³⁶

Acting as a whistleblower, at the end of 1924 Zangger started a large campaign to alert international organisations like ILO or the League of Red Cross Societies, as well as American health authorities, to prohibit the use of the 'death-dealing liquid',³⁷ as he called it. In addition to pointing out the hazards of the mixture, Zangger accused Ethyl gasoline corporation of already having exported its petrol to continental Europe.³⁸ Both accusations were denied by the spokesperson of Ethyl.³⁹ The committed scientist went so far as to plan a conference tour in the United States. However, he eventually cancelled his trip, following the advice of his American colleagues and after receiving threats.⁴⁰

Zangger's fight against lead was more successful in Switzerland, as claims about its harmfulness quickly became public. In an article published by the most important medical journal of Switzerland, the toxicologist explained that the lead compound is 'one of the most violent poisons of the central nervous system'. Zangger insisted that the widespread use of lead fuel was 'one of the most serious threats to public health' especially for children.⁴¹ The editorial offices received letters from scandalised readers.

³¹ Markowitz and Rosner, *Deceit and Denial*, pp. 20–35.

³² Markowitz and Rosner, *Deceit and Denial*, p. 35.

³³ *Journal de Genève*, 26 février 1925.

³⁴ *Der Bund*, 6 novembre 1928.

³⁵ Archives of ILO, Hy 103/6/59/3 Advisory conference committee list of unhealthy trades, Correspondance with Dr Zangger.

³⁶ *Journal de Genève*, 2 août 1925.

³⁷ 'Charges our gasoline poisons cities abroad; swiss scientist says dust of Zurich contains lead compounds from motors, clipping from *The New York Times*, 18 March 1925, Archives of Heinrich Zangger Zurich, Zentral Bibliothek, 100.

³⁸ 'Knock in gas engines foiled by lead atoms', *New York American*, 8 March 1925.

³⁹ 'Denies there is danger from lead in gasoline', Archives of Heinrich Zangger Zurich, Zentral Bibliothek, 100.

⁴⁰ H. Rausch, 'Zum 50-Jahre-Jubiläum des Umweltschutzartikels der Bundesverfassung – Ein kritischer Essay', *Vereinigung für Umweltrecht, Umweltrecht in der Praxis* (2022), p. 132; M. Breu, S. Gerber, M. Mosimann, T. Vysušil, 'Vom Tiger im Tank – Die Geschichte des Bleibenzins', *Gaia* 11 (2002).

⁴¹ H. Zangger, 'Eine gefährliche Verbesserung des Automobilbenzins', Sonderabdruck aus der *Schweizerischen Medizinischen Wochenschrift* 2, Basel, Benno Schwabe (1925).

For example, a reader of the *Journal de Genève* considered it ‘lamentable’ that ‘we are sprayed with this toxin’, while concurrently ILO was taking measures against lead paint.⁴²

The Swiss Federal Council banned the production and use of lead-containing petrol on 7 April 1925.⁴³ The decision was based on Zangger’s conclusions, who alerted the Swiss authorities. To justify its decision, the Federal Council referred to accidents in the production process as well as the potential long-term health effects. This ban didn’t raise any opposition in the parliament. The Federal Council didn’t refer only to Zangger’s opinions and concerns, but pointed to ‘the great emotion, especially in medical circles’ following the announcement of the existence of this new blend produced by Standard Oil.⁴⁴ In 1925, this lead-free fuel was an option that could be used without fear of shortages, given that there were still several types of petrol on the market.⁴⁵

Nevertheless, leaded petrol had its advocates in the 1920s. Parts of the tourism community and the car lobby – most vociferously the Automobile Club of Switzerland (ACS) – defended the additive, calling the Swiss ban ‘anti-automobile’. At the time, the ACS considered the Swiss authorities to be particularly hostile to automobiles.⁴⁶ The president of ACS argued in a press release that public health was not at all at risk. He noted that the American authorities were as ‘concerned as our own’ and that if the blend were dangerous, it would be prohibited in the USA. He highlighted the use of lead in lead pipes for gas and drinking water, and argued that ‘nobody had the idea until now to be concerned about this serious danger to our nervous system’.⁴⁷

Apart from these reactions, the ban on leaded petrol was unanimously accepted in Switzerland in the 1920s. This political step addressed the health problem. For this reason, the frame proposed by Henry isn’t relevant to understand the 1925 moment because the problem was publicised and solved. On the other hand, although it didn’t work, the first signs of misinformation to defend lead usage can be detected. Indeed, actors like ACS downplayed the danger of TEL by underlining the toxicity of other leaded products as a diversion. This accords with a recurrent procedure in speeches defending the use of toxic substances.⁴⁸ Another method is intimidation of scientists, as the case of Zangger shows. The ban on TEL lasted until 1947 in Switzerland. Ethyl Gasoline Corporation gave the blend the official name of ‘ethyl gasoline’ which had the advantage of hiding its toxic characteristic.⁴⁹

Dangerous but cheap – Switzerland authorises the use of leaded petrol (1947)

In 1930, Ethyl Gasoline Corporation established themselves first in the UK via Ethyl export and then Associated Ethyl Company – from 1938 – to market TEL outside the USA. In Europe, demand increased gradually due to the European automotive industry’s tendency to favour powerful engines able to compete with the American industry. These powerful engines depended on the octane rating that the lead-based blend was able to increase. At the same time, General Motors – the staunch ally of Ethyl Gasoline Corporation – also extended its influence on the European market.⁵⁰ Furthermore, the development of TEL in Europe was closely linked to World War II and the need for air power. Nazi

⁴² *Journal de Genève*, 26 Feb. 1925.

⁴³ Swiss Federal Archives (SFA), official publications, Management reports of the Federal Council, 1925, p. 246.

⁴⁴ AFS, Publications officielles numérisées, Procès-verbal(-aux) des décisions 07.04.-07.04.1925, E1004.1 1000/9. Band 295 Ref. No 70, Antrag vom 30. März 1925. (Gesundheitsamt).

⁴⁵ H. Hochuli, *Die Entwicklung des schweizerischen Benzinmarktes 1936–1948* (Zürich, Dissertation Volkswirtschaft, 1952).

⁴⁶ Breu, Gerber, Mosimann, Vysušil, ‘Vom Tiger im Tank’, 204; on the reaction of the tourism community, see *Neue Zürcher Zeitung*, 21 March 1925.

⁴⁷ ‘La benzine empoisonnée’, *Journal de Genève*, 1 March 1925.

⁴⁸ Henry, *La fabrique des non-problèmes*, p. 66.

⁴⁹ Markowitz and Rosner, *Deceit and Denial*, p. 19.

⁵⁰ Breu et al., ‘Vom Tiger im Tank’, 204 ; Kitman, ‘The secret history of lead’.

Germany contributed to the acceptance of leaded petrol as early as 1935, when the United States Department of Defense decided to tolerate the production of TEL in Germany by I.G. Farben.⁵¹

In Switzerland, leaded petrol was still prohibited during World War II. Like a lot of governments, the Federal authorities decided to ration the use of petrol to avoid shortages. Two companies were contracted by the authorities to produce an additive – an ersatz – to limit imports and save petrol. These companies produced liquid substitute fuels, mostly infused with paraldehyde and alcohol made from Swiss wood.⁵² These ersatz additives played the role of TEL – still banned in Switzerland – by increasing the octane rating.⁵³ After the war, the pro-automobile community fought against the production of this local mixture. The automobile clubs accused it – sometimes wrongly⁵⁴ – of causing malfunctions in engines. In fact, the ‘automobile community’,⁵⁵ which included automotive lobbyists, specifically criticised its price. In Switzerland in 1948, the pump price was still a third more expensive than in years just before the war, which gives legitimacy to this argument.⁵⁶ Together with the oil industry (Standard, Shell and BP),⁵⁷ these circles were lobbying the government to reverse the ban of TEL use, and to abolish the Swiss blend. In 1946, the Swiss Road Federation (FRS), the umbrella organisation of the motorists’ main associations like the Touring Club and Automobile Club, declared war on the local blend, which it described as a ‘miserable federal cocktail’.⁵⁸ The Section for Power and Heat of the War Industry and Labour Office and the military department followed the FRS.⁵⁹ In 1946, Switzerland’s supply of unleaded petrol in sufficient quality and quantity was at risk, given the growing importance of leaded petrol on the market.⁶⁰ In 1947, the Federal Department of Home Affairs nominated a first ‘Commission for Ethyl Benzine’ to study the modalities of its introduction into the Swiss market. The commission included representatives of the military department, engineers, the manager of Carbura – the semi-state mutual aid organisation of fuel importers – and only one physician, Dr Dettling. Within a short time, on 17 April 1947, the Swiss Federal Council decided to allow the sale and use of leaded petrol based on the conclusions of the commission.⁶¹

The Department of Home Affairs complemented its decision with a set of preventive measures. It made recommendations about handling the product and set up a second commission – almost the same as the first one – responsible for examining potential health impacts on public health in the next two years.⁶²

⁵¹ J. Borkin, *Die unheilige Allianz der I.G. Farben: eine Interessengemeinschaft im Dritten Reich* (Frankfurt a.M.: Campus Verlag, Reihe Campus Bd. 1030, 1990).

⁵² Hochuli, *Die Entwicklung des schweizerischen Benzinmarktes 1936–1948*, pp. 29–30.

⁵³ ‘On pourra utiliser de la benzine éthylysée’, *Touring*, 17 April 1947.

⁵⁴ In the summer of 1946, incidents had occurred. In fact, it was not a problem with the additive, but with the petrol-alcohol ratio: ‘Problèmes actuels du trafic routier’ conference in Fribourg, 5 May 1947, Archives of TCS, Geneva, boîte 175, 1947, dossiers et correspondance, conférences.

⁵⁵ C.M. Merki, *Der holprige Siegeszug des Automobils, 1895–1930 : zur Motorisierung des Strassenverkehrs in Frankreich, Deutschland und der Schweiz* (Wien etc.: Böhlau, 2002).

⁵⁶ Hochuli, *Die Entwicklung des schweizerischen Benzinmarktes 1936–1948*, pp. 98–99.

⁵⁷ Id..

⁵⁸ *Touring*, 22 May 1947; Protokoll der 17. Sitzung des Direktionssausschusses der FRS, 9 mai 1946, Archives du TCS, Genève, boîte 149, 1945–6.

⁵⁹ An exception to the ban had already been made for combat aircraft in 1936: M. Breu, S. Gerber, M. Mosimann and T. Vysušil, *Bleibenzin - eine schwere Geschichte: die Geschichte der Benzinverbleiung aus der Sicht der Politik, des Rechts, der Wirtschaft und der Ökologie* (Munich: ökom Verlag 2002), p. 184.

⁶⁰ Ibid., p. 121.

⁶¹ Rapport du Conseil fédéral sur sa gestion en 1947, p. 180 :

<https://www.amtsdruckschriften.bar.admin.ch/detailView.do?id=50000639#1> (accessed 10 Oct. 2022).

⁶² E3300C#1993/154#66* Direktor Dr. A. Sauter: Eidg. Bleibenzinskommission ; E5001F#1968/100#11* Eidg. Bleibenzinkommission.

This decision raised strong reactions in the newspapers. The satirical newspaper *Nebelspalter* published several caricatures about it. One made reference to the experimental and dangerous aspect of the decision, while an ironic text suggested business interests were at play:

The federal government allows the use of leaded petrol
... but only until we know
whether we are getting sick or dying.
...
Let us be resistant little guinea pigs
... remain healthy and alive with diligence,
In order not to make business difficult for the interested parties
To make it more difficult or even lose it.⁶³

Members of the commission like Dr Dettling put forward arguments in favour of lead in newspapers and in publications like the *Touring*, which were addressed to car users. They insisted on the technical argument to justify the choice of lead. However, using this argument is contradictory because official advocates of lead admitted at the same time that alternatives existed to increase the octane rating... alternatives like the Swiss additives mentioned above. The economic argument was central: yes, the blend is dangerous, but it is first and foremost cheap. Another argument was the fact that the leaded petrol was already used everywhere, where ‘no negative influence [was] observed’. The members of the commission admitted that its use represented a risk, but they insisted on the first and most obvious danger – poisoning by direct contact – while the second danger – long-term intoxication – was downplayed.⁶⁴

The opponents pointed to both dangers and the risky and uncertain nature of the use of leaded petrol. This criticism was also present in parliament. In June 1947, National Councillor Kurt Leupin, a democrat from Basel and professor of pharmacology, submitted a formal request to the Federal Council appealing for information on the reasons for the decision, which ‘could have incalculable consequences for public health’. He asked the Federal Council to address concerns in the media, among medical practitioners, and even among roadside workers.⁶⁵ The plea, supported by a dozen parliamentarians, seems very clear-sighted today: an example of ‘environmental reflexivity’⁶⁶ – or awareness about environmental and health dangers – at the beginning of the Great Acceleration. The deputy spoke of a ‘poison policy’ (*Giftpolitik*) that ‘should not leave parliamentarians indifferent’. He particularly highlighted the second danger, chronic lead poisoning by inhalation, and mentioned the effects, most of which are now verified. He was annoyed that the Swiss authorities relied on studies coming from the ‘interested trust of the Ethyl Gasoline Corporation’. In conclusion, he appealed to the decision-makers’ sense of responsibility towards future generations to reverse their decision.

Swiss President Philipp Etter’s response was based on Dr Dettling’s statements. He responded to the criticism of the biased nature of the American research (led by Kehoe) by referring to the conclusions of UK studies, also reassuring. He asserted that the matter had been pursued ‘neutrally’ by the

⁶³ ‘Benzin mit Blei-Tetraäthyl’, Caricature de Carl Böckli, 29 mai 1947:

<https://digicopy.afz.ethz.ch/?&guid=8575114b0c374e6db3d675a1272d71e1> (accessed 10 Oct. 2022)

⁶⁴ ‘A la veille de l’entrée en scène de l’essence éthylysée. Le rapport décisif du professeur P. Schlaepfer, chef du Laboratoire fédéral d’essai des matériaux’, *Touring*, 24 April 1947; *Der Bund*, 1 June 1947; ‘Depuis le 1^{er} juillet. Le nouveau carburant rouge aux colonnes d’essence. Ses caractéristiques, ses avantages, ses dangers’, *Touring*, 10 July 1947; *La Liberté*, 2 July 1947; *La nouvelle revue de Lausanne*, 16 July 1947.

⁶⁵ Procès-verbaux de l’Assemblée fédérale, Conseil national, séance du 19 juin 1947, p. 747–48. Traduction de l’allemand par l’autrice.

⁶⁶ Bonneuil and Fressoz, *The Shock of the Anthropocene*.

commission. Leupin said he was not satisfied, accused the authorities of mistaking the Swiss population for laboratory rats, and emphasised the exponentially increasing effects these emissions would assume.⁶⁷ Between the advocates of leaded petrol and its opponents, there was another discourse, a fatalist one, between minimisation and denunciation. The *Revue automobile*,⁶⁸ for example, didn't share the confidence of the majority of the 'automobile community'. The magazine acknowledged the existence of both hazards (accidents and long-term impact) and argued it was 'prudent to introduce them on a trial basis':

Progress requires certain sacrifices ... Motorists will, in general, have a better performance of their engine ... Let's make an honest, impartial, scientific test of the two years planned ... *Wait and see!* ...

If we have to pay too much for the technical benefits of lead ... Then too bad, let's replace it with something else.⁶⁹

This was in 1947; getting rid of lead would take about another fifty years. This point of view leads to some intermediate reflections concerning this 1947 moment in the light of the initial question about the opponents' capacity for action, in this case facing the 'merchants of doubt'.

Parliamentary opposition was not addressed by the authorities. The commission published its report only thirteen years later, in 1960, and its conclusions were that the prohibition was not necessary.⁷⁰ Why this failure? To return to Henry's processes, how do we explain the invisibility of the lead problem and the ignorance of the Swiss authorities (and those of other countries) in the post-war years? This episode from 1947 gives some clues. According to the typology of American politician Elmer Schattschneider in his book *The Semisovereign People: A Realist's View of Democracy in America*, quoted by Henry, the debate here is confined to the space area of 'pressure politics', characterised by negotiation. The debate failed to reach the sphere of 'party politics', didn't get political and didn't reach a larger area.⁷¹ The 'automobile community', led by the Road Federation, presenting itself as the 'owners of the problem'⁷² argued that the switch to lead was inevitable in technical and economic terms. The establishment of the commission represents a way to govern the critical voices. Leupin knew it: in two years, the commission was unable to measure the impacts, invisible for the first several years. Furthermore, the work of the merchants of doubt was paying off after World War II. Clearly, we are not dealing with direct manipulation but rather with a more subtle process. The Federal President followed the recommendations of a commission heavily influenced by studies funded by the petrochemical industry. Nevertheless, Kehoe had become the undisputed world reference in lead toxicology. In this context, it was difficult for the researchers working in the commission to distance themselves from Kehoe.

⁶⁷ Procès-verbaux de l'Assemblée fédérale, Conseil national, 4 décembre 1947 ; 'Au Conseil national', *Journal de Genève*, 5 Dec. 1947.

⁶⁸ Swiss Journal of the Motorist, Central Organ of the Motorist and General Interests of the Traffic. This mistrust is perhaps related to the magazine's target audience, which is not so much consumers as professionals (garage owners, mechanics, etc.) who were at risk and potentially affected from lead emissions.

⁶⁹ 'La nouvelle essence', *La Revue automobile*, 10 July 1947.

⁷⁰ U. Haefeli, 'Luftreinhaltepolitik im Strassenverkehr in den USA, in Deutschland und in der Schweiz. Ein Vergleich der Entwicklung nach 1945', in C.-M. Merki and H-U. Schiedt (eds) *Strasse und Strassenverkehr/Routes et circulation routière*, *Traverse* 2 (1999): 171–91.

⁷¹ Henry, *La fabrique des non-problèmes*, pp. 40–46; E.E. Schattschneider, *The Semisovereign People: A Realist's View of Democracy in America* (New York: Holt, Rinehart and Winston, 1960).

⁷² J.R. Gusfield, *La culture des problèmes publics: l'alcool au volant : la production d'un ordre symbolique* (Paris: Economica, 2009).

Winning time: From acceptance to weaning (1948–2000)

In the 1950s, critical voices alerted the public and the authorities about the dangers of leaded petrol in Switzerland and other countries, while the number of privately owned vehicles increased. In the USA, facing smog and other environmental impacts from automobiles, a ‘thirty-year process of strengthening environmental regulation’⁷³ was launched. The nuisance started to concern European authorities.⁷⁴ At that time, an increasing number of studies from medical practitioners were denouncing the omnipresence of lead in the air and human bodies, and its ensuing clinical consequences.⁷⁵ Two rival camps were gradually emerging in the Swiss medical community: those at the head of the commission and those who denounced the human health risks of lead. The people at the head of the commission were linked to the governmental authorities, who tended to downplay the danger to human health. For example, the president of the Commission for Air Hygiene, Dr Högger, softened several alarming conclusions documented by members of his team⁷⁶. On the other side, the whistleblowers conducted independent research on their own patients. Among these outsiders, one can mention Dr Fatzer, who refused to join the commission, or Dr Cramer, who simply called for a ban ‘regardless of the interests involved, even if they are oil-based’ in 1964.⁷⁷

Let’s go back to the moment TEL was introduced in Switzerland. After two years of observations, in 1949, the commission’s mandate was renewed without producing a report as, they explained, ‘the research did not yield any clear results’.⁷⁸ In 1953, an intermediate report concluded that ‘there are no significant hazards to the public’.⁷⁹ In the 1950s and 1960s in the USA, Robert Kehoe and his team from the Kettering Laboratory asserted that lead was naturally present in the human body, which could safely absorb it without developing adverse symptoms. His studies were supported by Ethyl Corporation, DuPont and the Lead Industries Association.⁸⁰ It’s interesting to look at the consequences of the work of the ‘merchants of doubt’ in the case of Switzerland, and the intermediate report of the Commission for Ethyl Benzine in 1953. This reassuring study on the presence of lead particles in food had certain biases, but not only because several of its conclusions were based on Kehoe’s research. The authors selected studies that tolerated a high concentration of lead in the human body. For example, the study quoted a British scientist, Monier Williams, who believed that one should not ingest more than 1 mg of

⁷³ T. McCarthy, *Auto Mania: Cars, Consumers, and the Environment* (New Haven: Yale University Press, 2007), p. xvii.

⁷⁴ S. Mosley, ‘“A network of trust”: Measuring and monitoring air pollution in British Cities, 1912–1960’, *Environment and History* 15 (3) (2009): 273–302.

⁷⁵ T. Bersin, ‘Bleihaltiger Treibstoff-Abgasgifte’, *Med. Neuheiten* 63 (1957); R. Fatzer, ‘Anzeichen von Bleivergiftung?’, *Schweizerischen Medizinischen Wochenschrift* 83 (5) (1960); L. Jecklin, ‘Bleistaub in der Luft’, *Das Schweizerische Rote Kreuz* 65 (5) (1956): 9–10.

⁷⁶ For example the ‘Study of blood lead levels and leaduria in two groups of prisoners, one interned in the countryside, the other in the immediate vicinity of a highway’ led by Lob and Desbaumes expressed concern about the effects of emissions of lead particles and spoke out in favour of eradicating PTE in internal reports. Their support for the complete elimination of lead did not appear in the 1971 official Report of the commission: D. Högger (ed.), *Das Problem der Benzinverbleiung: Untersuchung der Eidgenössischen Kommission für Lufthygiene*, Berne, Eidgenössisches Gesundheitsamt (Bulletin des Eidgenössischen Gesundheitsamtes, Sonderdruck aus der Beilage B, n° 3, 1971). SFA: E7256-01#2011/232#461* Eidgenössische Kommission für Lufthygiene: Berichte.

⁷⁷ ‘Une grave question. Le plomb menace-t-il la santé publique?’, *Touring*, 13 Feb. 1964.

⁷⁸ AFS, E7310A#1973/117#203*, Protokoll über die Sitzung des Carburas Vorstandes 9. Juin 1949.

⁷⁹ AFS, E3300C#1993/154#66* Direktor Dr. A. Sauter: Eidg. Bleibenzinskommission: *Untersuchung über die Verunreinigungen mit Bleiverbindungen, hervorgerufen durch die Verwendung bleitetraäthylhaltiger Motofahrzeug-Treibstoffe*, 30 octobre 1953.

⁸⁰ Markowitz and Rosner, *Deceit and Denial*, p. 109.

lead per day. The Swiss study retained this conclusion, rather than that from Schwarz and Spitta⁸¹ who considered 0.1 mg to be sufficient to be harmful, a concentration ‘which looks excessively low’ to the author. Finally, the author asserts that ‘it seems that the value of 1 mg offers safety’. This example shows how arbitrary most of the conclusions were when it came to defining acceptable thresholds. They tended to accept the more recent American research, strongly influenced by the lead industry.⁸² At the same time, Ethyl planned to increase the quantity of lead in petrol and was embedding itself more deeply in the European market.⁸³

However, in the 1960s, attention to the deleterious effect of leaded petrol grew. In the USA, after years with no independent studies, the Public Health Service published their first study, *The Three City Survey (1961–1963)* (Los Angeles, Philadelphia, Cincinnati), which revealed very high blood lead levels in the urban population, compared to the rural population.⁸⁴ In 1965, a study by Patterson showed that lead concentration in the ice of Greenland had increased by 400 per cent between the middle of the eighteenth century and the mid-twentieth century; then by another 300 per cent between 1940 and 1965.⁸⁵ The independent geochemist and other scientists pointed to the industrial lead’s adverse impact on the environment and the role of TEL. A conference was convened by the Public Health Service for the first time after 1925. In 1969, Patterson proved the biases of Kehoe’s samplings and research.⁸⁶

In the 1950s and 1960s, despite awareness in some scientific circles, the debate did not emerge publicly immediately, neither in the American media⁸⁷ nor in Europe. How can we explain such non-emergence during these two decades? Furthermore, in the context of my research question, how can we explain the impotence of these voices exposing widespread lead contamination? Many authors studied the battle against lead on a legislative, judicial and administrative scale in the USA. They showed how the lead industry tenaciously defended its strategic product, whose elimination assured serious repercussions for the petroleum and automotive industry.⁸⁸ But what happened in the period before effective policy measures (in the mid-1970s) on a European and national scale?

The 1955 example of further resistance at the Swiss parliamentary level, eight years after Leupin’s opposition, provides some clues. The independent Zurich National Councillor Alois Grendelmeier submitted a postulate on ethyl gasoline, which was supported by about twenty parliamentarians. He asked the Federal Council if they believed that there was a ‘threat to public health’, given the increasing traffic. He requested that neutral experts study the question and publish a survey, and recommended political measures. In his speech, the member of parliament mentioned the ‘suffering of the population’ that ‘has no choice but to live in this air’. He noted that about a billion litres of petrol were consumed annually in Switzerland, resulting in about 250,000 kilograms of lead salts being burnt per year. Grendelmeier insisted on the unanimity among practitioners who confirmed the predictions of Heinrich Zangger thirty years earlier. He criticised the bureaucratic, out-of-touch nature of the commission and the absence of practising physicians ‘who pay attention to the lives and sufferings of the population’. Like eight years earlier, Philipp Etter defended his politics of lead tolerance through technical

⁸¹ G.W. Monier-Williams, *Trace Elements in Food* (London: Chapman & Hall, 1949); Z. Schwartz, *Angewandte Chemie* **13** (1926): 829–30; Spitta, *Zentralblatt für die gesamte Hygiene mit Einschluss der Bakteriologie und Immunitätslehre* **29** (1933): 689–705.

⁸² The Swiss commission recommended setting a threshold, which the Federal Council did in April 1955 (0.6 cm³/l). In fact, the threshold limit had already been set at 0.6, but the legal basis was unclear. so it wasn't really progress. Breu et al., *Bleibenzin - eine schwere Geschichte*, p. 15.

⁸³ Warren, *Brush with Death*, p. 204.

⁸⁴ Markowitz and Rosner, *Deceit and Denial*, p. 110; Warren, *Brush with Death*, pp. 206–10.

⁸⁵ C. Patterson, ‘Contaminated and natural lead environments of man’, *Archives of Environmental Health* **11** (3) (1965): 344360.

⁸⁶ Markowitz and Rosner, *Deceit and Denial*, p. 111–14.

⁸⁷ Warren, *Brush with death*, pp. 216–17.

⁸⁸ *Ibid.*, from p. 208.

arguments. His answers were based on Dr Dettling's conclusions and the fact that all motorised countries adopted them, and on the commission's reassuring intermediate surveys (based on Kehoe's results). Etter accepted the postulate, meaning that he considered Grendelmeier's concerns. He also argued that the commission had not published its final results.⁸⁹ Moreover, the debate remained mostly confined to parliament and took up only a few hours in the 1950s and 1960s.

At that time, the Touring Club Suisse (TCS) was playing a fundamental role in the promotion of automobile transport, similarly to the auto-industry in other countries. Since the 1920s, the TCS had been fighting the collateral damage of automobile traffic in order to improve the situation and at the same time the image of the automobile – for example, by promoting road safety or, more specifically, finding solutions for car cemeteries. The services TCS offered (breakdown service, etc.) boosted the number of its members,⁹⁰ which gave the pressure group recognition from the authorities.⁹¹ Furthermore, the organisation had a certain hold on the media and newspapers.⁹² The TCS hardly mentioned the debate about lead emissions in the 1950s. Given its role as 'owner of the problem', its obfuscation about health damage locked up the debate. In the 1960s, its newspaper addressed TEL pollution issues, but tended to downplay, query or even deny them.⁹³ Invisibility gave way to a type of 'factory of doubt'. In the 1970s, this kind of article coexisted with unequivocal pleas against the lead additive in a sort of schizophrenia.⁹⁴ On a political scale, comments about lead often referred to Kehoe's research. It had a direct influence on the threshold suggested in the surveys of the Commission for Ethyl Benzine and the Commission for Air Hygiene from 1961. The Federal authorities reduced lead from 0.63 g/l in 1947 – the same amount as in 1955, when Grendelmeier tried to alert the authorities – to 0.15 for normal petrol in 1984. In 1971 only was lead reduced to 0.54 g/l.⁹⁵

From the mid 1970s, doubts over the danger of lead in petrol – by scientists close to the auto, petrol and lead industry – had finally been dismissed. Research documented the effects of global contamination: no fewer than 5,000 papers on TEL toxicity were published in 1978 alone.⁹⁶ The lead issue became a major public health concern, first in the United States where unleaded fuel was introduced in 1975. By that time, by some estimates, so much lead had been deposited in soils, streets, and building surfaces that an estimated 68 million children would have toxic levels of lead in them and some 5,000 American adults would die each year from lead-induced heart disease.⁹⁷ As part of the laws against air pollution, manufacturers had to equip their engines with catalytic converters to reduce CO and NOx emissions. Lead was not only toxic, but also hindered the function of these catalytic converters. Hence, for mechanical reasons too oil companies were finding ways to reduce lead content. In Europe, Germany

⁸⁹ Procès-verbaux de l'Assemblée fédérale, séance du 28 septembre 1955, from p. 342.

<https://www.amtsdruckschriften.bar.admin.ch/viewOrigDoc/100004821.pdf?id=100004821> (accessed 10 Oct. 2022). See also : 'Von Flüssigkeiten aller Art', *Die Tat*, 30 Sept. 1955.

⁹⁰ Half a million in 1969: *Touring*, 2 Jan. 1969.

⁹¹ A. Mach, *Groupes d'intérêt et pouvoir politique* (Lausanne: Presses Polytechniques et Universitaires Romandes, 2015), p. 37.

⁹² An example of this is the all-expenses-paid invitation to journalists to visit road infrastructure in Europe. *Touring*, 7 July 1955.

⁹³ For example, by talking about 'allegedly dangerous pollution of the atmosphere': 'Les problèmes du plomb et de l'oxyde de carbone dans les gaz d'échappement', *Touring*, 10 April 1969.

⁹⁴ 'Une grave question. Le plomb menace-t-il la santé publique?' *Touring*, 13 Feb. 1964 ; 'Le conducteur est-il toujours un meurtrier ?', 8 March 1973; 'Diminution de la teneur en plomb de l'essence. Problèmes et contradictions', 17 March 1977; 'Les effets sur l'homme des gaz d'échappement des moteurs', *Touring*, 30 June 1977.

⁹⁵ E3300C#1996/290#623* Reduktion des Bleigehalts im Motorenbenzin 'unverbleit' 1983– 985.

⁹⁶ Nriagu, 'The rise and fall of leaded gasoline', p. 21.

⁹⁷ D. Blum, 'Looney gas and lead poisoning: A short, sad history', *Wired*, 5 Jan. 2013.

was at the forefront of the fight against lead, which would eventually disappear from the EU in 2000.⁹⁸ Since the 1970s, the auto industry progressively advocated for the catalytic converter. It was at the same time a way to reinvent and support the car industry.⁹⁹

As aforementioned, the study of this phase, which has been well analysed for the USA, while Europe and Switzerland strove to follow Germany's lead,¹⁰⁰ is beyond the scope of this article. Parallel to the politicisation and subsequent treatment of the problem at a global level, the factory of doubt did not immediately disappear. Based on my findings, it contributed to the spread of the idea that the introduction of lead in petrol was due only to technical reasons and that this 'mistake' was corrected in the 1970s, 1980s and 1990s by removing lead from petrol. The work of merchants of doubt often outlasts their time. Lead advocates were still quite vocal in the 1970s. For example, Marc Lhéraud – president of the Lead Information Center – downplayed the dangers of lead additives in 1974 in a series of respectable scientific outreach literature.¹⁰¹ The conclusion of the final report of the Federal Commission for Air Hygiene in 1971 even denied some current harm, but at the same time recommended reducing its use¹⁰².

In the 1970s, there were still economic circles like oil companies and lead sellers, who were involved in slowing the demise of leaded petrol.¹⁰³ As one Ethyl executive noted internally, Kehoe – who increasingly aroused scepticism in the scientific and political arenas from the late 1960s on – 'bought us time'.¹⁰⁴ As in most European countries, Switzerland banned leaded petrol from pumps on 1 January 2000.

Conclusion

By examining the political acceptance of a danger in terms of environmental health, I wanted to show the vast awareness of ongoing poisoning, even in automotive circles, and its invisibility. These mechanisms also existed in several other cases of contamination (insecticides like neocide, DDT, asbestos, etc.). And recently, researchers have demonstrated that the oil industry was aware of the global warming problem as early as the 1970s. In the 1980s, a campaign was started to dispute climate science and weaken international climate policy.¹⁰⁵ These mechanisms highlight a certain powerlessness of authorities on the national scale as long as an environmental and/or health problem is not publicised and remains confined to the political arena. My case study shows that political opposition to an industrial poison can be attended to, marginalised or absorbed by the authorities. The decision-makers were influenced by the communication strategies of large companies and the connected factory of doubt.

The first moment discussed here (1925) showed that warnings can be listened to, provided that the doubt factory is not too powerful, and that the prohibition measure does not threaten supply. Marginalisation, which affects whistleblowers, takes two forms: occasional and structural. It was occasional when it

⁹⁸ E. Bussière, *Milieux économiques et intégration européenne au XXe siècle* (Berne: Peter Lang, 2006); V.M. Thomas, 'The elimination of lead in gasoline', *Annual Review of Energy and the Environment* 20 (1) (1995): 301–24.

⁹⁹ The US industry came first (General Motors from 1971), followed by the northern European and Japanese industries. Southern Europe switched later to unleaded gasoline.

¹⁰⁰ M. Näsman and S. Pitteloud, 'The power and limits of expertise: Swiss–Swedish linking of vehicle emission standards in the 1970s and 1980s', *Business and Politics* 24 (3) (2022): 241–60; <https://doi.org/10.1017/bap.2022.3>; Breu et al., 'Vom Tiger im Tank'.

¹⁰¹ M. Lhéraud, *Le plomb* (Paris: Presses Universitaires de France, Que sais-je, 1974).

¹⁰² Högger (ed.), *Das Problem der Benzinverbleiung*, p. 199.

¹⁰³ Kitmann, 'The secret history of lead'.

¹⁰⁴ Markowitz and Rosner, *Deceit and Denial*, p. 116.

¹⁰⁵ Christophe Bonneuil, Pierre-Louis Choquet and Benjamin Franta, 'Early warnings and emerging accountability: Total's responses to Global Warming, 1971–2021', *Global Environmental Change* 71 (2021): <https://doi.org/10.1016/j.gloenvcha.2021.102386>.

affected the speech of opponents, as when Dr Zangger received threats or when Clair Patterson was directly attacked by the world of lead toxicology.¹⁰⁶ On the Swiss scale, I also observed some mockery targeting politicians critical of, or doctors reporting, the threat of low-level lead contamination in the 1950s and the 1960s.¹⁰⁷ Structural marginalisation concerns the socio-professional paths of whistleblowers. The structural inequalities¹⁰⁸ between provincial physicians and the experts of the commission should also be highlighted.

I consider that the absorption of criticism plays an even more decisive role in the non-emergence of controversy regarding health and environmental risk. First, it affects the medical community. Dr Dettling was at first very much opposed to the use of leaded petrol, but this was tempered from the moment he worked for the authorities within the Commission for Ethyl Benzine.¹⁰⁹ Some did not want to compromise themselves: Dr Fatzer, a dentist in Wädenswil, was approached to join the commission but refused. As an outsider, he tried from 1958 to the late 1970s to put pressure on the Swiss Health Department and on politicians by sending dozens of studies documenting the toxicity of lead.¹¹⁰ Some criticism was taken up by political decision-makers, who introduced control measures. The formation of commissions, for example, is certainly a way to respond to concerns, but it can also result in silencing critics, as in 1947. Later, as early as the 1950s, the establishment of a 'safe' lead threshold was also a response to legitimate concerns and, at the same time, it controlled critics.¹¹¹

Several researchers have shown that the definition of a threshold paradoxically allows for the acceptance of contamination. Implicitly, they tend to legitimise the exposure of societies to toxic substances.¹¹² In the case of lead, the focus on short-term exposure often supplanted chronic exposure, although this had been a concern since the 1920s. The establishment of exposure limits as early as the 1950s made it possible to silence warnings about this second hazard, which became a reality in the post-war period. Finally, the weight of the 'owners of the problem', in this case the automobile organisations, cannot be neglected, as seen with the acceptance of the poison in 1947. Many other aspects could be further explored, such as the role of manufacturers. Their shift to the catalytic converter was a way of adapting to state concerns and demands. Unleaded petrol and catalytic converters were tools used by the auto industry in the 1980s to sell the idea of a 'clean' car.¹¹³

In the opposition to lead by parliamentarians in the 1940s and 1950s, one leitmotif recurs: the demand that decision-makers inform the public and base their decisions on truly independent, non-partisan studies. In his 1947 speech, National Councillor Leupin urged authorities to call a spade a spade: the name 'ethyl gasoline' reveals nothing; people must know that it is about large-scale lead burning, he pleaded. This story highlights the frequent impotence of the authorities at a national scale when facing worldwide contamination and, above all, during this process, the weight of the lobbies that have an interest in its continuing.

¹⁰⁶ C.I. Davidson, *Clean Hands: Clair Patterson's Crusade Against Environmental Lead Contamination* (New York: Nova Science, 1999); Warren, *Brush with Death*, from p. 210.

¹⁰⁷ W. Blumer, *Motorisierung – Seuche des Jahrhunderts* (Erlenbach/Zurich/Stuttgart: Eugen Rentsch Verlag, 1973), p. 8.

¹⁰⁸ Henry, *La fabrique des non-problèmes*, p. 76.

¹⁰⁹ During the war, he declared in his lectures about the use of lead in petrol that it was one of the greatest crimes of the 20th century: Dr Brönnimann, 'Der Verursacher muss an die Kasse!', *Der Bund*, 22 Dec. 1983.

¹¹⁰ AFS, E3300C#1993/154#66* Direktor Dr A. Sauter: Eidg. Bleibenzinskommission; E3300C#1996/290#630*. Bleibenzin. Dr Fatzer.

¹¹¹ C. Pessis, S. Topçu and C. Bonneuil, *Une autre histoire des 'Trente Glorieuses': modernisation, contestations et pollutions dans la France d'après-guerre* (Paris, La Découverte, 2013), pp. 25–27.

¹¹² S. Boudia and N. Jas, *Gouverner un monde toxique* (Versailles: Quae éditions, 2019).

¹¹³ A parallel can be drawn today with 'clean' electric cars whose production requires the use of fossil fuels and contributes to other environmental scourges and resource exploitation. N. Meunier, *L'arnaque de la voiture propre* (Paris: Hugo Doc, 2021).