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Disparate Lives, Fractured Mineral

Toxic Displacement in the Global Economy of Asbestos

Nicholas Surber

Degree of Master of Science (Two Years) in Human Ecology: Culture, Power, and Sustainability
30 ECTS

CPS: International Master's Programme in Human Ecology
Human Ecology Division
Department of Human Geography
Faculty of Social Sciences
Lund University

Supervisor: Alf Hornborg
Term: Spring 2018

Department:	Human Ecology Division, Department of Human Geography
Address:	Lunds universitet, Geocentrum 1, Sölvegatan 10, 223 62 Lund
Telephone:	046-222 17 59
Supervisor:	Alf Hornborg
Title and Subtitle:	Disparate Lives, Fractured Mineral: Toxic Displacement in the Global Economy of Asbestos
Author:	Nicholas Surber
Examination:	Master's Thesis (Two Years)
Term:	Spring 2018

Abstract:

The established scientific reality of asbestos is that (a) asbestos is toxic at a minuscule dose, and (b) exposure should be avoided whenever possible, with the evidence expanding almost exponentially over the past century. The purpose of this research is to explore the historical and global socio-natural entanglements of the economy of asbestos and the resulting mechanisms at play to occlude and marginalise the toxicity and emphasise profitability. Therefore, the aims are three-fold. First, the work will uncover and critically examine (utilising critical discourse analysis) asbestos product advertisements and related documents, specifically a selection of Eternit (asbestos-cement) variants from Skandinaviska Eternit AB in Sweden. A secondary goal is to compare the often antithetical stance, evidenced by their marketing strategies, of the asbestos-cement industry with those exposed victims confronted with the toxic realities first hand. Thirdly, the research will evince the global reach and attendant forms of environmental, toxic, and entropic displacement of the economy of asbestos vis-à-vis the omnipresent yet prosaic use of its products. Finally, these three attritional types of displacement are posited as prototypical instances of slow violence, extrapolating from an ecological Marxist framework in dialogue with perspectives in environmental public health and post-humanism.

Keywords:

economy of asbestos; displacement, abstract space, socio-natural transformation; slow violence; toxicity; environmental public health; ecological Marxism; post-humanism

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Acknowledgements*

First, I would like to thank the Human Ecology division at Lund University; in particular, my advisor Alf Hornborg for his constructive feedback, and a fellow student, Rebecka Blomberg, for all her support and technical assistance in working to understand arcane Swedish media and texts—an invaluable skill critically relevant to this thesis. I relied heavily on another student, Jesper Perälä, to review the mineralogy of asbestos fibres.

Next, to the various libraries and librarians. I am grateful for the help in Lund from the Social Sciences Faculty Library (viz. Ellen Fall) and the University Library in finding rare resources, or giving me unusual yet nuanced suggestions to guide this work through its meandering iterations. The municipal library in Lomma also proved a great resource to learn about Lomma Eternit and its histories.

Behind every librarian, there was another archivist. This thesis owes a great debt to the everyday efforts by archivists at the municipality of Lomma, those at the Special Reading Room at the University Library and who maintain the inspiring Ephemeral collection (vardagstryck); lest I forget the work at the Swedish Media Database (SMDB), part of the National Library of Sweden (Kungliga Biblioteket), in procuring ageing documentary footage for research.

Finally, I appreciate the thorough readings and moral support from my brother, Alexander, and my father, Mark, for pitching in when they could.

* *(in no particular order)*

*for Bonnie,
my very own private audience
and editor extraordinaire*

[It seems that] for it to be classified as criminal behaviour, the killing has to be quick. If the bullet takes 20 years, it's not called murder, it's called business.

-Paul Brodeur

(qtd. in Hills 1989, 165)

Introduction

The Magic Mineral

Many accounts of the “magic mineral” that is called asbestos (Hills 1989, 9-10; Peacock 2010, 104; Schwarz 1997, 2-4) begin with the folklore: some say it formed a fireproof wick to burn at Athena's temple (Pliny the Elder), or that Charlemagne kept a special tablecloth to amaze guests at the end of a storied dinner.¹ Rumour has it that even Benjamin Franklin found a peculiar purse made from the stuff. Still, those are examples of finished products. Before it reached any consumer—famous or not—there was extraction. One more case: the Romans, starting around the first century CE, utilised animal bladder skins as primitive respirators to avoid the diminishing returns from quickly fading and deceased slave workers forced to mine for the Empire (Hills 1989, 11-12). That's nearly 2,000 years ago, without the trappings of modern science in any form.

Placing Asbestos in the Industrial World

There are two ways to find asbestos and its mineral cousins. First, asbestos deposits are exposed with the landscape for all to see and inhale—like in any typical mountainous region with rocky outcroppings, perhaps granite or limestone (Carbone et al. 2011, 1). The Cappadocia region of Turkey and scattered villages in Guanajuato, Mexico exemplify this sort of environmental exposure (Carbone et al. 2011, 4-5; Ortega-Guerrero 2015, 2-3.)² Second, asbestos is mined commercially as an opencast and/or underground system (van Horssen 2016, 122-3.) After extraction, the material is sorted, cleaned and processed in the mill, transformed into a product at the factory, sold to distributors, all to ultimately be installed at its resting place for the consumer (McCulloch and Tweedale 2008, 39-40). The current era of asbestos production—linked to the so-called “second Industrial Revolution” of the late 19th century with chemistry at the forefront—started small, and with labour intensive techniques, but increasing specialisation and automation allowed output to proliferate rapidly (Schwarz 1997, 4). In short, by Virta's estimate (2006, 32-4), annual global production rose from only 30 thousand metric tons in 1900 to peak at nearly 5 million metric tons in 1977—thereafter decreasing slowly and holding at about 2 million from 2000 to 2011 (cf. Virta 2007, 7; 2010, 6; Flanagan 2016, 10.)³ The “magic mineral” of the few was an industrial staple for the masses—this was no diminutive operation (Schwarz 1997, 2-5.)

1 Asbestos is listed as a “magic mineral” in numerous texts, without referencing the origin therein.

2 These refer specifically to another mineral termed erionite, which has some similar fibre properties.

3 Between 2012 and 2016 world production decreased from about 2 to 1 million metric tons. There is a sizeable delay with these aggregated statistics. Virta (2006, 32-4) estimates global cumulative production of about 181 million metric tons between 1900-2003.

In truth, the sprawling global asbestos industry operated as a cartel—more resembling OPEC or the Federation of Quebec Maple Syrup Producers (derided as the “OPEC of Maple Syrup”) than any idyllic free market (*The Economist*, 2015.) The key companies in this cartel structure were Eternit (CH), Johns-Manville (US), Phillip Carey (US) and Turner & Newall (UK); naturally, they dominated the market(s) and set prices throughout the asbestos boom years of the 20th century (McCulloch and Tweedale 2008, 25-6.) Johns-Manville (J-M), for instance, owned what was once the largest asbestos mine in the world, adjacent to the working-class settlement of Asbestos, Canada (van Horssen 2016, 4.) One of two mines in southeast Quebec close to the American border, the Jeffrey mine anchored the town's oscillating population ranging up to about 10.000 (between 6-7.000 today) with 2.000 on-site jobs at one point (van Horssen 2016, 122-3, 164-5, 183). This mine opened in 1879, established as a small pit in the field by four locals. It grew drastically over the decade and was controlled by J-M from 1916 to 1982, thereafter sold to a group of former J-M officials, and ceased operations only in 2011, marking the end of elephantine Canadian asbestos exports (Mauney 2016; van Horssen 2016, 30-32). Today, the colossal mine remains and the town is considering a post-asbestos future with discarded magnesium tailings (Rastello and Pearson 2018.)

At the other end of the commonwealth, Australia was no stranger to asbestos. Wittenoom is another working-class small town established for its proximity to the mineral. Unlike Asbestos, Quebec, this Western Australian mine was incredibly isolated—abutting Karijini National Park at the foot of the Hamersley Ranges in the Pilbara region (Croy 2017). Perth, the state capital, is about 1.000 miles to the south and nearly every visitor relied on small flights for transportation from the capital in lieu of a lengthy drive or riding the train (McCulloch 2006, 3-4.) Up until 1944, two entrepreneurs paid miners for asbestos at Wittenoom; however, the primitive operations burgeoned after selling to the Colonial Sugar Refining Company (CSR) and its subsidiary Australian Blue Asbestos (ABA) (Hills 1989, 17-18; Wahlquist 2015; McCulloch 2006, 1-4).⁴ Wittenoom became Australia's premier asbestos mine, with annual output reaching 15.000 tonnes at its zenith, before closing in 1966 (McCulloch 2006, 5.) From the 20.000 residents of Wittenoom, there was a cumulative exposure of 7.000 miners (averaging 200 miners for any given year) over the mine's brusque duration. In the decades since, the town and mine has been mostly demolished, and a group of locals still living there is resisting the Western Australian government's ongoing containment plans, involving forced relocations (Hills 1989, 1-2; Wahlquist 2015). Meanwhile, the quasi ghost town has become a sizeable tourist attraction.

4 ABA has since been renamed to Midalco (Hills 1989, 17-18.)

Whilst Europe had some asbestos mining (e.g. Italy and Cyprus), the emphasis was on asbestos manufactures (McConnochie et al. 1987, 342; Ruers 2011, 15; Turci et al. 2016, 321.) Sweden—with no deposits of its own—was no exception (Hillerdal 2004, 154.) Moving down the production chain from mining towns to factory communities, Lomma hosted its own asbestos-cement factory, Lomma Eternit, owned by the Cementa group, although managed by the subsidiary Skandinaviska Eternit AB in Scania, southern Sweden (Wallin 2015, 24-6; 56-7.)⁵ The factory began in 1873 as a cement business, and from 1905-6 the plant transformed to refocus on Eternit, as would be its purpose from 1917-1977 when it ceased operations (Wallin 2015, 12.) Sweden as a whole imported 10 to 20 thousand tonnes of raw asbestos annually during the 1950-70s, with a considerable share directed to this industry (Westerholm et al. 2017, 1-3.) Lomma Eternit employed around 300-350—twice as many as Wittenoom—in 1975 as it began shutting down (Andersson 1980, 17.) Lomma is situated within kilometres of two cities: Lund and Malmö, thereby making it far more connected than Asbestos, Quebec and Wittenoom (Grönkvist 2018; Lomma Kommun 2018, 2.) With a current population of nearly 13,000, Lomma is far from a ghost-town: the factory zone has indeed been demolished and redeveloped (Högberg 2011, 36.)

All three cases, in Australia, Canada and Sweden, were predicated on exploiting an economy of asbestos—with asbestos front and centre. Still, despite this rampant commercial use, asbestos was inadvertently excavated during vermiculite mining near Libby, Montana, USA. Libby is a remote town in between the city of Spokane, Washington and renown Glacier National Park (Libby, MT 2004.) The town was always small (around 2600 today), and as production expanded, the local workforce reached 150 by 1962 (Schneider and McCumber 2016, 90.) The mineral was discovered alongside asbestos at a nearby mountain in the early 20th century, then probed to uncover potential uses, and mined extensively until 1990 under the brand name of Zonolite (Bandli and Gunter 2006, 949). Vermiculite is utilized commercially as fertilizer, insulation, and in fireproofing, to be brief (Tanner 2015, 2; 2018, 1-2.) The mining was first presided over by the local Zonolite Corporation and later multinational W.R. Grace & Company; Libby became the largest source of the ore in the world at 267,000 annual tonnes in the 1960s (Peacock 2010, 66).⁶ In

5 The factory was owned by the Scandinavian Eternit company, with various name-changes throughout the period. The Cementa group (numerous names as well) consisted of many varying Swedish cement corporations, and its financial hold on Lomma alternated from partial to full ownership. Most important, the subsidiary will be listed as Skandinaviska Eternit AB and the parent company as Cementa going forward.

6 Many of the company's products were branded under 'Zonolite.' Hence, the term will encompass the economy of Libby's asbestos-inflected vermiculite goods. However, there was a South Carolina W.R. Grace vermiculite mine without the contamination, but processing amalgamated the source minerals (Peacock 2010, 147.)

comparison, at this time, the Jeffrey mine in Quebec extricated 30.000 tonnes a day, twice as much as Wittenoom's annual haul, and still enough to literally bury the output from the so-called Zonolite Mountain in Montana (van Horssen 2016, 124; Peacock 2010, 37.) Due to a geological quirk, vermiculite and asbestos were part and parcel to any extraction—unused asbestos was nevertheless released in staggering amounts—thus, local miners and other residents were exposed together for nearly a century (Peacock 2010, 34). The hamlet relied historically on the logging and mining economy; its strategic position close to the Rocky Mountains drives the pivot to tourism, similar to Wittenoom (Blodgett 2018; Peacock 2010, 27-9)

Yet, as these mines (and factories) expanded and manifold newly discovered deposits entered the production chain, a damning international—albeit fledgling—medical literature was bolstered into consensus (Stayner et al. 2013, 206-7.) Alarming reports arrived before 1900 in the UK (coincident only with the Jeffrey mine), eventually festering with more accounts by the 1920s and 30s, thereafter including Germany and the US (predating only Wittenoom), and continuing to metastasise with more conclusive links from the 1940s (McCulloch 2006, 10; McCulloch and Tweedale 2008, 7-11.) The first reported asbestos related deaths were in the 1950s for Sweden (Sveriges Television, 1981; Hillerdal 2004, 155), and 1960 for Wittenoom (McCulloch 2006, 13.) For each and every asbestos experience herein, there is evidence to connect cover-ups by mine and factory owners (often abetted by government agencies) in order to suppress critical reports and research and to diffuse blame from the work environment to any other believable factor as the industry progressed in time and scope (Andersson 1980; McCulloch 2006, 10-14; Peacock 2010, 39-41; Ruff 2016.) The production commenced in these otherwise trivial little towns, but their reach became and continues to be global.

The Research

There is only a feeble body of social science research compared to the medical and geological aspects—despite a century of asbestos mining—and attention thus far is unevenly divided between locales (McCulloch 2006, 1-2.)⁷ For example, research appears focused on either the epidemiological and public health consequences from mines and the resultant product

7 Regarding social science in Libby, Montana, Cook and Hoas (2009) elucidate socio-cultural factors in local risk taking, and Schwarze (2007) outlines a discourse of silencing to enable production and activist tactics to publicise asbestos risks. Moreover, Cline et al. (2010) examine social-psychological effects from the public exposure and litigation in Libby. For Lomma, there is less attention, with Högberg's (2011) piece on redevelopment to rehabilitate the factory's legacy, and Andersson's earlier investigation (1980.) Although the Jeffrey mine in Quebec was the largest source of asbestos in Canada (by the tonne), it never became a research hot-spot, or disaster area, as with other mining towns (Lowrie 2016). Van Horssen's history is the most thorough research to navigate the realities of living with the mine and asbestos in the early years (2016.)

installations (e.g. Carlin et al. 2015) or the geology of the minerals (e.g. Bandli and Gunter 2006), both aiming to characterise and treat the biophysical symptoms of exposure—ex post facto. Asbestos, as shown above, evinces significant interdisciplinary potential to gather these myriad and diverse works and educe a larger and more critical mosaic at the nexus of geographic and historical political economy, socio-cultural practice, and political ecology. This economy emanated as a mineral from mining communities like Asbestos (Quebec), Libby, and Wittenoom, passed through secondary facilities (specifically Lomma Eternit), all to be consumed dually as an explicit commodity and as an implicit environmental toxin anywhere a market could be maintained, with this delicate web held together by three distinct forms of displacement. The need to investigate is crucial: asbestos is presently legal in many countries—with 1.3 million tonnes produced in 2017 (Flanagan 2018, 27) and thereafter new workers continue to be exposed in an international market (Furuya et al. 2018, 1.) Even in countries with bans, asbestos products remain in homes and workplaces to unwittingly expose new generations. Hence, there are three aims: (1) to enlist critical discourse analysis (CDA) on various asbestos advertisements from the case in Lomma, Sweden, (2) to ground and therefore contrast (i.e. comparative analysis) the corporate arguments from CDA with asbestos experiences predicated upon secondary sources throughout each instance along this production chain, and (3) to connect the research to three specific forms of displacement. Two specific research questions will be addressed, as a result of archival research and critical discourse analysis.

- (1) How were specific arguments from Skandinaviska Eternit AB cultivated and developed over time and space in these cases to further engender a successful economy of asbestos?
- (2) How and where are producers and consumers bound together in this economy?

The Plan of This Thesis

Following this introduction, **chapter two** explores three fractures of asbestos fibres, as a mineral, product and toxin in the expansive literatures of mineralogy and environmental public health. **Chapter three**, on the other hand, troubles conventional notions of risk and toxicity by introducing competing notions of nature and society, not to mention their ongoing transformation, as elaborated by ecological Marxism and post-humanism. **Chapter four** clarifies the dialectical critical realist philosophy that undergirds this work, how that relates back to ecological Marxist and post-humanist theory, and why critical realism is useful for asbestos research in particular. **The next chapter** explains the methods that propel the thesis, namely in three convenient steps: archival research, critical discourse analysis, and the secondary asbestos experiences that ground the analysis of Skandinaviska Eternit AB's advertisements, sourced in brochures, guides, trade journals, one film

and company magazine. In chapter six, an extended discussion of the results are presented, delineated as four separate arguments to sell workers and consumers alike on the Eternit brand of asbestos-cement, alongside the contrasting historical episodes of the economy of asbestos in Asbestos, Quebec, Libby, Montana, Lomma, Sweden, and Wittenoom, Australia. Thereafter, the **discussion** turns to analysing this economy as a convoluted, albeit successful case of displacement in the environment, toxicity, and entropy across time and space. Finally, the **conclusion in chapter eight** summarises the research and the distinct logic behind each of the three perspectives, arguing in the process for ecological Marxism as the singular option to capture the nebulous, unquantifiable and human toll of the slow violence elucidated below.

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What Is Asbestos, Anyways? A Review of Mineralogy and Public Health

Asbestos the Mineral and Asbestos the Product

Asbestos is not a thing in and of itself—rather, it is a classification, a typology. Mineral fibres meeting asbestiform criteria are, again, found naturally throughout the world (Stayner et al. 2013, 205-7). Hence, asbestos describes a certain mineral state, not a unique chemical formulation. Asbestiform minerals are either amphibole, or serpentine: under a microscope, amphiboles are distinguished as straight and rigid shards, while serpentines have a more elastic curvature (Dogan and Dogan 2005, 209-10.) Any form of airborne asbestos is a health hazard; as amphiboles are more capable of adhering to internal organs, specifically pleura, compared with serpentine fibres, they are considered most toxic (Craighead et al. 2009, 4-5.)⁸ Primarily, there are five asbestiform amphiboles: actinolite, amosite, anthophyllite, crocidolite, and tremolite—alongside others without commercial application nor toxic infamy (see **figure 1** below.)⁹ In contrast, chrysotile is the only serpentine variety (Dogan and Dogan 2005, 210-11.) Amosite, chrysotile and crocidolite are the minerals directly involved in the economy of asbestos (Bandli and Gunter 2006, 949-50; Craighead et al. 2009, 2-3).¹⁰

The USGS (Virta 2002, 12-3) lists around 3,000 historical uses; of these, the biggest asbestos industries have catered towards asbestos-cement, brake linings, plastics (PVC), roofing, and fire

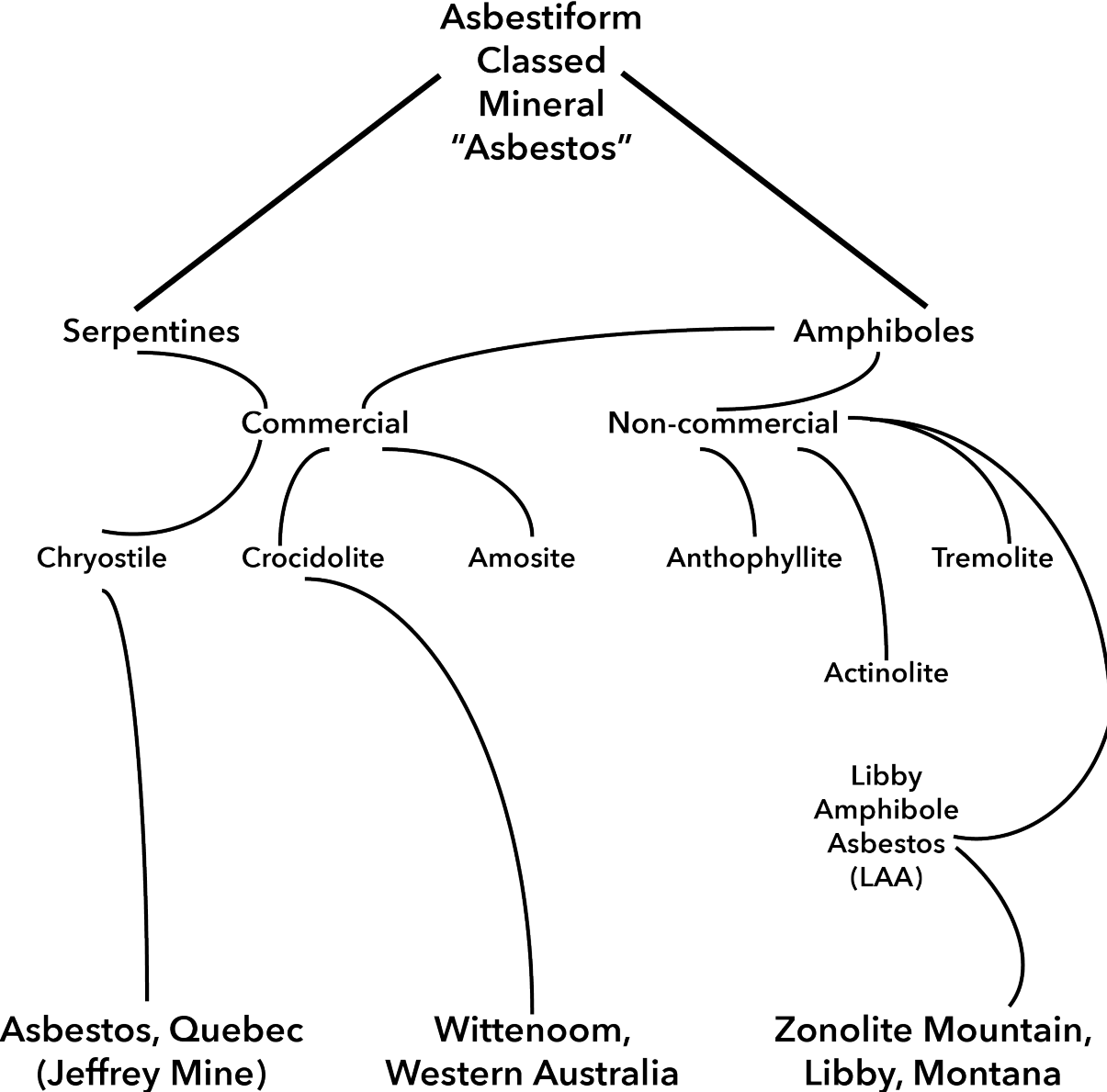
8 The pleural cavity encases the lungs and throat. This area is a common substrate for respirable fibres.

9 The rural communities in Mexico and Turkey (referenced earlier) are facing environmental exposure to erionite, which, whilst toxic, does not fit the rigid asbestiform typology (cf. Carbone et al. 2011.)

10 In Libby, vermiculite was contaminated with a hybrid of tremolite so exotic as to be named Libby amphibole asbestos, or LAA (e.g. Winters et al. 2012.) It was not a successful product in its own right (Schneider and McCumber 2016, 75-6.)

protection (cf. Dogan and Dogan 2005, 214.) The ultimate usage of fibres are contingent on type and quality, the mine proprietor, and the length: for any one mine extracting just one mineral fibre, fibres often vary tremendously in aspect ratio and density (McCulloch and Tweedale 2008, 22-3; Craighead et al. 2009, 10-11, 14.)¹¹ These fibres can insulate materials (thus resistant to heat, a poor conductor of electricity, and able to dampen sound), prevent corrosion (e.g. saltwater and rust), are lightweight and also fire-resistant (Virta 2002, 13.)

Figure 1. Asbestos Classification Map.¹²



Shorter fibres gravitate towards asbestos-cement, roofing, and plastics, whereas long fibres are optimal for brake linings. Reinforcing short (e.g. chrysotile from the Jeffrey mine) with long fibres

11 The aspect ratio of asbestos, or any object, is just the ratio of width to height (or, length.)
 12 This figure builds upon Craighead et al. 2008, 2 and their figure 2.1.

(e.g. crocidolite from Wittenoom) greatly enhances the application potential and the profitability—often being critical (Hills 1989, 6-7; van Horssen 2016, 4.) Hence, finished asbestos products are often both a mix of sundry fibres and non-asbestos elements. Asbestos-cement is the largest and predominant market for operational mines today (Virta 2002, 13; Flanagan 2018, 27.)

Asbestos-cement, put simply, is another word for Eternit. In an anthology of research encompassing the history and future trends of this business, the name Eternit refers to:

[...] dozens of manufacturing companies and scores of building products; a dominant multinational industrial group, two global asbestos conglomerates, a brand, a patent and a generic term; in many markets, the word “Eternit” is used to denote a range of asbestos-cement building products regardless of the trade mark (Allen and Kazan-Allen 2012, 14.)

While Eternit constitutes the primary legacy for the economy of asbestos, the market was made possible only after the unfortunate consequence of a revelatory chemical-industrial process, invented by the Austrian Ludwig Hatschek in 1900 (Ruers 2011, 15.) This Hatschek process, alongside the trademark, was licensed to merely one company per country (Knoepfli 2011(a), 21-22.)¹³ The Swedish factory Lomma Eternit, in spite of the name, analogous tactics, and being an early adopter of the technology, was only tangentially linked to the global oligopoly of Eternit (Andersson 1980, 318-20; Wallin 2015, 24-6; 56-7.)¹⁴ Cartels and their closely related subsidiaries were the norm for mines and factories in the anything-but-free market for asbestos.

Asbestos the Toxin

Asbestos—given the economic scope—remains arguably the most well-studied occupational hazard in *public health* (McCulloch and Tweedale 2008, 11-2; Rosner 2017, 1.)¹⁵ Asbestiform fibres become toxic when they are respirable; in other words, when fibres have the right aspect ratio for both inhalation and biopersistence (Craighead et al. 2009, 5-6.) These fibres therefore make the air hazardous to breathe at infinitesimal levels of exposure. One fateful day can prove sufficient for

13 Throughout the first half of the twentieth century, Eternit companies in Europe and North America consolidated under the primary Eternit multinationals in Belgium and Switzerland (Knoepfli 2011(a), 21-22; 2011(b), 28.) What is more, as part of the SAIAC cartel (established in 1929 with the large Eternit companies and Turner & Newall, or T&N) and later TEAM initiative (another cartel including Johns-Manville, or J-M), most asbestos-cement corporations had incestuous shareholding arrangements to influence their economic behaviour, coupled with “vertical integration” to control output and prices from extraction (e.g. J-M’s firm grip on the Jeffrey mine) to installation (Ruers 2011, 15-19.) Hence, even as markets were opened up globally, the main Eternit and asbestos firms (T&N and J-M) kept the familiar oligopoly structure.

14 There is a documented history of communication between Skandinaviska Eternit AB, its parent Cementa group and the multinational Eternit cartels, ranging from practical asbestos-cement issues to suppression of asbestos related disease knowledge.

15 While academic searches for asbestos return a large number of medical studies, there are no cures (Furuya 2018, 1.)

asbestos to become irreversibly embedded with the body (McCulloch and Tweedale 2008, 5-6), and, worse yet, McCulloch (2006, 1-2) states that a single human hair has a diameter about equal to two million asbestos fibres.¹⁶ The statistical reality is that the varying risk from any particular asbestiform matters little when multiplied by millions upon millions of fibres pervading the air at sites like Lomma or Wittenoom on any given day.¹⁷

Exposure is either environmental or occupational (Stayner et al. 2013, 206.) The former refers to indirect, potentially unknown, and unintentional exposure (cf. Ward et al. 2006), whereas the latter is direct and traceable contact as part of the labour to extract, produce, and transport it from mine to consumer (Carlin et al. 2015, 194). Inhalation is often silent and asymptomatic owing to the microscopic size of the shards that, typically, blend into the local environment and can belie a sense of harmlessness during the exposure (Craighead et al. 2009, 5.) Finally, as incriminating as the dusty clouds that enveloped the town of Asbestos, Quebec, Libby, Lomma and Wittenoom might appear, asbestos work throughout this entire period was just another risky job for preconditioned miners (Sveriges Television, 1981; Hills 1989, 50-1; McCulloch and Tweedale 2008, 6; Peacock 2010, 77-9; van Horssen 2016, 130.)

Asbestos—for the record—is deadly: Furuya (2018, 1, 8-9) concludes that globally 255,000 die annually, at present. The statistics vary, however; Stayner et al. indicate 125 million annual exposures—just for work (2013, 206-8.)¹⁸ By 2020, several thousand former Wittenoom inhabitants will have perished from the crocidolite—miners, managers, housewives and children alike (McNulty 2011, 2). At least 400 are dead in Libby, Montana in a community of around 2,600, and, moreover, approximately 20,000 have received a fatal dose of Libby amphibole asbestos, LAA, stemming from Zonolite Mountain (Schneider and McCumber 2016, 449-50; U.S. Census Bureau, 2018.) In 2011, Högberg (41) maintains that over 250 have perished from working at Lomma Eternit. Furuya emphasises the correlation between the global economy and hazards of asbestos with this heuristic: every 20 tonnes of extracted asbestos implies an additional case of asbestos related disease (2018, 1.)

16 Regarding biopersistence, the thin and longer amphiboles like crocidolite (Wittenoom and Libby), are lodged the easiest, whereas serpentine chrysotile fibres (Quebec) cluster together and can pose less risk (Craighead et al. 2009, 5-6; McCulloch and Tweedale 2008, 127-9.) Serpentine fibres are less respirable because of the clustering behaviour, and as a result, much harder to become lodged in pleura.

17 The toxicity is a function of many variables, however, the medical evidence clearly concludes that any amount or type of asbestos is dangerous and prior attempts to conceal chrysotile as innocuous are false and malicious.

18 Five years before Furuya's review, Stayner et al. suggest only 100,000 mortalities—the statistical methods differ and information is often incomplete when it comes to asbestos.

How do so many die? Asbestos is linked to a grisly cornucopia of illnesses, compiled under the term asbestos related disease (or, simply ARD.)¹⁹ Historically, the epidemiology codified around the big three diseases: asbestosis, lung cancer and mesothelioma. In each case, there is typically an abeyant progression rendering it difficult to diagnose and are facile to confuse with non-asbestos related illnesses (Carlin et al. 2015, 194). Epidemiologists confirmed serious links to asbestosis by the 1930s, then came cases of lung cancer (1940s), and lastly, mesothelioma (1960s)—concomitant to their relative latencies and labour histories at the mines or processing facilities (McCulloch and Tweedale 2008, 7-11.)²⁰ In short, asbestos workers become ill en masse from asbestosis, lung cancer and eventually mesothelioma, and since the 1960s, all three are capable of diagnosis. During the onset of asbestosis in the UK, Dr. Merewether (Chief Inspector of Factories) elucidates the matter in that,

if only the slightest exposure to the dust results ultimately in death, then the scope of necessary preventative measures is summed up in one word —prohibition —for, practically speaking, *it is impossible to prevent such exposure* (Merewether 1933, 114; my emphasis.)

This was 1933. Yet, only 55 countries have banned the usage of raw asbestos or its 3.000 plus products (Furuya 2018, 1.) Australia (Soeberg et al. 2018), the EU (including Sweden, see Westerholm 2017), and—just this year—Canada (Ruff 2017) have prohibitions, while the US does not (Lemen and Landrigan 2017.) Unequivocal complete bans are the solution, according to this public health viewpoint (Furuya 2018, 9; Stayner et al. 2013, 213.)

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Three Approaches to Articulating Disaster: Rethinking the Transformations of Asbestos

This work draws from three distinct approaches (namely, environmental public health, ecological Marxist, and post-humanist) to envisaging asbestos, and especially Eternit, relying upon differences between the landscapes of risk and toxicity, to ultimately illustrate an exceptional case of displacement. For the public health literature evidenced above, risk implies the epidemiology of exposure vectors and toxicity is the domain of the medical field—the problem is in understanding exposure and minimising ill-effects until all products are fully outlawed. Risk and toxicity get a critical reading from Marxism: risk applies to two proximities, that of asbestos products and the

19 These range from asbestosis, lung cancer, general lung impairments like COPD, mesothelioma, and even autoimmune conditions (Bandli and Gunter 2006, 959-60; Carlin et al. 2015, 194-5).

20 Each disease progresses according to its own latency period, from years to decades. Hence, an asbestos mine (known or unknown) witnesses outbreaks of asbestosis, lung cancer, and then mesothelioma—if employees are still working there.

capital flows that undergird and sustain it; consequently, there is the biophysical toxicity of exposure and the surrounding “toxic capitalism” (Smith 2009, 410-11.) Asbestos, in this account, is perturbed by the *specifically capitalist form* of socio-natural relations, yielding dual mechanisms of toxicity, as the capitalist relations driving extraction, production, transport, and installation of its products necessarily but not sufficiently determine the possibilities of contamination (Tombs and Whyte 2014, 81.) At the outset, asbestos is a toxin insofar as it is propagated as toxic capital, whereas these instances of capital appropriation (per se) are inherently virulent (Smith 2008, 410-11.) *Post-humanists*, lastly, engender these fibres with performativity to stress the practices of demolition and the fibre's endurance as nature in society, long past its consumptive shelf-life. Notwithstanding, this research foregrounds the critical role of displacement as a deliberately and ecologically Marxist concern, in an effort to comprehend the episodes of the asbestos economy that will follow.

Nature and Society in Ecological Marxism

What is nature? What is society? As to the former, Loftus expresses ecological Marxist concerns with the endorsement of Smith's delineation between primary and secondary nature (2012, 11-12.) Firstly, *primary nature* is that which results from use-value: the value assigned to goods or services to be utilised for extra-economic use.²¹ The vermiculite mine in Montana is an example; when Edgar Alley discovered the deposit in the early 1900s, he experimented with samples to transduce the use-value mineral (physical properties, estimated to be socio-culturally beneficial) into an exchange-value product (Schneider and McCumber 2016, 40-1.) Furthermore, there is *second nature* as an amalgam of use and exchange value, with exchange-value referring to the monetary sale of a good. The market price of vermiculite or chrysotile hence reflects and internalises their values as, for instance, an insulator (use), insofar as it fosters demand for the use to intersect with its supply (exchange). For Smith (and Loftus in turn), capital is contingent upon second nature:

Capitalist production (and the appropriation of nature) is accomplished not for the fulfilment of needs in general, but for the fulfilment of one particular need: profit. In profit, capital stalks the whole earth. It attaches a price tag to everything it sees and from then

21 This distinction between primary and secondary nature is tenable as it pivots around the instigation of capital flows: pre-capitalist societies becoming capitalist. However, the issue with Smith and Loftus' argument about a decisive rift from use-value to exchange-value driving this transformation is that use-value is conceptually problematic (Hornborg 2018, 8-11.) This rift in Marxist thought opposes “natural” use-values with social exchange-values, despite the point that use-value reflects both biophysical qualities with culturally-situated preferences. Use-value is thus natural and social, and cannot be reduced to an imagined pre-capitalist or pure nature. For instance, the insulating quality of vermiculite refers to its chemical composition, but is still valued only in wider society. The focus should be on the dually natural and social transformation from pre-capitalist to capitalist, as a dialectic process.

on it is this price tag which determines the fate of nature (2008, 78.) As “capital stalks the whole earth”, second nature supplants the first. That is to say, flows of capital and the subsequent transformation of primary into second nature are driven by the capitalist, for profit. Neither Alley's chance discovery nor the establishment of the Jeffrey mine some decades before (cf. van Horssen 2016, 17-9) were motivated “for the fulfilment of needs” by the few individuals involved at their inception, but the spectre of “one particular need: profit.” However, there is no “End of Nature” (cf. McKibben 2006) nor Smith's “appropriation of nature” here in this world of irrevocably global environmental change, only its transformation (cf. Malm 2018, 28-33.) Second nature resides in the world of capital.

First or second, nature is not alone in the industrial world, as this anthropocentric formulation of nature co-evolves with society.²² Essentially, society—capitalist or otherwise—is not expanding against any natural surface, but in (often discordant) tandem with nature. For instance, in the economy of asbestos, crocidolite fibres are not liberated from the depths of Wittenoom Gorge in Western Australia to be naturally graded, milled, processed, and above all, annihilated into a social product. Crocidolite is no less natural buried in an anonymous Australian attic than it was buried in that gorge. There is no cosmic struggle to annihilate nature by society; the two are intertwined but not inseparable. In order to highlight their collaboration (but not equivalence), Loftus relies on “socio-nature” (2012, 4-6.) Regarding Wittenoom, crocidolite is mined from nature, just as much as the bedrock, as a salient part of the societal metabolism after being targeted by the flows of capital into a defiantly socio-natural product for the global marketplace. Crocidolite, chrysotile, vermiculite—no matter: they are natural and social, or simply *socio-natural*.²³ Further, society and the social are sustained by this same metabolism—precipitated by the transformations of capital—and without the biophysical flow of raw materials, it cannot persist. Socio-nature, finally, is a differentiated whole, a paradoxical and dialectical intersection of comings together and apart (Gunnarsson 2015, 1-2.) In this way, the social and the natural can be traced to an extent, and the “cartographies of power” emanating from the uneven transformation of asbestos are drawn, yet not wholly controlled, by society and its human actors (Loftus 2012, 133.)

This research highlights a specific transformative aspect: displacement (Hornborg 2011, 54.) Places like Asbestos, Quebec, Libby, Lomma, and Wittenoom helped urbanise and construct the 19th, 20th and even 21st century city, with their 3,000 plus asbestos products—especially in the global

22 To wit, nature is not dependant on, or reducible to, society or our understandings of it.

23 Drawing from Malm's (2018, 44-7) discussion on hybridism, socio-nature is not a hybrid, but a hyphen for linguistic convenience.

market for asbestos-cement, or Eternit. Eternit physically produced the material conditions for urbanity, in its ceaseless and unassuming banality, scattered across its innumerable satellite installations. Urbanisation, for an aspiring Eternit conglomerate, was thus not limited to any orthodox city or other potential market, but to a globally interlinked constellation of economic outposts, such as these four asbestos mining settlements.²⁴ Asbestos, Quebec, Libby, Lomma, and Wittenoom were urbanised partly by their own product, in as much as these small towns permitted the conditions for urbanism. However, for these myriad companies to succeed, their efforts at socio-natural transformation required extreme levels of displacement to conceal the biophysical realities of asbestos extraction.

A Post-humanist Account of Asbestos

This view of socio-natural transformation, culminating in displacement and sourced in ecological Marxist concerns, is criticised for minimising the role of asbestos fibres, as a form of nature, by post-humanists.²⁵ The former perspective centres the role of capital in engaging the fibres and thereby dispersing the public health disaster into the global spaces of capital—the disaster is the fault of specific capitalists and their system of accumulation, ignoring the post-productive fates of asbestos fibres. The social aspect in the socio-natural transformation is determinant in the economy of asbestos. For the latter group of post-humanists (cf. Gregson et al. 2010; Houston and Ruming 2014), the social and natural act with equivalent potency, rendering asbestos fibres (nature) co-producers in the economy of asbestos. The fibres preform alongside, or against, the anthropocentric flows of capital. However, the relative quality of asbestos as an “inextinguishable fibre” suggests the limitations of capital to fully commodify and thereafter neutralise the toxicity (Gregson et al. 2010, 1065.)

Asbestos the socio-natural product is partially transformed according to capital, but the toxic qualities persist, as underlined by post-humanist interest in demolition. First, the biopersistence of fibres within the human body also applies to the socio-natures that (mal)nourish it. The performativity of asbestos in demolition practices to mitigate risk is emphasised by Gregson et al. (2010, 1067), in that

24 The urban is generally limited to the borders of the metropolis and the subject of Urban Political Ecology, or UPE in short (cf. Loftus 2012.) The socio-natural transformation is not strictly urban, but every bit as global as the spread of capital (Angelo and Wachsmuth 2014, 16.) Therefore, these small towns coexist with their larger cousins in this globalised urbanisation.

25 Depending on the author and field, post-humanism is also referred to as feminism or also UPE, but are united in their common concerns about the materiality and performativity (agency) of things (cf. Houston and Ruming 2014, 400.) Malm also addresses these concerns in terms of new-materialism (2018, e.g. 78-80.) In what follows, the controversy turns on the ontological status of asbestos fibres and essentially what, or who, is most responsible for the economy.

disturbance threatens animation, specifically an airborne dance of inextinguishable fibres that at least in certain parts of the world conjoins with occupational health legislation to choreograph a distinctive set of handling practices that in turn intervene in the enactment of particular practices of repair, maintenance, and demolition.

These “handling practices”, however, navigate an active landscape of risk—a risk that remains while asbestos preforms in its respective houses or office buildings, during demolition, and ultimately quarantined at the landfill. Therefore, abrogating the risk of exposure with bans and its attendant practices of deconstruction—as is the conclusion with public health advocacy, à la Kazan-Allen and the International Ban Asbestos Secretariat—does not nullify so much as transfer risk spatially and to those exposed during the process. This is the problem of environmental exposure: Eternit products can degrade wherever they lay and asbestos dust expelled from the mine can settle at the riverside awaiting the next flood year. The possibilities are just as endless as indiscriminate. As Houston and Ruming (2014, 403-4) reveal in the growing risks from pervasive do-it-yourself (DIY) home improvement throughout suburban Australia, asbestos circulates throughout both time and space, corralled neither by the productive nor destructive economies. Ban or not, asbestos is here to stay as an active participant in urban ecologies, replete with uneven distributions of risk and toxicity.

-4-

Critical Realist Considerations for Asbestos Research

Research is more than theory and method—whether or not the researcher is philosophically explicit about it (Yeung 1997, 55.) Two important aspects are thus epistemology and ontology. Moreover, asbestos research demands a realist philosophy of science: if the fibres, mines, factories, and ARDs are something less than biophysically real, then attempts to document asbestos histories, uncover new geologies, or track the myriad exposure pathways become moot and subject to adverse power relations, for example those emanating from the global asbestos industry. One such approach is dialectical critical realism.²⁶ Dialectics, here, emphasise that, “[...] reality is dialectically structured, via different modes of unity-in-difference whereby things have both points of identity with one another and points of divergence” (Gunnarsson 2015, 2-3). Reality cannot be reduced to either objects or relations, but only a stratified gestalt of the two. Thus, both chrysotile and power (relations) can co-exist ontologically without the scientific infighting.

Ontology is singular but stratified from the Critical Realist perspective. Echoing Bhaskar,

²⁶ This is a related branch of Roy Bhaskar's realist philosophy, who founded this school of thought.

Clegg (2016, 499) suggests that this dialectical and striated reality also operates as an open-ended and adaptive structure. Put differently, this is a three-dimensional ontology, with the empirical, actual and real elements (IACR 2017). On the surface lies the empirical, that is, physical experience, and the actual refers to events that contextualize these phenomena, while the third layer consists of generative mechanisms that cause or produce the former two. No layer is determinist as all three are required to make sense of this intransitive, “extra-discursive” reality (Laclau and Bhaskar 1998, 12-13); nor are they static: these components continually reshape each other. For instance, miners breathe in asbestos fibres (empirical), as part of a typical work day (actual), in order to be paid a monetary wage under capitalist relations (real). A hypothetical miner might relate most to the pay check, forget the particular day, and be unaware of asbestos—nevertheless each facet is real and contingent. Reality is more than viscerally meets the senses, and with consequences for us all.

This ontology is buttressed by epistemic relativism, i.e. that knowledge of reality depends on the knower's milieu and its validity is uncertain (Isaksen 2016, 246-7). First, reality is independent from the knowledge detailing it. Asbestos research, for instance, can be used to find and verify basic mechanisms that explain the prevalence of disease. This method is simple: compare all hypothetical mechanisms that can solve an event, and then work with the one which explicates the matter best. When new research arrives with more significant “explanatory power”, then it should be adopted (Isaksen 2016, 250-1.) In practice, there can be manifold root causes for just one phenomena, so that the empirical and actual dimensions can reflect an otherwise nebulous constellation of these underlying but real forces (Gunnarsson 2015, 10-12). “Capitalism made me do it” is hence an insufficient excuse for the business model of an asbestos cartel; nevertheless, profit motives likely effect decisions to expand, close mines or move operations to another country.

-5-

Searching for Eternit: Archival Research, CDA and Asbestos Stories

Ultimately, the research consists of three parallel components that have co-evolved. The first phase has been to complete multiple iterations of archival research, with the goal of discovering relevant primary materials emanating from Skandinaviska Eternit AB. Next, the crux of the research enlists critical discourse analysis, abbreviated as CDA, on the extant material. The practical aims with this tool, in particular, identify specific and repeated discursive arguments by the company, investigate their use throughout the publications, and to evaluate potential alterations in the reasoning over time as the epidemiology developed and public awareness of risks promulgated.

Adjacent to Lomma Eternit's advertisement campaign (dissected via CDA), there are a litany of second-hand accounts that document asbestos experiences from Quebec, Libby, Lomma, and Wittenoom, which informs and critiques the unilateral and polished company line through comparative analysis. This tertiary element of research is an undercurrent that flows throughout the thesis—in no particular methodological order—and furthermore imbues the study with normative purpose.

Step One: Archival Research

This thesis develops a dialogue between antithetical primary and secondary materials, in an effort to navigate the dissonance between sanguine corporate advertisements (Skandinaviska Eternit AB) with banal experiences at four sites of the asbestos economy. The primary sources are thus various adverts that sell assorted products under the corporate brand, Eternit, in the Swedish market.²⁷ In the larger marketing of Eternit, the company is seen as selling its material and discursive output to wholesalers, end-use customers, and—last but not least—the labourers who choose to work at the factory, Lomma Eternit. Paying customers were not the only ones to be “sold” on Eternit: factory workers consented to the workplace environment, too. The quotidian, whilst not of criminal intent akin to the smoking guns notorious in legal proceedings (cf. Peacock 2010, 249-50), (a) presents these otherwise insubstantial messages and (b) is relatively easy to acquire for research.²⁸ Three separate types of primary sources were obtained, with ten documents in total utilised for CDA (see table 1 below.)

The principal trove of documents are from Lund University's ephemeral collection, registered under Skandinaviska Eternit AB.²⁹ The collection reflects a quirk in Swedish copyright law, whereby all published materials must be submitted to Kungliga Biblioteket (KB), the National Library of Sweden, plus another six libraries scattered throughout the country (KB, 2018a.) Beginning in 1661 as a way for the monarchy to censor the press, today the law has created a cultural repository of over 14 million items—readily available for research (KB, 2018b.) The four items selected here are: a building material guidebook, colour sample brochure, new worker informational brochure, and a product advertisement.

Additional materials are held at Lund University's main library and the municipal archives

27 Despite the limitations on selling asbestos-cement due to Hatschek's patent, a limited number of English and German language materials were found in a search of the ephemera.

28 Archives relating to asbestos corporations are far from public: either tending to be restricted by companies or for confidentiality of employees or victims.

29 The collection is called vardagstryck in Swedish, or ephemera in English (Lund University Library, 2018.)

in Lomma. Two of these documents are articles in Lomma Eternit's *Eternitpressen* journal, which circulated annually from 1963-69 and then biannually between 1970-73. The earlier years feature simplistic journals, covered just by unvarnished construction paper; however, the 1970s editions are glossy and fully in colour. The other resource is the construction trade journal *Byggnadsindustrin*: three quarter page advertisements are included from 1936 and 1940, with one colour advert. Finally, the municipal archive sent digitised films produced from the company. A roughly 8 minute promotional film for Eternit products was also analysed; the production date is uncertain, as are most details of this clip.³⁰

Table 1. Information on Primary (Archival) Source Materials.

Item	Title	Medium	Source	Language
1	<i>Building Materials</i>	Print, brochure	vardagstryck or ephemera	English
2	<i>Malmex</i>	Print, brochure	vardagstryck	English
3	<i>Good to Know from Us at Eternit (1964)</i>	Print, pamphlet	vardagstryck	Swedish
4	<i>Eternit has No Natural Enemies</i>	Print, advert	vardagstryck	Swedish
5	<i>Eternitpressen, (1970); "Eternit in the Kitchen Environment"</i>	Print, article	Lund University catalogue	Swedish
6	<i>Eternitpressen (1972); "Fantasy is not Grey"</i>	Print, article	LU catalogue	Swedish
7	<i>Byggnadsindustrin (1936); Evacuation Ducts</i>	Print, advert	LU catalogue	Swedish
8	<i>Byggnadsindustrin (1936); Industrial roofs</i>	Print, advert	LU catalogue	Swedish
9	<i>Byggnadsindustrin (1936); Eternit tiles</i>	Print, advert	LU catalogue	Swedish
10	<i>For All Weather (pre-1964)</i>	Film, advert	Lomma municipal archive (Lomma kommunarkiv)	Swedish

³⁰ The film showcases products from the factory in Lomma and Köping. This second factory was operated by Svenska Invarit AB, another Eternit manufacturer under the parent company Cementa (Wallin 2015, 56-7.)

Step Two: Critical Discourse Analysis

This study culminates with the CDA resulting from the archival work. Critical discourse analysis, simply put, is a specific form of textual and visual analysis which attempts to unearth discursive practices at work and how they interrelate to (re)create meaning for recipients (Janks 1997, 329). CDA and its cousin, discourse analysis, are distinguished by the former's insistence in revealing '[...] the significance of power and social difference in society' hence the critical nature (Bryman 2012, 531-2.) Janks endorses Fairclough's standard approach (cf. Flatschart 2016, 23-4) that contains three dimensions to define and analyse: object, perception, and societal forces (1997, 329.) First, the object is just the data—be it verbal (written text), visual (e.g. photos or paintings), or a mixed medium (e.g. films or adverts.) Second, perception refers to processes of production and the human experiencing of said object. Third, societal forces mediate and partly generate these processes, but the discourse remains grounded in corporeal space and time—it does not come from nowhere and no-when (Flatschart 2016, 35-6.)³¹

In this case, the research outlines multiple arguments to justify and promote an economy of asbestos, which are predicated on the wider discourse that situate the factory worker and consumer alike. The selected repertoire of primary sources is designed for this patchwork of thought. Critical discourse analysis internalises the logic of “purposive sampling”; this technique opts for heterogenous materials that reflect the ethos of the research question (Bryman 2012, 418). The CDA herein captures the temporal spread of the company (1906-77), development of asbestos marketing strategies, differing media forms, and myriad interactions between the company, employees, and customers. Further, the ephemeral catalogue is ipso facto pre-selected for research, in that only some documents are submitted by publishers, reducing the catalogue size (Email to vardagstrycket, 30 May, 2018.)

One significant issue from Critical discourse analysis and in studying Lomma Eternit is the language barrier. Virtually all of the Swedish materials are, not surprisingly, in Swedish. As a result, when possible, translations and transcriptions were furnished, often with the assistance of native speakers who could understand the nuances of Eternit's recondite brand of corporate Swedish.³²

31 Flatschart (2016) proposes to extend Fairclough's (and thus Janks) CDA perspective into a sort of CRCDA, critical realist CDA, against countervailing trends in post-Marxist discourse theory—especially Foucault (cf. Bryman 2012, 540-3.) There is also an entire book to address critical realism and social construction (Elder-Vass 2012.) However, it should be noted that Fairclough and company maintain the standard guides to help researchers in practicing the technique, leaving critiques aside.

32 Please refer to acknowledgements for more information.

This is enough to confidently discuss advertisements and the factory worker's stories, but far short of any advanced linguistic analysis relevant to CDA.

Step Three: Asbestos Experiences

Despite this methodological focus on CDA and thus the archived Eternit advertisements, it is key to balance their commercialised imagination with lived experiences from those caught up in the ill-effects stemming from the economy of asbestos farther downstream. The specific asbestos experiences have varying durations to mostly cover the modern asbestos epoch, are small towns, involve a panoply of fibres, span the globe, and each contain significant records to study. However, considering limited time and the relative abundance of primary and secondary materials, the criterion of convenience was indispensable (Flick 2009, 122-3.) Instead of building a fully exhaustive study to cover many asbestos mines and factories, the research was whittled down to a necessary core of cases and primary sources that are both manageable and reflect the whole design. The secondary sources follow from written accounts and documentary footage, compiled around all four asbestos cases, replete with a multitude of interviews and document analyses. Regarding Asbestos, Quebec, there is the one and only academic research work here in van Horssen's *A Town Called Asbestos* (see table 2 below.) Libby has two revised books from investigative journalists: Peacock's *Wasting Libby* and Schneider and McCumber's *An Air that Still Kills*. Andersson's longstanding account *Asbestarbetarna berättar* is buttressed by more interviews in the documentary *Fördärvad av Asbest* and current affairs programme *Engman klockan nio*, both from Swedish public television (SVT) about the scandal in Lomma. Lastly, conditions and the aftermath of Wittenoom, decades thereafter, are depicted by Hills' *Blue Murder*.

Table 2. Information on Secondary Source Materials.

Publishing Year	Location	Title	Time Period
2016	Asbestos, Quebec, Canada	<i>A Town Called Asbestos</i>	1881 - 1983
2010	Libby, Montana, USA	<i>Wasting Libby</i>	1919 - 2010
2016	Libby	<i>An Air that Still Kills</i>	1919 - 2016
1979	Lomma, Sweden	<i>Engman klockan nio</i>	1906 - 1977
1980	Lomma	<i>Asbestarbetarna berättar</i>	1906 - 1977
1981	Lomma	<i>Fördärvad av Asbest</i>	1906 - 1977
1989	Wittenoom, Western Australia, Australia	<i>Blue Murder</i>	1943 - 1988

Four Arguments for Eternit, and One Against

Various themes arose—convergent and divergent—from the study, with extensive and iterative critical discourse analysis and (archival) research, elaborated by the secondary asbestos experiences. Both types of sources are educed from capacious materials; ergo, the findings are selective and culled to advance a discussion about four distinct arguments enlisted to sell Eternit products. To be brief, throughout the documents, Skandinaviska Eternit AB (1) promulgates an argument that Eternit is the predominantly rational choice, (2) that only Eternit bests the competition, in that it resists the chaotic destruction of weather as a natural force, (3) that Eternit embodies the ideal and modern qualities of the home, and finally, (4) that Eternit is the aesthetic preference with their preoccupation of natural beauty and patination. On the other hand, those most exposed to the sources of Eternit at the asbestos mines in Asbestos, Quebec, Libby, and Wittenoom, while subject to this sort of socio-natural imaginary, faced an often antithetical reality, with a toxic and volatile collision between the two never far away from the labourers. Secondary experiences will follow interpretations of the ephemeral documents to contrast these Eternit arguments.

Argument One: Eternit as the Rational Choice

Twentieth century modern life and its economic expectations, first and foremost, appear repeatedly throughout the ephemera. If there is any one document to inculcate the entire marketing zeitgeist of Lomma Eternit, it would be their undated promotional film.³³ The essence of this argument is its economic appeal to the consumer. In this film, titled “For All Weather”, the economy is a chief concern in an extended presentation of two Eternit and Invarit products: SIDI and COLORBESTOS.³⁴ SIDI and COLORBESTOS (yes, all capitals) are the names for two separate asbestos-cement wall panels that cover a given wall's exterior; SIDI is a smaller option at 60 by 30 centimetres, whereas COLORBESTOS extends to an entire wall, 300 by 80 cm. After detailing other various qualifications, their ultimate appeal is the cost,

Building with SIDI and COLORBESTOS implies that the house will be cheaper to build. Why? Well, firstly the material is relatively cheap in itself. Secondly, the material has a low weight in relation to the area

33 While the film is undated, there is a reference to an asbestos mine in “Southern Rhodesia”, which became “Rhodesia” in 1964 and initiated independence under minority rule starting in 1965 (The Editors of Encyclopaedia Britannica, 2018.) In 1980, the country became internationally recognized as an independent country under the name of Zimbabwe (Sanger et al. 2018) Therefore, the film belongs to the era between 1911 and 1964.

34 The film showcases both factories: Lomma (Eternit products) and Köping (Invarit products.) Sometimes, the two factories produce the same product line, as appears to be the case here and elsewhere in the documents.

that it will cover. That means low costs for transportation. As a result of the material being easy to handle and its ability to have a large surface area, those are also justifiable ways to save money. But there are also other benefits than the pure economical ones... [translation]

There are four dimensions to this frugality: the intrinsic cost, transportation and handling costs, plus the sheer quantity. First, both the key components— asbestos and cement—are inexpensive for the company. Second, no matter the size of the home or other building, a lot of paneling is required, so the lighter the panels, the less it will cost to transport from factory, to business, and finally home. Asbestos was, and remains, prized for its featherlight density. Third, the materials do not require special knowledge to transport easily; they are actually manageable despite the size. Fourth, SIDI and COLORBESTOS can cover large parts of the wall—that's less work (hours) for everyone, especially with larger apartment buildings. In sum, “the house will be cheaper to build”, and Eternit is therefore a rational, modern choice, with the looming health hazard nowhere to be seen or heard from these scenes.

The quarter-page adverts from the trade journal *Byggnadsindustrin* replicate this rational choice argument. *Byggnadsindustrin* discusses contemporary issues for any and all aspects of the eponymous construction industry and, unlike the film, has a professional audience. Asbestos the construction material is thus but one part of this significantly larger sector. Owing to the literally voluminous size of the journal and the esoteric texts, the ads (published at the behest of Lomma Eternit) were targeted instead for analysis. For example, there are two pieces from 1936 (issues 1 and 2) which foment Eternit economics. In issue 1, evacuation or ventilation ducts are the product (without a colourful name, like COLORBESTOS), and with few words, three of six qualities are economic: “space-saving”, “lightweight”, and “easy to mount.” Although this is a completely different product versus the wall panels, Lomma Eternit still expresses low transportation and labour costs, in addition to the duct's ability to conserve space. In issue 2, there is another brief advertisement, but for industrial roofs instead. The reasoning here, in three sentences, lists the minimal weight (“the plates weigh only 16 kg per square meter”) and ready installation (“the plates are laid directly on iron or wood ridges”) as the first two concerns. Roofs, ventilation ducts, and wall panels—despite the range of disparate functions to the customer—are all presented as the right economic choice.

This conflation, between heterogeneous products and congruent benefits, is both reinforced and elucidated in *Eternitpressen*. Now, *Eternitpressen* is not *Byggnadsindustrin*; the former is more of a company newsletter, specific to just Eternit products, and published solely by Skandinaviska

Eternit AB. The issues are relatively short (about 20 pages) and amalgamate technical illustrations of Eternit in real-world projects with more general and ideological pieces—particularly the second iteration in the 1970s. The possibilities of Eternit are postulated succinctly in an article by Lars Germundson for the June 1972 publication. In “Fantasy is not grey”, two further benefits are customisation and utility. The initial four product lines (viz. SIDI and COLORBESTOS from the film plus evacuation ducts and roofing from *Byggnadsindustrin*) are standard Eternit, right off the assembly line at Lomma. Yet, Germundson evinces a panoply of unexpected uses with hand-made varieties: sound-neutralising baffles at school, planting boxes for office buildings, and acoustic-enhancing siding at the movie theatre—just to start with. This pivot to specialised Eternit is predicated upon fulfilling the customer's wishes, whilst remaining affordable:

When it comes to hand-made Eternit, the form is relatively cheap. It can therefore be economically advantageous with [a] special design. Rarely [there is] a form costing 1,000 SEK. Without wasting money, the architect can then let his imagination flow and create the special products he wants and this in competition with comparable standard products. [...] [translation]

The architect, as an imagined customer, might need Eternit to cover an apartment complex, or be used as roofing or for ventilation, but what is the want, that is to say, the real demand? Germundson asserts that any standard solution might suffice, including the more uninspired Eternit, but the ultimate goal is to give exactly what the architect desires. Better yet is the suggestion that this hand-made alternative is optimal and cheaper or at least competitive to other suppliers. Thus, Eternit avoids the entire trade-off between an affordable cost and “the special product he wants.”

What is more, Germundson finishes the piece by describing potential do-it-yourself (DIY) options to create new functions from pre-existing standard products. Four separate ideas are elaborated: boxes are inverted and mounted to become a ceiling with lights, ventilation pipes can be bisected for another type of ceiling, the same pipes can be transformed into lighting fixtures, and lastly, planting boxes can serve again as some form of wallpaper. This is a clear testament to the versatility of asbestos products in its sound-proofing, insulating, low density and fire-resisting capacities—even after the product has been moulded to one use, it can easily be reshaped to suit another purpose entirely. In the end, there are manifold standardised and abstruse Eternit solutions rising from the same process; however, they are so eerily similar that the economic basis remains unchanged. It doesn't really matter if the product is an evacuation duct, sound-diffusing baffle, rubbish bin, or wall panel: the economics are consistent, allowing the advertisements to become derivative.

The advertising does not stop at the paying consumer, rather it is turned inward towards its very own employees at Lomma Eternit. The new worker brochure, released in 1964, was designed to supersede an older version and made available for everyone; it informs the reader about the work schedule, breaks, vacation and sick leave rules, security, other benefits and ends with a photographic presentation of the current management. Furthermore, the outward emphasis on uniqueness and pride is internalised in the sections on the background and company history, thereby encouraging labourers to think the same—albeit in a more subdued manner. Asbestos is presented as the mineral which primarily distinguishes cement from Eternit, as Eternit is claimed to be “[...] about five times the strength of ordinary concrete”, and thus analogous to reinforcing cement with “reinforcement bars.” Next, Lomma Eternit is special compared with the industry writ large as it was an initial franchise, commencing just six years after the patent in 1900. A few lines are devoted to quantitative aspects of the newly completed factory—the now 10.000 square metre area, silos holding up to 1.200 tonnes of cement, a separate facility for its staple product Malmex at an annual yield of some 18.000 tonnes (more than Wittenoom's annual extraction alone)—ending with all the newly installed technology. One machine in particular, an automatic sawmill with drill machine, is described as the first for any Eternit corporation in Europe. Lomma Eternit is thus portrayed as a prosperous and growing company, replete with more than enough advanced machinery, all organised to produce an extraordinary commodity, Eternit.

Interestingly, there is a stick to this carrot. Towards the end of the brochure, there is a diminutive paragraph regarding absence, with language to persuade workers that both co-workers and the factory are needlessly hurt. First, there should always be a “valid delay.” The crux of the argument is incredibly clear: “think of that when you're gone, the workload of your companions increases and production falls!” Don't be absent: your compatriots will be unduly burdened and the output might be forced to diminish for a day or two. Hence, there is no explicit acceptance of the need to miss work, nor any compromise that workers could have a life beyond labour. Most of all, the narration switches from the entire company, as a community, to a suddenly personal tone; the language goes from passive and diffuse (“one of the world's first Eternit factories was planted in Lomma”, “it became apparent”, “has been installed”, “was installed” et cetera) to active (“you're gone” and “your companions”.) Lomma Eternit is a larger product to anonymously be a part of—as an individual, the job is to not complicate the assembly line.

Living the Rational Choice

Working in the asbestos industry—at the mines or Eternit factories—was primarily a

necessary choice for residents, not one of pride. Labourers needed a paying job to support themselves and their families, and often enough, the local asbestos economy was the only game in town. For instance, witness the economic context in Lomma: Carl Björkman, a fifty-year stalwart of the company, recalled a choice in 1928 between Eternit and the sugar factory, but candies created an uncomfortably hot working environment and was a longer bike ride from home (Sveriges Television, 1979.) With the information he had, asbestos-cement made more sense. Later, while discussing the corporate culture, Björkman explains that the older generation remained loyal, since 'it was cheaper to get rid of a worker than [buy] a new machine. It is easier to get a new worker than a new machine. It cost nothing to get a new worker. Naturally, they got a new worker instead.' If it came down to replacing machinery or acquiring new staff, the answer would be the latter. How was labour so cheap to procure for Lomma Eternit? After all, Björkman entertained the idea of making candies at the sugar factory; moreover, the neighbouring municipalities of Lund and Malmö host large populations—Lomma was in fact centrally located to save funds. Björkman was included with a few veterans interviewed in *Fördärvad av Asbest*, who together asserted that, early on, permanent jobs were rare (“you had to take the work that was there”); the prospect of consistent employment alone was reassuring. In another anecdote by a co-worker of Björkman, he recounted taking breaks from work at Lomma Eternit, “but it was hard to get anything else” that could support regular expenses like a mortgage and utilities (Sveriges Television, 1979.) Life was difficult without Lomma Eternit.

Libby, Montana has little in common with Lomma besides the asbestos economy. Both were small towns dependant upon the resource industry, yet Libby is not close to any population centre. Instead of the sugar factory, Libby residents had about two options: the vermiculite mine or logging the forest that envelops the town. One vermiculite employee, Les Skramstad, moved to Montana from his native North Dakota on a whim in 1954, eventually staying for life (Peacock 2010, 29-32.) At first, Skramstad tried work with the US Forest Service, at the sawmill, dam construction in nearby Troy; through all this tumult, he managed to start a family and briefly absconded in 1957 for a last-ditch effort to become a real cowboy. This moonlighting did not take hold on Skramstad, and he returned to a newly relocated family in Libby. Economic security did not follow, however, as they struggled to survive that winter, and he decided to try and subsist off hunting and gathering in the forest. Eventually, Skramstad learned of a temporary opening up at Zonolite Mountain and scuttlebutt had it that working at the mine was a dependable career choice; hence, he took the offer and ended up there, on a permanent basis, for two years (45-6.) He quit work at Zonolite only to move the family, per his wife's request. With Libby, alternatives to working for the Zonolite

Corporation were rough, drastic and erratic—thereby leaving little to no security for a budding family.³⁵

The crocidolite deposit at Wittenoom Gorge in Australia shared this remoteness—many visitors and newcomers relied on air travel. Wittenoom the settlement differed from Libby and Lomma since it was established after the mineral discovery to support and enable mining operations by the government and ABA, minimizing the scope for any alternative business model (Hills 1989, 34-5.)³⁶ Whilst Libby faced oscillatory and extreme weather conditions at the foot of the Rocky Mountains, Wittenoom suffered from perilous heat—so extreme, in fact, that outlandish efforts were required to attract miners beyond the wage. In Hills' account (29-30),

even without knowing about the terrible dangers of asbestos, no one would go there. The company was prepared to pay double what a miner could earn at, say, the goldfields at Kalgoorlie, and they offered almost unlimited overtime. But word about the appalling working conditions at Wittenoom had got around, particularly among the professional Australian mining community, that it was no place for a white man.

The first choice—experienced miners—was not an option. Buttressed by the conservative government's push to populate the desolate north, CSR representatives were sent to suffering regions of postwar Europe to secure contract labour under an absurd and mendacious premise, that the climate was similar and working environment ideal (31-2.) In essence, Wittenoom was supposed to foster a secure and prosperous working culture for a group of potential immigrants with analogous desires to the miners at Libby or the Eternit employees in Lomma.

For a group of Italians, CSR even produced appealing job descriptions, which bore no resemblance to crocidolite mining. Loads of Europeans were convinced enough to sign two-year contracts; despite the pay and overtime, many were beyond eager to leave Wittenoom and Australia as soon as they faced the reality (Hills 1989, 33-4.) Nevertheless, once you were cajoled to sign that contract, the only way out was to fulfil those obligations. Spero Delpero convinced other Italian workers to send a joint letter with their grievances to the Italian Consulate and the appeal was swiftly ignored (35-7.) Persuasion or any lack of viable alternatives did not suffice to attract and sustain a workforce, such that ABA basically was forced to incarcerate the immigrants under a labour camp regime. Worse yet, many Australians were brought to the mine as a government-sponsored alternative to jail in Perth (156.) In Wittenoom, the company forcefully created its own labour pool in shipping people from Italy and elsewhere—there was no success with subtle

35 Skramstad, here, worked at the Zonolite Corporation, since this is before the 1963 transfer to W.R. Grace and Company.

36 Australian Blue Asbestos, the subsidiary of the Colonial Sugar Refining Company, CSR.

manoeuvrers or any intrinsic appeal towards the workplace.

Argument Two: Nature versus Weather, with Eternit to the Rescue

What comes to mind, if you are in the market for a new roof, or walls, or perhaps even planting boxes? Initially, it might be the cost, ease of installation, or just the delivery. At some point, one might ask: how durable is the product? Can it last, or is it just cheap? What about the quality? No matter how affordable Eternit products were at the time of purchase, asbestos-cement was engineered in a dizzying array of functional but mundane solutions to endure, that is, resist deterioration endemic to the competition. Yes, it is inexpensive, but it lasts too. In this way, the company encourages a distinct apprehension centred on the disruptive and problematic tendencies of weather and how Eternit can overcome this challenge. The film, “For All Weather”, not surprisingly commences with a detailed narrative voiceover that originates Eternit as a method to outlast these destructive and chaotic forces. To start with, there is the weather to reckon with, as

The weather has throughout the ages offered nature in a cyclical and tumultuous pattern. The sky has saturated its moisture all over our planet, and the sun has heated the air and the earth, beneficial for all vegetation and delightful for us all. But throughout the ages the power of the weather has also had a destructive ability on the Creation.

[translation]

Weather acts upon a docile nature here. First, there is the good: weather is responsible for the rain and humidity, plus it ensures there is enough heat. Therefore the plants flourish and people can also have a pleasant climate—there is a generative effect. Second, there is always a catch; weather, in its power, propels and accommodates life, only to jeopardise the earth, or Creation. Outside of this precarious balance, weather is a serious threat.

In this perennial cycle of creative destruction, Eternit implies that in nature—not weather—lies the answer. The voiceover continues with,

one day the sun is warming and drying the earth and the next day it is permeated by rain and humidity. The destruction due to the weather will never cease to amaze. But nature has also had an ability to withstand these attacks with resistant materials. In Africa, in Southern Rhodesia to be more precise, the Scandinavian Eternit Company [Skandinaviska Eternit AB] has a mine where they extract one of nature’s most resistant minerals. [translation]

The first paragraph presents moisture and aridity as a harmonious relation; now the effects of the sun on mysterious matter are beneficial, but threatened by rain. Here comes the saviour: Southern Rhodesia contains “one of nature’s most resistant minerals”, itself a part of nature.³⁷ Although this mineral has to be “extracted” from an African mine, it persists with its innate naturalness against

³⁷ To be clear, Southern Rhodesia is today the country of Zimbabwe.

this destructive onslaught of the weather.

The film started with weather versus nature, but Eternit is the only victor. The final passage elaborates the critical role of asbestos within Eternit, in that

the asbestos fibres can be found deep down in the mountain. These fibres are completely resistant to both moisture, humidity and heat. What if one could mix this material with a bonding agent and then let the mass harden into sheets. Would you not then get a material that could withstand the phenomenal destructiveness of the weather? Why then not mix it with cement, only the best is good enough. [translation]

“Moisture, humidity and heat”, previously problematic in excess, albeit fundamental in moderation, are no risk to asbestos. Thereafter, the logic is crystallised where the Hatschek process to yield asbestos-cement is rhetorically hypothesised with this series of three questions; “only the best is good enough”, asbestos is implicitly improved with the addition of cement. These “sheets”, specifically SIDI and COLORBESTOS for the film, will withstand the verities of weather, whether or not it is an excessively punishing sun one day or a torrential downpour the next. In short, it does the job well and does it economically—no wonder asbestos is the “magic mineral” after all. For the finished Eternit home, there is a three-fold hierarchy between weather, nature, and society. At the outset, weather—replete with its meteorological prowess—runs roughshod around the planet, chaotically nurturing life only to ultimately molest and eviscerate this growth. Nature, on the other hand, can only submissively tolerate the endless vagaries that weather brings; some parts of nature fare better than others. Lomma Eternit, in this convoluted mythology, sought out the premier natural material to resist weather, and asbestos from Southern Rhodesia was the simple answer. Now that people are safe from the weather by installing and trusting Eternit to protect not only themselves, but also their material belongings, their home is fit to become a representation of wider society. Weather is thereby subdued by nature, packaged here as the asbestos-cement products SIDI and COLORBESTOS, which in turn buttress society in the physicality of the home.

It's not just the wall paneling SIDI and COLORBESTOS that embody this antagonistic dynamic. The argument is replicated, albeit in more practical terms, to market one of Lomma Eternit's roofing products, Siluett, in a later brochure from the early 1970s. Under the title of *Eternit Has no Natural Enemies*, the brochure assures the audience with four layers of protection; the first claim being that “fire does not touch the material.” It's fire-proof and heat-resistant, as alluded to previously. Second, “water and all manner of moisture run right off.” Next, “temperature fluctuations, storms and any other extreme weather does not affect the structural integrity”—Siluett will not flinch under duress. “Dirt and air pollution are firmly and immediately rejected” forms the

final declaration. These four benefits, namely heat-resistance, water-proofing, weather-proofing, and dirt repellence, nullify the risk of deterioration completely. Hence, for other non-Eternit roofs, fire, moisture, extreme storms and even dirt are indeed its “natural enemies”, and what is more, the clever delineation of nature and asbestos from the weather is missing entirely from the Siluett piece. Only one adversary, “temperature fluctuations, storms and any other extreme weather” is unambiguously the result of nefarious weather patterns. The rest are natural and a part of weather/climate systems, creating an equivocation in debasing nature to the same adversarial role. Lastly, setting aside climate change for a moment, the spectre of a building fire and air pollution stemming from industrial society implicate the potential of anthropogenic action to damage the residence. Siluett is expected to save people from nature (water and moisture), the abrasive elements of weather (fluctuations and extreme events), and sometimes themselves (fires, dirt, air pollution.) The mythology does not hold between advertisements.

Socio-natural Consequences from the Cures of Asbestos

Lomma Eternit, in the peculiar understanding of nature above, failed to envision any sort of socio-natural dialectic. For them, nature (including asbestos) is on the outside and society is left fledgling inside. This schism—that which Eternit is engineered to underly both literally and allegorically—is virtually absent in stories of living with the mine, notwithstanding any appearance of firm boundaries. The Jeffrey mine in Quebec, as the largest asbestos mine in the world, was situated in the middle of this biophysical and discursive skirmish. Mining began at the end of the nineteenth century, in a diminutive open pit with a paltry workforce and limited by the surrounding farmland; the chrysotile (serpentine asbestos) from nearby Thetford was prized at the time, commanding a higher price and more ambitious operations (van Horssen 2016, 21.) The industry added myriad uses and prospered from burgeoning demand during the First World War, which led to changes in ownership to the Johns-Manville Corporation, J-M, and the original cemetery's relocation—bodies included (30-1.) Up until 1949, this pattern was fortified and aggrandised: demand for chrysotile grew, so the mine expanded as did profit, but only with tacit approval of the Asbestos city council (39-41.) J-M expected to usurp land from the city, often populated central areas at the mine's periphery, and in return the city encroached on the agrarian hinterlands to direct the displaced districts, aided by corporate housing and infrastructure. This was by definition a sacrificial process for *A Town Called Asbestos*, because Jeffrey mine production was tantamount to the economy; if the town resisted moving, and the pit stagnated, then the town's economy was in peril. Sacrifices were not merely necessary, but predictable and ordained. Thus, the transplanting of individual landmarks like the cemetery transitioned into the whole city centre,

notably the well-endearing Le Carré store, during 1928-33. The mine was solid, yet the town was fluid and expendable, and the boundary within Asbestos was newly demarcated by a barbed-wire fence after this relocation.

Wittenoom, operating for just about twenty years, did not share this sort of restless prosperity—the mine registered annual profits for one year alone, 1961 (Hills 1989, 77.) However, instead of bringing the mine to the town, locals sanctioned by ABA (Australian Blue Asbestos) dragged crocidolite from the gorge into the settlement itself. Simply put, there is no mining without the undesired and relatively useless byproduct of crushed rock called tailings, and Wittenoom was no exception (157.) Where did all this subpar crocidolite go, if not make the 160km trip to Port Samson on the coast with the exports (68)?³⁸ Eventually, the company and residents alike found alternate uses, and according to a survivor, “it was delivered to you for nothing ... it was like a bonus for being a good boy [...]” As part and parcel to the daily operations, ABA employed a driver to deliver new tailings from the site to the community, placed 14km away at an otherwise safe distance. 33,000 tonnes were ultimately transported—equivalent to more than a two year haul in the best of times—with a panoply of functions: to seal the town roads, pave all the driveways plus the small airport, cover the school playground, tamper the dust in the yards between the streets, and even alert inhabitants to poisonous snakes under a house with the distinct tracks. Wittenoom the town was built in part by, and on top of, Wittenoom the mine and the collateral called crocidolite. Unlike the globe-trotting commodity quickly shipped off to Port Samson to blend into other asbestos products, the tailings themselves remained around the town (159-60.) The tailings, not the long foreclosed mine, present a sustained risk to people; in ongoing dust samples, the Western Australian Health Department had found asbestos 43km away, with far higher levels in the now ghost-town (Wahlquist 2015.) Wittenoom and its surroundings were irradiated for twenty years—just not with radioactive isotopes as in Chernobyl or Fukushima.

The answer for Wittenoom, after the closure in 1966, later on when the dangers were finally undeniable, was a governmental effort to quarantine the contamination. By enticing the stragglers to relocate, essentially covering the crocidolite with topsoil, and then keeping people far away, the threat could be contained (Wahlquist 2015.) Libby did not have this option. Yet, the problem was eerily similar, since their Libby amphibole asbestos (LAA) spread throughout the town in the form of tailings. Zonolite Mountain had accumulated some hundreds of thousands of tonnes of the noxious mixture over almost a century of mining—rock, soil, vermiculite, and around 30-40

38 Of course, the tailings contained many other minerals besides crocidolite—the ore was not 100% pure.

percent asbestos—enough to erect an entirely new mountain (Peacock 2010, 77; Schneider and McCumber 2016, 18.) Locals similarly discovered many uses and embraced the tailings with symbolic trips for that free truckload of “waste vermiculite” from the export plant or loading facility to be used invariably as attic and wall insulation for the arduous winters (Peacock 2010, 78-9.) In the end, the “waste vermiculite” was a de-facto subsidy from Zonolite and thereafter W.R. Grace for tolerating life in the mining town, just as the tailings worked for Wittenoom. These tailings did not just keep the family warm: Grace allowed them to find new uses, for instance, as a convenient and affordable pavement for the high school track, skating pond at the elementary, and at the baseball fields (Schneider and McCumber 2016, 397.)

Here's where the stories diverge. 24 years after Wittenoom, the vermiculite mine at Libby shut down in 1990, not to the toxic morass that had increasingly obnubilated the town, but to economics (Peacock 2010, 96-7.) Libby vermiculite had become unprofitable with looming occupational health regulations, so Grace cut its losses. The disaster went unrecognised until Schneider and McCumber's reports began in 1999, and while some locals left, Libby was not a ghost-town (78.) The US Environmental Protection Agency (EPA) has developed a byzantine system for examining and remediating the Libby amphibole asbestos (LAA) sprinkled around Libby and Troy in the years since, starting small in 2000, but by 2016 the estimated cleanup cost is \$1 billion USD (Schneider and McCumber 2016, 459.) Replacing Grace, the EPA is now the economic anchor, having inspected most of the communities' 8.072 properties and demolishing affected buildings, public sites, not to mention extracting the soil. Besides the scores of dead locals, miners or not, some of the 5.000 tonnes of asbestos fibres to spew from Zonolite Mountain on any given day were lodged into the trees (Cook and Hoas 2009, 105; Ward et al. 2006.) Logging around Libby therefore risks another round of deadly exposure, and the asbestos is back to nature, bringing another dimension to extend the concept of biopersistence beyond the body.

Argument Three: The Ideal Home, Brought to You by Eternit

Ideas of an optimal home and home life feature prominently in certain Eternit ephemera. Ultimately, most customers look through an Eternit catalogue to furnish a house or apartment building, be it the roof, walls or some manner of hand-made project. Social relations, in Lomma Eternit's advertising approach, are frequently confined to the home and specifically how to achieve the good life. As previously mentioned, a simple, one-story suburban Swedish house is the key setting for “For All Weather.” After explaining the repellent capabilities of any and all Eternit products to protect homes from the adverse effects of the weather, the scene changes to a model

home after a drive home from work in the wintertime. The voiceover is unambiguous:

Let the rain, snow and nasty weather go on outside. Let the weather really put up a fight. Inside the walls it is familiar, cosy and comfortable, as it should be in a home. And the SIDI sheets that this house is covered with on the outside will not be harmed by harsh weather. [translation]

Protecting the home from “rain, snow and nasty weather” only means as much as the milieu being safeguarded. While we hear that, on the inside, “it is familiar, cosy and comfortable”, the camera stares at a family (mother, father, two children) through the window at dark. There are two effects: the markedly bright and well-lighted common room evinces the ideal domestic attributes and it simultaneously showcases “the SIDI sheets that this house is covered with on the outside.” This happy and idealised family is brought to you by SIDI; the ideal home is an Eternit home.

Later in the film, the narration continues to explain the layers of insulation in the wall that support SIDI and COLORBESTOS, and also the ease of installing an Eternit roof. For these demonstrations, the house is barren and under construction—not exactly exuding the lived-in feel like the first family. Ultimately, the house is completed, and a young couple arrive from a miserable, snowy landscape. They talk briefly to the foreman, then suddenly, the husband grabs and carries his wife into the brand-new home, another single-story suburban outpost. Now the house can be enlivened to match the first family. Further along, the film places another satisfied couple in the interior of a furnished living room—with no SIDI to demonstrate. The couple listens and nods agreeably, in unison, to the narrator's paramount appeal—economics—and congratulate each other for making the rational choice. The atmosphere, once more, sustains the “familiar, cosy and comfortable” tone. The film thereafter concludes by unifying the two arguments, with this logic in that “the dream to own a home can become a reality.” Eternit homes, with their low cost and high durability, can actualise the dream of home ownership, replete with all the idyllic appeal.

Other materials manifest a focus on particular ideal qualities within the home, not just the general milieu. A one page spread in the October 1970 edition of *Eternitpressen* is devoted to an exemplary kitchen, with both advanced and exclusive technology, in addition to the cleanliness. The kitchen was on display at a fair by the appliance company Husqvarna, “[...] for those who wanted to buy a more exclusive design and choice of materials and equipment.” Lomma Eternit relies and builds upon the reputation of Husqvarna to provide a quality kitchen environment (ovens, stoves, freezers), with its central addition of a black countertop.³⁹ The Eternit countertop, Massiv, is reported to be superior, because it diffuses heat from pots and pans, resists breaking the fall of any

³⁹ This is the Massiv brand name of countertops in the Lomma Eternit lexicon.

glass or tableware, and remains clean and spotless. Competitors, such as the stone countertop, do not stand a chance. Not only does the countertop keep the kitchen pristine, but the accompanying picture with the text presents the cutting-edge Husqvarna demonstration kitchen as glossy and sparkling. Nothing is out of place, no signs of actual use are visible, and the appliances shine with the reflection from the bright lights. The kitchen, in Eternit's ideal setting, is perfectly clean and features the latest innovations.

The bathroom is yet another room that can be supplied and enhanced by Lomma Eternit. Back in 1936, there is a third advert, placed in the third issue of *Byggnadsindustrin*, that relates to Eternit tiles. These tiles are equally suited towards, “bathrooms, toilettes, staircases, movie theatres, laboratories, hospitals, shops, cafes, [and] kitchens” to name a few. The three tiles, named Enamelled Eternit, Granitised Eternit and Gloss Eternit, have disparate uses in their respective settings. Although the tile campaign predates the “Fantasy is not grey” article by nearly forty years, Lomma Eternit remains insistent about the wide array of uses. The logic, however, is the opposite: there is exactly the right tile for the building being tiled, versus any specific need can be met with some alignment of standard, hand-made or repurposed Eternit. At this point, what surface cannot be covered by Eternit? It's in the tiles, countertops, walls, insulation, roof, planting boxes, rubbish bins, lighting fixtures and still more. Adjacent to the text is an illustration of the result, a tiled bathroom—complete with an immaculate checkered floor and tiled wall. The bathroom shines, just as the Husqvarna kitchen does; in lieu of fancy technology, the ideal Eternit bathroom is spacious and luxurious.

Not So Ideal Homes in Quebec and Libby

This utopian Eternit home—spacious, luxurious, spotless, affordable, cutting-edge, and somehow endearing—was not reproduced for the local miners living around the open pit at Asbestos, Quebec. As the mine expanded and the workforce bloomed in the period leading up to 1949, housing for the new arrivals became scarce—a cycle exacerbated by the process of metabolising successive generations of town centres to aggrandise the pit and increase production (van Horssen 2016, 38-40.) The lifespan of any residence or other building in town could thus be measured not in years, but in metres from the mine's edge. Without the option to shutter the mine, the working-class community faced two options: rely on J-M (Johns-Manville) for company housing, or collaborate and work together. J-M preferred employees to rent from the company; this way, families were moved quickly to new barracks when the mine grew without resistance (45-6.) The few homeowners developed a system to pull entire houses to the new property, and the

managerial class lived at a comfortable distance from the mine without fear of similar relocation. With growing certainty about continued prosperity and skepticism for the J-M rental system, residents created the Chez Nous Ideal project in 1942 to locally build and own homes (83-4.) However, housing allocations were just another battleground in the infamous strike of 1949, wherein police, strikebreakers and anyone friendly to J-M could stay in the rentals, but striking families were evicted (95, 101.) Originally an efficient policy, the rentals became a corporeal mechanism of social control throughout the strike.

Miners, haunted by the unsuccessful strike in 1949, resisted the town's creative destruction and bolstered the Chez Nous Ideal (van Horssen 2016, 117-8.) This worker collaboration allowed locals to increase independence and fight undesirable expansion with pervasive land and home ownership for the post-strike era until Johns-Manville's bankruptcy and consequent sale of the Jeffrey mine in 1983. Besides shattering the sense of security, miners and residents alike were no longer silent about the ceaseless noise and exploding rocks regularly threatening the oldest quarters of town (45.) Home life in Asbestos, Quebec was increasingly dangerous; an ever more industrialised pit, coupled with locals hesitant to move, led to homes embodying the corporate versus miner strife—not at all the “familiar, cosy and comfortable” refuge that Lomma Eternit sold to newlyweds. Before, production, profits, and manpower were directly correlated, yet technological innovations after 1949 left Asbestos with a stagnant and eventually decreasing labour pool, alongside record production and profits (128-30.) Miners and the town council were now critical to J-M and the new reality of, “flying rocks, thick clouds of toxic dust, and the constant noise of new machines [transforming] the community into an industrial horror.” Physical (freedom from relocation, rocks and the dust) and emotional security (freedom from stress) were true luxuries in Asbestos.

Libby was spared a similar assault, owing to the absence of an aggressive labour history and the distance separating the mountain and the town. Nonetheless, local homes became permeated with Zonolite (re)activated during traditions expressed both internally and externally, engendering a toxic landscape populated by toxic homes. Inside, Libby homes and any other insulated with Zonolite across the US had a drawback to the rational appeal in that the attendant asbestos deteriorated into the closed environment, ripe for inhalation (Schneider and McCumber 2016, 203.) The very product devised to protect Libby families from the bitter cold each winter, just as exemplified in the Lomma Eternit film, albeit with wall paneling instead, invited a new enemy in the form of asbestos. Moreover, house-cleaning in Libby to project a confident and spotless home (as

captured in the *Byggnadsindustrin* tile ads and Husqvarna kitchen) was in fact intoxicating; the practice weaponised settled asbestos fibres as no solvent or regular vacuum cleaner can neutralise the dust (26; 58-9.) From these four places in the asbestos economy, Libby stood out in one regard: the mine intentionally extracted vermiculite, and not asbestos. Vermiculite per se (resting untouched inside Zonolite Mountain, or dissociated from asbestos) was innocuous, such that any other dust or tailings (full of asbestos) were ignored as a health risk. For Libby residents, it was not that asbestos is harmless, but that *there is no asbestos here*.

Locals were unaware of the deposit's noxious impurities, believing for a time the company explanation that asbestos was “harmless” tremolite, and they developed surprising uses for Zonolite (Peacock 2010, 93.)⁴⁰ One hyperbolic example is the recipe for whole-wheat Zonobread, based on “1 ½ cups water and three cups No. 4 Vermiculite Feed Grade”, apparently since the bread rose quite well (Peacock 2010, 35.) Outside the house, gardening was a common practice, with vermiculite spread around as fertiliser; Cook and Hoas, from their work in Libby, learned from a resident that “you could grow a carrot and that carrot would be nice, long, and straight, just like a picture carrot” (2009, 106.) While the Zonolite and later W.R. Grace companies afforded locals the possibility of a modern, ideal home with the standard pay-check and bonus Zonolite tailings, there was an irrefutable price. Every home in the Zonolite constellation, nourished by “whole-wheat Zonobread” and “picture carrots” from the vermiculite-enhanced garden outside and insulated by leftover Zonolite padding the walls and ceiling, was furthermore incubating toxicity in the form of Libby amphibole asbestos fibres.

Argument Four: Eternit's Culmination of Wants Is Aesthetic

Simply put, Eternit products are ideally suited for the ideal home—clean, beautiful, natural, and ageless. The document most concerned with an aesthetic appeal is a colour swatch guide for Malmex panels from the 1970s coincident to the Siluett brochure and *Eternitpressen* articles. This English language guide begins with brief summaries of asbestos, cement and Eternit, pointing out in the end that Eternit now has an appeal beyond its established merit, such that “today Eternit is a mixture of asbestos, cement, and colour. To the product's qualities can now be added, 'esthetically [sic] pleasing’.”⁴¹ Asbestos and cement supply the essential physical and economic qualities, with Eternit being heat-resistant, fire-proof, lightweight, strong, affordable, and durable, but colour

40 The conflation is between vermiculite, tremolite, and asbestos. Earlier research termed the deposit close to Libby as tremolite, and asbestos is not a geological classification. Therefore, the fact that tremolite meets the asbestiform criteria, and is considered asbestos for the public, can be used to distort the truth.

41 The suspicion here is that Skandinaviska Eternit AB began sales in the UK, so documents were recreated for the new market.

changes the equation. Colour can make the product beautiful and therefore also the home it envelops; it is another selling point for Lomma Eternit. Still, the Malmex guide does not just print a few colours and call it quits, rather, each of the swatches that are highlighted are complementary and gleaned to evoke a certain naturalness. Many hues are likewise named after nature; “pearl white”, “mist grey”, “lichen grey”, “wicker yellow”, and “ocean blue” are a few examples. The beauty that arises from augmenting Malmex with colour dyes is designed to educe naturalistic comparisons, despite this comparison being semantic. You can compare and imagine the blue facade of Malmex to the ocean, or the lichen hanging from the willow tree with your refurbished apartment building, nevertheless, Malmex and the other Eternit brands examined heretofore are still only asbestos-cement.

The advertising strategy here develops hierarchy of needs and wants. First, the needs; customers demand that the product works as suggested (e.g. *Byggnadsindustrin* or *Siluet* brochure) and that it is cost-effective for young families and large-scale construction firms alike (*For All Weather* film.) Second, the wants; families receive their dream-like homes (*For All Weather*), surfeited with the modern amenities (Husqvarna kitchen) and a jocund home life, whilst architects are unbridled by past financial or technical restraints. They are free to “create an aesthetic harmony”, with “asbestos fibres that captivate and enliven the grey surface”, according to Germundson's article for *Eternitpressen*. The “aesthetic harmony” of Eternit is the ultimate goal, and natural colours are instrumental therein. A second dimension to this harmony is patination. All of these product lines, be they for roofs, walls, insulation, countertops, baffles, sound diffusers, or pipes, have a long lifespan: they can function anywhere from years to decades. So, if the weather is at all destructive as proposed in the film, then their solutions need to resist the barrage and look good under duress. To resolve the issue of degradation, the colours from the Malmex guide radiate a patina effect: Malmex walls, SIDI walls, Siluet roofs, Massiv countertops, and granitised Eternit tiles all become more beautiful with age.

Beauty Is Nowhere to be Seen in Wittenoom and Lomma

Asbestos was not extracted or manufactured into Eternit under ideal, or even favourable, conditions. One reason the mine at Wittenoom struggled, beyond the remoteness and savage climate, was managerial incompetence. CSR, as the Colonial Sugar Refining Company, had virtually no institutional knowledge of asbestos mining before taking this claim, and while they sent managers around the world to learn the trade while forming the subsidiary called Australian Blue Asbestos or ABA, the mine and attached mill festered from a deadly working environment (Hills

1989, 21-3.)⁴² The wrong machinery was bought and the underground mine constructed haphazardly—some tunnels were only 1 metre high and safety concerns did not penetrate the thick rock. The mine, plus the questionable water supply, fetid food stores and dearth of acute medical care risked preventable disease, like septicaemia, tetanus, gangrene and TB (18, 25-6, 35.) Least of all, crocidolite (the “blue asbestos” being mined) dust counts were off any charts, yet masks were unwearable at those levels and 40°C heat—pilots found the airstrip by looking for the giant dust plume. No wonder seasoned miners wouldn't take the relatively high wages, as “[...] you have to design in safety from the start, you can't go running around later trying to tack on a fan here, a waterhose there and handing out Mickey Mouse masks to the workers” (50.) Instead, ABA exhausted 7.000 well-deceived and nearly indentured workers over 23 years to feed an operation with a maximum workforce of just 200 (35.) In Wittenoom, you had to survive long enough and pay your dues to ABA in order to quit, all the while bearing the risks of asbestos related disease.

The hazard from Lomma Eternit, while markedly less than at Wittenoom, remained significantly endangering for labourers. The dust at the factory, a potent mix of asbestos fibres sourced alternately in Canada, Cyprus and Southern Rhodesia, produced a similar effect to all of the mines examined here in routinely covering equipment and the people inside (*Bra att veta vid oss för Eternit* 1964.) Björkman, the longstanding veteran, remembers during the *Engman klockan nio* interview (1979) that there was one position that required standing at a machine for the entire eight hour shift: “yes, you ate a piece [of your lunch] and worked. Sometimes it took a couple of hours to eat a couple of sandwiches”, covered with asbestos if you couldn't escape to the bathroom. Moreover, the asbestos came home with the workers, just as in Quebec, Libby and Wittenoom, with one widow, Hilma, remarking that “their clothes were stiff like sticks. You could not wash or fix them”, and another, Elsa, reflecting that “they saw it on their clothes, and heard them coughing. It came out of the nose and mouth when they coughed.” Eternit ruined their clothes and infiltrated their bodies from the outside in, day after day, for months, years and even decades—as was the case for Björkman's generation. If the products rolling off the assembly line at Lomma Eternit were supposed to protect customers, what could protect the workers from the asbestos-laden factory itself?

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Asbestos as a Toxic Case for Displacement

The Spatiotemporal Profile of Asbestos

Asbestos the mineral conforms to a specific “spatiotemporal profile” analogous in many

⁴² This was one method for CSR to interact with the asbestos and Eternit cartels, and most important, rely on them for information about research on crocidolite.

ways to coal deposits, which renders it ripe for the global scale of displacement (as a product) evidenced in this research. Malm utilises the term *spatiotemporal profile* in his case study tracing the inception of the fossil fuel economy in coal production to evaluate the behaviour of different kinds of energy sources (2016, 38-42.) As we know, asbestos was not mined to produce energy, however, it bears many similarities to coal: it can be mined from bedrock, refined into commodities, and then easily transported as a stock resource within the global market. Spatially, therefore, asbestos can be readily corralled and manipulated, all according to the dictates of capital in search of profit. To engage the spatiotemporal profile of asbestos thusly, is also to metabolise it: asbestos the mineral (1), interred for instance under literal mountains of rock at Wittenoom Gorge in Australia and Zonolite Mountain in Montana, or concealed by listless Quebec farmland—by itself a form of primary nature—becomes asbestos the product (2), Eternit for Skandinaviska Eternit AB and Zonolite for W.R. Grace in Libby and eventually asbestos the toxin (3). This product, branded as COLORBESTOS panelling, Massiv countertops, SIDI panelling, Siluett roofing to name but a few, has transformed into secondary nature under the discretion of capital and its social relations.

The socio-natural transformation of asbestos is not complete without its constituent toxic metabolism over time. All throughout this global disbursement of asbestos products, the risks follow suit, yet the benefits are immediate and lasting. Miners down in the pit at Asbestos, Quebec, up the mountain near Libby, or down the gorge at Wittenoom, akin to the factory workers inside Lomma Eternit are paid their wages, alongside the executives at Australian Blue Asbestos, Johns-Manville, Skandinaviska Eternit AB, or W.R. Grace. The architect finds the subcontractor to splice together that special sound baffle, newlyweds raise a family in that suburban home of their dreams, and developers can purchase Enamelled Eternit tiles in bulk at a great rate. For the consumers, the asbestos fibres undergirding their homes and facilitating their daily lives are invisible, with toxic consequences decades in the making.

This spatial movement characteristic of both coal and asbestos follows from an labyrinthine network of nodes and arteries. The economy of asbestos requires certain infrastructure to establish and maintain its markets; Malm describes spaces of coal (i.e. capital) accumulation in terms of interlocking nodes and arteries (2016, 301-3.) First, the nodes refer to concrete places of economic activity: the mines, mills, processing centres, expansion hubs, retail stores, and final residences that multiply at every step. Second, arterial infrastructure is designed to connect the dispersed constellation of nodes, for example, the road connecting Wittenoom to Port Samson on the Western Australian coast, the railroad line running through Libby, Montana or leaving the Lomma

Eternit factory by boat or rail. The key distinction, according to Malm, is not between node and artery, but within the production of abstract space from the absolute. In the economy of asbestos, Lefebvre (1991, 229) proposes *absolute space* as the domain of the purely natural, whether it is chrysotile asbestos untouched by the Jeffrey mine in Quebec, crocidolite asbestos beside the Wittenoom Gorge, or the forests abutting Zonolite Mountain; therefore absolute space exemplifies primary nature à la Smith. Still, the defining characteristic, for Lefebvre, is not wild nature but instead social relations undisturbed by the restlessness of capital: primary nature and absolute space are definitively socio-natural. *Abstract space* creates second nature, with its concomitant nodes and arteries, again in the pursuit by capital for profit, and “the dominant form of space, that of the centres of wealth and power, endeavours to mould the spaces it dominates (i.e. peripheral spaces), and it seeks, often by violent means, to reduce the obstacles and resistance it encounters there.” (Lefebvre 1991, 49.) The socio-natural transformation of asbestos applies both from primary to secondary nature, as it does from absolute to abstract space, realized in this convoluted array of nodes and arteries.

Displacement, Three Ways

The transformation of asbestos, in its above myriad forms, simply put, requires its constituent environmental, toxic and entropic load to be displaced in order to marginalise and distance the risks of exposure (Hornborg 2011, 49-54.) The ultimate goal for these asbestos corporations is the accumulation of profit; their economy of asbestos, in turn, is predicated upon sourcing deposits in absolute space, sculpting socio-nature to become amenable to productive activity, thereafter maintaining the distributive constellation of abstract space that connects distant mines to urban dwellings, even when they are an ocean apart. Materially speaking, each and every crate of Eternit panels embodies this distinctly *environmental load*: (1) the destruction of primary landscape to eventuate distribution, as in the ever-expanding Jeffrey Mine in Quebec, gradual implosion of Zonolite Mountain in Montana, or the settlement of Wittenoom Gorge in Australia, (2) the processual pollution at the source, in terms of Libby's adjacent forests and rivers, omnipresent dust encasing Lomma Eternit, or the radioactive spread of asbestos tailings beyond Wittenoom, and (3) the adverse social conditions, between Wittenoom's de-facto incarceration of cajoled workers, Lomma Eternit's workforce having no choice but to toil away, day by day, for decades, or the labour strife between Johns-Manville and employees culminating in the strike of 1949 and weaponised ore pounding the adjoining residences at Asbestos, Quebec. By and large, the environmental burden successfully left consumers unscathed and unaware of the history behind their Siluett roof or Zonolite insulation. Displacement was instrumental to engender the economy,

with a network of abstract space “[..] to reduce the obstacles and resistance” potentially troubling the spectre of profit.

What is more in these stories of asbestos is the toxic potential of the mineral fibres. These places in the economy of asbestos, while demonstrably dangerous with the risks of accidents, unsafe working conditions, and preventable illnesses such as gangrene and TB, had these risks in common with other industrial staples, like coal or oil. Nevertheless, the physical contact and manipulation required for asbestos products released prodigious amounts of dust, pummelling respiratory systems with millions of fibres each hour. This exposure to toxic vectors connecting any given deposit to the workers and family member alike, despite the corporate awareness of the public health literature throughout nearly the entire history of the modern asbestos economy, constitutes a secondary, *toxic load*. Put differently, it is hard to imagine these asbestos mines adjacent to cities—given the reality that any of these corporations, like Johns-Manville or W.R. Grace, would expect asbestos related diseases to appear in the decades that followed. You can silence the town doctors, and curtail the local imagination, but how do you handle Wittenoom scale exposure (~10% morbidity) translated to Perth, or Sydney? The corporate solution is to seclude and segregate the risk, by displacing the toxic load at the initial extraction and production sites. All of the locales were quite distant or powerless, such that they could suffer in silence. Consumers and producers were kept apart by the extensive abstract space—just enough distance to allow sales and enable ignorance about the conditions, but not enough to abrogate risk in the homes. Thus, the environmental load could be displaced far easier, as millions of consumers continue to be exposed by the innumerable leakages endemic to the economy of asbestos.

The ephemeral documents highlight a tertiary form of displacement in terms of thermodynamics. The common goal that connects the *For All Weather* film, *Byggnadsindustrin* adverts, *Eternitpressen* articles, new worker guide, Siluett and Malmex brochures, beyond rationality, is the aspiration for aesthetic beauty. This beauty, in the eyes of Eternit, portrays a sense of order: scenes from *For All Weather* end with clean and organised homes, the Husqvarna kitchen (with Massiv countertop) is immaculately placed without a modicum of dust, and the tiled bathroom from *Byggnadsindustrin* appears unused. While these advertisements likely exaggerate the cleanliness of actual living spaces, they represent the objective nonetheless. The ideal has real consequences; order, shipped to the customer in the form of Siluett roofing panels, Malmex siding, or bags of Zonolite, is part of the exchange. Order and cleanliness here is a form of biophysical control, namely a relatively low state of entropy that requires energy to sustain—this is an

appropriation of *negative entropy* (Hornborg 2011, 54-55.) In the economy of asbestos, this negative entropy for the end-consumer in the home, apartment, or office building was accomplished as the result of the antithetical and chaotic processes stemming from the various mines and factories in the *displacement of entropy*. Finally, the sense of harmony and order does not last, since the products and surrounding homes eventually decay and become subject to a destructive economy, and yet more displacement, when the day of demolition arises.

Displacement as Slow Violence

Displacement, either environmental, toxic, or thermodynamic, is a violent process. Drawing from Lefebvre, displacement can be defined as an often violent method to effectuate abstract space, in reducing stubborn “obstacles and resistance” in the “peripheral spaces” at the behest of the “centres of wealth and power”, and furthermore thanks to Smith, “for the fulfilment of one particular need: profit.” The obstacles of remote geography in the desolation of Libby, Montana and Wittenoom, Australia and social resistance to the risks of an economy of asbestos between asbestos related disease and an intentionally hazardous environment are minimized through the clever engineering of abstract space. Moreover, throughout these transformations of asbestos, there is violence, be it in the chicanery to get immigrants to move to Wittenoom, and then forcefully retain their labour, the discarded ore launched into Asbestos, Quebec without an alternative employer, or the omnipresence of surplus Zonolite around Libby when managers were aware of the asbestos it contained. Again, this is long before any diagnoses of asbestosis, lung cancer, or mesothelioma. Nixon (2011, 2) captures this dynamic as “slow violence”, “[...] that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space.” Underneath it all, this is at the core of the economy of asbestos, every bit as real as the shovels, rail cars and gigantic dump trucks that plague these deposits and the resultant networks of abstract space to ensure corporate profit at the expense of real lives.

The toxicity which results from weaponising the asbestos fibres, launching them as products into the market, works primarily through time. Asbestos therefore has dual mechanisms of metabolism: (1) the environmental phase, whereby fibres are chipped from the bedrock, adapted into some 3.000 or more products for the global market, and transported to innumerable consumers; (2) the toxic phase, where years blend into decades without symptoms, until at some point the fibres irritate the body tissue enough to develop a host of asbestos related diseases. In this way, the first phase is expedient in time by quickly sourcing the deposits and supplying the market across titanic stretches of space, yet the second phase is definitively latent, since there is this spatial

and temporal gap between exposure and symptom. Asbestos fibres can travel the world across mere weeks or months, and then lie undisturbed in the home for decades, until the demolition crews arrive to extract the fibres once more to the landfill. For Nixon (2011, 47-51), both the latency period and extended life span of asbestos products are categorised as *environmental time*, beyond the grasp of alacrity news cycles, which boggle the imagination and fail to captivate attention. This temporal dimension to the toxicity creates an innate displacement, since symptoms present themselves decades after the worker or consumer can ameliorate the risk. The fibres cannot be surgically removed from pleural tissue in the lung, even as the mines close, the insulation is recaptured by the removal experts, or the wall panels are unscrewed—the asbestos related diseases merely continue to incubate.

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Conclusion

Asbestos fibres, examined here in the forms of crocidolite (Wittenoom), chrysotile (Lomma and Quebec), and Libby amphibole asbestos (Montana), are not just another benign product relegated to the annals of the industrialising world. First, they endure in the anthropocentric sciences as a toxin to minimise, if not eliminate exposure to protect people from an unambiguous public health hazard, after nearly a century of cover-ups and conspiracies to protect the industry and keep it viable everywhere the market reached. This is the language of risk, measured by various technologies, and ultimately determined acceptable or not under the esoteric strictures of public health and statistics (cf. Furuya et al. 2018; Stayner et al. 2013; Tombs and Whyte 2014.) The production can continue, as long as it is deemed safe enough; if not, there is always the possibility of the ban (see Lemen and Landrigan 2017; Ruff 2017; Soeberg et al. 2018; Westerholm 2017.) Risk is measured as the duration and intensity of exposure to fibres, and toxicity determined by mineralogy and work environment.

Ecological Marxism, on the other hand, expands the notion of risk to an entire economy of asbestos, with toxicity a function of capital machination. The global imperative towards banning asbestos contrasts this emphasis on capital with a post-humanist perspective (cf. Gregson et al. 2010; Houston and Ruming 2014) in the demolitions and deconstructions involving asbestos sites. First, asbestos fibres do not disappear after a ban, rather, they are transferred into a new matrix of nodes and arteries behind an “economy of disposal”, with new potentials for exposure in this industry (Gregson et al. 2010, 1067.) For the post-humanists, workers and fibres act together in a changing material landscape of risk and toxicity. By endowing the asbestos with performativity, the

social is reduced to the natural and the concomitant power relations that allow for an economy of asbestos are unchallenged—there is no room for normative claims against an industry McCulloch and Tweedale (2008) characterise in their title as *Defending the Indefensible, Blue Murder* (1989) for Hills, *Wasting Libby* (2010) for Peacock and *An Air That Still Kills* (2016) for Schneider and McCumber. Despite the post-humanist counterpoint that “for materials there are no yesterdays”, materials are subject to power (Gregson et al. 2010, 1066.) Asbestos fibres did not climb up mountains of bedrock, sprint across the Australian outback, tuck themselves into freight containers, or process themselves at the factory—just as much as they did not flee the roof or demolition crew or even attack the lung. This thesis reveals the *resolutely human potential* of capital to construct multifarious nodes and arteries spanning time and space, to transform innocuous deposits of minerals classed as asbestiform into both quotidian products and rarefied toxins as a social and natural process of displacement.

With asbestos related diseases, production, and profits skyrocketing throughout the 20th century, workers, as well as consumers, were not a pressing concern for this industry of cartels and misinformation. Instead of expressing caution in handling Eternit products, or channeling staggering profits into a less lethal substitute, the sampled advertisements for the Swedish asbestos-cement market, with the help of critical discourse analysis, glean a dire worldview of endless destruction by the interchanging hands of the weather and its natural elements dispersed over four arguments. The only solution is to invite the “magic mineral” of asbestos, expedited into the convenient and affordable products of Eternit, into the home or workplace as a natural and aesthetically pleasing barrier from the sinister and uncontrolled outside. Rather than lessen this hyperbolic rhetoric over time as the hazards multiplied, the transition from a simple efficacious argument in the 1930s (*Byggnadsindustrin*) to a later generation determined to inculcate an entire worldview by the 1960s and 70s in films, brochures, adverts and their own journal of propaganda, *Eternitpressen*, further demonstrates the cultural machinations of an amoral and indefensible industry. Consequently, the extant documents reviewed here play no small part in the global death toll of 255.000 per annum (Furuya 2018, 1.)

While asbestos is seen today as an undeniable toxin in the other sampled countries (Australia, Canada, Sweden, and the US), the risks of disposal pale in comparison to the asbestos products—including the Eternit label—engaged in a new round of modernisation (Bruna and Prandstraller, 2011; Giannasi 2012, 65-71; VICE Media, 2016;)⁴³ Over 1 million tonnes of new

43 The US is currently considering a host of deregulatory efforts, and asbestos is among them (Kullgren, 2018.)

fibres are mined from sites in China, Kazakhstan, and Russia for the battered but nevertheless global marketplace with bans from longtime extractors Brazil (banned in 2017) and Canada (implementation in 2018; Flanagan 2018, 2; Ruff 2017, 1.) The next phase of disposal, and the spike in the onset of latent asbestos related diseases, is just beginning for these countries. Hence, additional research could explore the everyday development of asbestos economies surrounding new markets in Asia and elsewhere, the worldviews and compensatory mechanisms they engender in an age where the risks of asbestos are one click away, and an evaluation of hazards in the substitute economies of asbestos.

The economy of asbestos, documented here as a global, convoluted socio-natural transformation from the faraway mines, mills, connecting railways, shipping lanes, to nearby processing factories, distributors, advertisers, and ultimate installation, was powered by capital with its displacement of the environment, toxicity, and entropy. For Paul Brodeur, an author of multiple books surrounding the asbestos conspiracies, the displacement was obvious: “if the bullet takes 20 years, it's not called murder, it's called business.” In this work, the bullet is not simply asbestos fibres, but an entire constellation of outposts and vectors that bind fibres from Asbestos, Quebec, Libby, Montana, Lomma, Sweden, and Wittenoom, Western Australia together with manifold consumers of Eternit, Zonolite (from Libby) and the other 3.000 possibilities, in both the pursuit of profit and the reality of toxicity. What is more, this form of spatially and temporally displaced “murder” is exactly postulated by slow violence, as “an attritional violence that is typically not viewed as violence at all” (Nixon 2011, 2.) After all, it's just business, right?

The Environmental Protection Agency is proposing regulatory changes that might allow new uses of asbestos to be permitted as they would not have to seek special approval, giving companies easy and unregulated access to future markets.

Glossary of Terms

Asbestos, asbestiform minerals

The terms in this section relate to the principal minerals that fit the asbestiform (asbestos-like) criteria, or that are closely related and therefore relevant. The definitions refer to Craighead et al. 2009, 3-6; 16-7, unless otherwise directed.

actinolite

This mineral exists as an amphibole fibre, but without any ongoing commercial applications and is not mined.

amosite

One of the three commercial fibres, alongside chrysotile and crocidolite. Between 1925-75, it constituted about 2-3% of global production. The name comes from the acronym AMOSA, or asbestos mines of South Africa, where this so-called 'brown' asbestos is usually sourced—due to the fibre's distinct coloration.

amphibole (fibre)

Asbestiform fibres are considered to be either amphibole or serpentine. Amphiboles have a straight, shard-like geometry and, when ejected into an outside environment, tend to dissipate into single fibres.

anthophyllite

This is simply another example of an amphibole. It has no current commercial use and is not related to deposits examined for this thesis.

chrysotile

Chrysotile, otherwise known as 'white' asbestos, is the predominant mineral fibre in the economy of asbestos. From 1925-75, 90-95% of the global asbestos supply was chrysotile. This fibre is the only serpentine example—all others are amphibole. The Jeffrey mine encircled by the town of Asbestos, Quebec exploited chrysotile deposits and was often the biggest asbestos mine Canada, if not the world (Mauney 2016.) Moreover, Eternit products from the Lomma Eternit factory in Sweden mixed cement with chrysotile asbestos (sourced alternately in Canada, Cyprus and Southern Rhodesia.)

crocidolite

This is 'blue' asbestos. The ore from Wittenoom Gorge in Western Australia was notable for this prized variant of amphibole asbestos, but is especially harmful. Crocidolite was also amalgamated with chrysotile or other fibres for durability, or just for particularly demanding asbestos products.

Libby amphibole asbestos, LAA

The ore that was mined on Zonolite Mountain abutting Libby, Montana has perplexed geologists. Older studies conclude that the deposit is closest to tremolite (e.g. Bandli and Gunter, 2006); however, extensive research following the onset of the public health disaster in 1999 does not definitely suggest any of the orthodox amphiboles. The compromise in the literature is therefore found in the term: Libby amphibole asbestos (e.g. Winters et al. 2012.) The mineralogical composition is unique to Libby and was not successfully commercialised.

serpentine (fibre)

This additional type of mineral fibre is distinguished by a curved geometry and tendency to cluster, when compared to rigid amphiboles. The only known example is chrysotile.

tremolite

Tremolite is another non-commercial amphibole, akin to actinolite and anthophyllite. The asbestos at Libby was believed and purported to be tremolite until the most recent geological studies of the deposit.

vermiculite

The mineral vermiculite was the target lode at Zonolite Mountain, as it had a panoply of ready commercial uses, for example in insulation and fertiliser; many applications are similar (if not identical) to asbestos. Nevertheless, vermiculite and LAA are geological cousins and the seams are interrelated, which is why extraction and filtering of vermiculite in Libby projected the toxic asbestiform byproduct into the air and soil all over the town and neighbouring forests. Pure vermiculite is, theoretically, not a public health risk on its own.

tailings

In any given mining operation, only a certain amount of extracted ore qualifies for further processing. The rest is not suitable economically or is another mineral entirely, and they referred to as the tailings.

Asbestos Cartels, Corporations and Subsidiaries

The following information clarifies the byzantine array of asbestos-related businesses, in some manner connected to this thesis.

Australian Blue Asbestos, or ABA

This subsidiary of the massive Colonial Sugar Refining Company was created in 1943 to operate the crocidolite mine (and town) at Wittenoom, in Western Australia. It was renamed to Midalco--presumably to avoid the word "asbestos."

Cementa group

In Sweden, like most countries, the asbestos-cement business was a part of the gigantic cement industry. The Cementa group was in itself an agglomeration of companies (Cementa koncernen in Swedish) and has various names relating to differing configurations of subsidiaries during the nineteenth and twentieth centuries, for instance, Cementförsäljnings AB Cementa, Industri AB Euroc, Scancem AB, and Skånska Cement AB. For the time period relating to the primary materials, Cementa was the most common denominator for the parent company name, and thus Cementa is the title utilised in this work (cf. Wallin 2015, 5.)

the Colonial Sugar Refining Company, or CSR

CSR is a large multinational company, based in Australia with the sugar cane industry at its core. The crocidolite operation was an entirely distinct venture for the company, which never became profitable. Wittenoom was run, in practice, by CSR through its subsidiary in ABA (Midalco.) Their crocidolite was exported around the world, especially blended with Johns-Manville's chrysotile from the Jeffrey mine. The unique demand for versatile crocidolite by other asbestos outfits kept CSR in the asbestos cartel orbit, despite its diminutive production levels (Hills 1989, 21.)

Eternit, the Swiss company

The Austrian inventor, Ludwig Hatschek, was behind the industrial process to synthesize asbestos-cement around 1900. The European cement industry took notice and adopted the Hatschek process. Over the interwar period, two asbestos-cement multinationals consolidated the market in Europe: one in Switzerland and the other in Belgium. The Swiss Eternit giant, the Eternit Group, was the legacy of the Schmidheiny family. This company largely instigated and formalised the cartel structure of the asbestos-cement and cement industries (Ruers 2011, 15-6.)

the Johns-Manville Corporation, or J-M

The Johns-Manville corporation was an asbestos company in the US. Johns-Manville owned the Jeffrey mine in Asbestos, Quebec for the longest period, from 1916 to 1982, when it declared bankruptcy. J-M was an important part of the asbestos cartels, like in the TEAM initiative.

Philip Carey

Philip Carey was an American asbestos corporation, similar to Johns-Manville and another participant in the cartels. They operated another Quebec asbestos mine in East Broughton, which served as the settings for the LeDoux report which partially led to the strike of 1949 at the Jeffrey mine—operated by J-M (McCulloch and Tweedale 2008, 41-2.)

SAIAC cartel

This was the cartel for asbestos-cement corporations centred in Europe, but expanding from 1929: Eternit Group (Switzerland), T&N, Eternit Belgium and other companies. The acronym (in French) SAIAC stands for Sociétés Associées d'Industries Amiante Cement, or Associated Society of the Asbestos-Cement Industries (McCulloch and Tweedale 2008, 25-6.)

Skandinaviska Eternit AB

This was the subsidiary company that operated the factory in Lomma, Sweden, informally referred to as Lomma Eternit by the workers, management, and locals alike. For the period 1906-77, when the factory produced Eternit branded asbestos-cement, it was often owned by some variant of the wider Cementa group.

TEAM initiative

This businesses initiative began in 1962, with SAIAC, T&N, and J-M, to expand the existing and profitable asbestos-cement markets in North America and Europe into developing regions, such as China, Mexico, and Nigeria—to name but a few—with coordinated investments and strategy (Ruers 2011, 18-9.)

Turner & Newall, or T&N

This asbestos corporation was based in the UK and controlled asbestos mines in South Africa. The Eternit Group and T&N started the SAIAC cartel for asbestos-cement (Ruers 2011, 15-6.)

W.R. Grace and Company

W.R. Grace & Co. is yet another large American corporation, which operated Zonolite Mountain from 1963 to the final mine closure in 1990. Like the Zonolite Corporation before it, Grace sold vermiculite containing products—contaminated with asbestos—to a global market for decades. This contamination was made public starting only in 1999 (Peacock 2010, 64-5; 80.)

the Zonolite Corporation

This was the primary company operating on Zonolite Mountain by Libby, Montana in the early 20th century, before W.R. Grace bought it. The industry commenced at Libby, around 1919 due to the efforts of Edgar Alley with his many experiments to probe the vermiculite ore (Peacock 2010, 23-4; 33-4.)

Asbestos, Medical Aspects

There are many serious medical conditions that result from asbestos exposure (any fibre), far more than is sensible to recite in this sort of thesis (Dogan and Dogan 2005, 215 reference lesser-known “Cancers of the larynx, pancreas, esophagus, colon, and kidney” for example.) COPD, or chronic obstructive pulmonary disease, can result from asbestos fibres as well; COPD like asbestos below increases the risk for other asbestos related diseases (Mayo Clinic Staff, 2017.) Below are some common concepts that generalize the maladies and the interactions of asbestos fibres in the body.

asbestosis

Asbestosis is a variety of pulmonary fibrosis (of the lungs.) Asbestos fibres begin to adhere to the lungs, slowly scarring tissue that enables the lungs to expand. In this sense, asbestosis impedes lung function over time. While asbestosis is not a cancer, it can lead to, for example, mesothelioma and lung cancer. Smoking can be a deciding factor as this habit increases fibre retention in the lung. This disease usually requires significant exposure to asbestos, with potentially shorter latencies than lung cancer and mesothelioma, however still upwards of a decade (Mayo Clinic Staff, 2018.)

asbestos related disease, ARD

For this work, any disease that has been shown to result (partially or entirely) from asbestos exposure is considered to be an ARD: asbestos related disease. The focus here is to consider the most notorious, with asbestosis, lung cancer and mesothelioma explicitly emphasised for brevity. Cancers are the final act of the ARDs.

aspect ratio

In geometry, the aspect ratio of a fibre, or anything, is the ratio of width to height or length and therefore is unit-less. The fibre's aspect ratio is crucial in estimating both the risk to public health and where it is likely to be corporeally re-deposited.

biopersistence

The biopersistence of any particular fibre simply means how capable it is of remaining in the body, especially the lungs. Serpentine, i.e. chrysotile, break down over the course of months, whereas amphiboles, e.g. crocidolite, are comprised of different elements and generally do not deteriorate significantly over the course of a lifespan (Craighead et al. 2009, 4-5.)

mesothelioma

This cancer can be the most latent of the big three ARDs—taking from fifteen to thirty or forty years to manifest itself. Generally, the cancer metastasises from malignant mesothelial cells that line the organs and chest cavity, viz. the pleura, that can spread throughout the body. There are three types of mesotheliomas: pericardial (originating at the pericardium), peritoneal (lining of the abdomen) and pleural (most common and refers to the chest cavity). Studies linking asbestos fibres to mesothelioma were published beginning in the 1960s (Dogan and Dogan 2005, 216-8.) More than the others, mesothelioma is the signal asbestos disease: it was medically obscure until the prolific explosion of the asbestos economy (Hills 1989, 59-60.)

pleura

A common resting place within the respiratory system for asbestos fibres. The pleura lines the outer coating of the lungs and throat, and fibres can become embedded—irreversibly—in this tissue until death. Also, this is a site where asbestos related disease can fester and metastasise (Craighead et al. 2009, 5-7.)

respirability

Besides biopersistence, this term refers to a critical factor in the known risk factors for developing asbestos related diseases. Individual or small clusters of fibres become more respirable, or able to be inhaled, when they are thinner (smaller diameter) or longer. Clusters, as are the case with chrysotile, are more difficult to inhale. Thus, the aspect ratio is decisive in determining if, or which, fibres enter the body at all (Craighead et al. 2009, 4-5.)

Asbestos Products

Despite the 3.000 or more asbestos products more broadly, this research focuses on a smaller subset of products under the brand label of Eternit and Zonolite. They are defined below.

Byggnadsindustrin

The second periodical is called *Byggnadsindustrin*, created for the entire construction sector. For at least 1936 and 1940, Skandinaviska Eternit AB placed advertisements here, for ventilation ducts, roofing and the different lines of tiles.

COLORBESTOS

This asbestos-cement product, COLORBESTOS, is very similar to SIDI except that it is sized to fit and panel an entire portion of a wall at 3 metres by 80 centimetres. Hence, if you want to cover your home with Eternit, you would need a lot of SIDI panels, but fewer COLORBESTOS panels.

Eternit, asbestos-cement

Asbestos-cement is the specific result of the Hatschek chemical process that binds together chrysotile and cement for innumerable practical applications. Any entity using Hatschek's patent and thus technique had to call the products Eternit, making Eternit synonymous with asbestos-cement.

Eternitpressen

This is one of the two periodicals examined that relate to Skandinaviska Eternit AB. The *Eternitpressen* journal was published annually, by the company, from 1963-69 and then biannually between 1970-73. The journals feature a combination of short and longer texts, relating to special construction projects, marketing aspects, or suggestions about how to use Eternit—both practically and theoretically.

Eternit, tiles (granitised, gloss, and enamelled)

One product under the Eternit umbrella were different sorts of tiles, for basically any room (interior.) Three lines of tiles were marketed as granitised, gloss, and enamelled (literal translation) in the 1936 edition of the construction trade journal, *Byggnadsindustrin*.

Malmex

Malmex refers to the particular brand name of a long-standing and popular Skandinaviska Eternit AB exterior paneling for large walls.

Massiv

Massiv is an Eternit branded countertop, showcased in a brief article for *Eternitpressen* with the Husqvarna demonstration kitchen.

patina

The idea of patina, or patination, is a concept frequently enlisted in the primary sources surrounding Skandinaviska Eternit AB's marketing strategy. They claim, for every product, that the material design and type of colour are designed to appear aesthetically pleasing with age—even considering most product usage on the exterior of homes or businesses. That is to say, an Eternit roof, or wall will look just as well, if not better, as the years or decades pass.

SIDI

SIDI and COLORBESTOS, as described in the source documents, are virtually the same product of wall paneling. SIDI, however, is quite small: 60 by 30 centimetres.

Siluett

Siluett was another brand name of Eternit in Sweden. In this case, Siluett was one option for an asbestos-cement roof.

Zonolite

Zonolite was the primary commercial term for W.R. Grace's vermiculite products. Unlike Eternit, there are many other product names that ignore the term Zonolite, but it is predominant. This wording is also used in the text to differentiate vermiculite the ore from the combined and essentially inextricable product of vermiculite and Libby amphibole asbestos, LAA, that left Zonolite Mountain as a (by)product.

Places Along the Economy of Asbestos

This section briefly highlights distinct places used, or caught up in, the global economy for asbestos, including of course Eternit.

Asbestos, Quebec

This is the town in Quebec, near the American border, that was founded in the 1800s to support the chrysotile open-cast mine, called the Jeffrey mine. Whenever possible, the town is referenced as Asbestos, Quebec to minimize confusion with other asbestos phrases.

Cyprus

Cyprus is the location of an asbestos mine that was the source for some of the Eternit used at Lomma.

Jeffrey mine

This mine in Quebec was the largest asbestos (chrysotile) mine in the world for a long period in the twentieth century, thereby dominating Canadian exports. The Jeffrey mine operated, under various owners, from 1879 to 2011.

Libby, Montana

Libby is a remote Pacific Northwestern town in the Rocky mountains near the Canadian border and Glacier National Park. The town was central to vermiculite mining and processing operations under both the Zonolite Corporation and W.R. Grace and Company for the entire duration: 1919-1990. Libby amphibole asbestos covered the entire region, not just the mine or town, until ongoing cleanup operations were instigated by the United States EPA in the 2000s.

Lomma Eternit

Lomma Eternit refers just to the Eternit factory and complex in Lomma, Sweden, that was a part of Skandinaviska Eternit AB and ultimately, the Cementa group. It is additionally used at times instead of the formal subsidiary name. The factory opened in 1873 and closed in 1977, but only from 1906 onwards did it produce Eternit. Today, the old factory has been demolished and the area redeveloped, leaving little trace of Lomma Eternit.

Port Samson, Western Australia

Port Samson is a city on the coast in northwestern Australia that was a key port for the exports of crocidolite asbestos and where most of the product was first transported to after leaving Wittenoom (Hills 1989, 68.)

Southern Rhodesia

This colonial-period country in Africa, present-day Zimbabwe, was yet another source of asbestos for Skandinaviska Eternit AB and is mentioned by name during the *For All Weather* film dissected in chapter 6 (Sanger et al. 2018.)

Thetford Mines, Quebec

Thetford Mines is another asbestos town situated close to Asbestos, in southern Quebec. While Thetford Mines was not studied in this thesis (apart from acknowledging Schwarz's 1997 dissertation), it was highly involved in the strike of 1949 between the Johns-Manville Company, its workers, and the townsfolk of Asbestos (van Horssen 2016, 21, 107-10, 114.)

Troy, Montana

Troy is a short distance from Libby, Montana and was the site of additional Zonolite processing infrastructure during the period of operations. It has many structures that are being ameliorated by the Environmental Protection Agency (EPA) as well as Libby (Schneider and McCumber 2016, 459.) One of the specific employees mentioned in this research, Les Skramstad, also worked in Troy for a time (Peacock 2010, 29-32.)

Wittenoom Gorge

Wittenoom Gorge is the area including the mine and town. At certain points, CSR tried to call the town 'Wittenoom Gorge' instead of just 'Wittenoom', but the name never stuck. For this thesis, Wittenoom Gorge and Wittenoom are used interchangeably considering the context of remoteness and CSR's grip on the settlement (Croy 2017; Hills 1989, 1-6; 34-5; 157.)

Wittenoom, Western Australia

Wittenoom was the small and exceedingly remote town created to support the crocidolite mine (same title) at Wittenoom Gorge, some 1,000 miles north of Perth in the scenic Pilbara region of Western Australia. It is located in the same area as Karijini National Park. Today, the town is almost empty and cut-off from public infrastructure, therefore making it a pseudo ghost town.

Zonolite Mountain

Zonolite, or Vermiculite Mountain was the name of the mountain almost adjacent to the town of Libby, Montana, that housed many of the vermiculite facilities during the mining era. There was additional infrastructure in Libby itself as part of the processing, packing and transportation of Zonolite.

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