

Transnational Hazard: A History of Asbestos in South Korea, 1938-1993*

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Introduction

Asbestos is a peculiar material. It is a common name for six different types of minerals in serpentine and amphibole groups with fibrous or needle-like structures. Because of its strength and resistance to fire and heat, this “magic mineral” was manufactured into various insulating and fireproof materials, gaskets, and brake linings for vehicles by mixing it with cotton, rock wool, or cement. Because of its physical character, durable and fibrous structure, it causes various diseases, including asbestosis, lung cancer, and mesothelioma (a rare type of cancer on the linings of organs). As opposed to various chemical hazards invented by humans, asbestos and its toxicity are of nature, but human interventions amplify its risk of affecting human health.¹ In that, asbestos as a hazard is a material that inhabits an intermediate area between nature and culture.

Asbestos is a hazard that has a long history and pervasive geography. In Europe and North America, asbestos began to be industrially used in the late 19th century, and by the 1930s, asbestos became essential in the sectors including construction, ship building, automobile industry, and military.² In Asia, asbestos manufacturing

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¹ On a complex relationship between the mineral and people in an asbestos mining town, see Jessica van Horssen, *A Town Called Asbestos: Environmental Contamination, Health, and Resilience in a Resource Community* (University of British Columbia Press, 2016).

² On the history of asbestos as an industrial commodity and a safety technology, see Rachel Maines, *Asbestos and Fire: Technological Tradeoffs and the Body at Risk* (Rutgers University Press, 2005).

began in the late 19th century in Japan. Global asbestos consumption data suggests that asbestos production sharply increased in the 1970s.³ Asbestos's adverse health effects were reported as early as the late 19th century among miners and workers, but the science on the relationship between asbestos exposure and illnesses was shaped within the politics between the state, industry, occupational hygienists, and workers. In the New York Academy of Sciences' conference in 1964, scientists and medical professionals concluded that asbestos is a carcinogen although the industry representatives strongly disagreed.⁴ Regulations or bans on asbestos use followed especially with a landmark International Labor Organization's Asbestos Convention in 1986. Today, 67 countries have completely banned the use of all types of asbestos and asbestos-containing products with South Korea joining in 2009. However, global asbestos consumption has been increasing at an alarming rate in countries including China, Russia, and Brazil.⁵

In South Korea, public health consequences of asbestos manifested its deadly face in the last two decades. While former workers in the asbestos textile industry discovered their illnesses had a shared cause, occupational health experts newly diagnosed asbestos-related lung diseases among the residents who lived near asbestos mines and factories, and among people who had no identifiable source of exposure.⁶ Since 2011, more than five thousand people have been officially recognized for their asbestos-related diseases by the Asbestos Injury Relief Act, showing that asbestos has been posing a great health risk not only to the miners and workers but also to people living in their surroundings built with asbestos.⁷ This paper aims to understand how the present environmental and health crisis came to exist in South Korea.

³ Robert L. Vita, "Worldwide Asbestos Supply and Consumption Trends from 1900 through 2003," (U.S. Geological Survey, 2006) <https://pubs.usgs.gov/circ/2006/1298/c1298.pdf> (accessed on June 5, 2021).

⁴ National Institute of Health and New York Academy of Sciences, *Biological Effects of Asbestos* (New York Academy of Sciences, 1965); Geoffrey Tweedale and Jock McCulloch, "Chrysophiles versus Chrysophobes: The White Asbestos Controversy, 1950s–2004," *Isis* 95:2 (2004), 239–259; Morris Greenberg, "Biological Effects of Asbestos: New York Academy of Sciences 1964," *American Journal of Industrial Medicine* 43:5 (2003), 543–552; Geoffrey Tweedale and Jock McCulloch, *Defending the Indefensible: The Global Asbestos Industry and Its Fight for Survival* (Oxford University Press, 2008); Jock McCulloch, *Asbestos Blues: Labour, Capital, Physicians and the State in South Africa* (Indiana University Press, 2012).

⁵ International Ban Asbestos Secretariat, "Current Asbestos Bans Compiled by Laurie Kazan-Allen," http://ibasecretariat.org/alpha_ban_list.php (access on June 2, 2021).

⁶ Yeonsil Kang, "Asbestos Activism and Environmental Health Policy in South Korea: A Study of Knowledge Production about Hazard in the Compensation Regime" (Ph.D. Dissertation, Korea Advanced Institute of Science and Technology, 2017).

⁷ The number of relief recipient is updated monthly and can be accessed at the Korea Environmental Industry and Technology Institute, Asbestos Damage Relief System <https://www.adrc.or.kr/user/board/noticeList.do> (accessed on June 30, 2021).

In following asbestos dust from the present to the past, from the victims' lungs to the factories and mines, this paper raises key questions in historically understanding "landscapes of exposure."⁸ The temporal scale of the disaster caused by this hazardous mineral is one. Disaster scholars have paid attention to disasters that stretch back in time. Violent events of disasters are consequences of accumulated failures in politics and policy, economy and industry, technology and culture, requiring us to look beyond.⁹ In writing a history of hurricane Katrina, historian Andy Horowitz examines a 100-year history that includes flood controls, urban developments, growth of the oil industry, and racial politics in New Orleans instead of focusing on the hurricane in 2005 and the aftermath. Emphasizing that "disasters are from within," his study emphasizes disasters not as an abnormal event but as being "not so different from other moments in time." This mundaneness of disasters invites us to examine "state policy, cultural imagination, economic order, and environmental possibility" all of which shape our material surroundings, natural and built.¹⁰

This paper chronologically traces how asbestos was mined, manufactured, and industrialized in South Korea, delineating the political economies within which the current public health crisis was given rise to. This chronology of asbestos begins in 1938 when the largest asbestos mine in East Asia started operation during the Japanese Colonial Period and ends in 1993 when an asbestos textile factory worker was recognized as the first occupational cancer case in the country's history. By analyzing the influence of U.S. foreign aids to the growth of the asbestos industry, this paper fills an important temporal gap, highlighting the continuity in promoting the hazardous industry between changing political and economic circumstances. If asbestos mines were developed as a part of the Japanese colonial project, the U.S. foreign aid supported asbestos manufacturing during the Cold War with the larger goal of achieving industrial self-help. Pushing for modernization, the South Korean government created a market for various asbestos products in rural towns with housing improvement projects. Rushing for industrialization, the government attracted

⁸ Gregg Mitman, Michelle Murphy, and Christopher Sellers, "Introduction: A Cloud over History," in Gregg Mitman, Michelle Murphy, and Christopher Sellers eds., *Landscapes of Exposure: Knowledge and Illness in Modern Environments*, *Osiris 2nd Series* 19 (2004), 1-17; Jody A. Roberts and Nancy Langston, "Toxic Bodies/Toxic Environments: An Interdisciplinary Forum [Introduction]," *Environmental History* 13:4 (2008), 629-635; José Ramón Bertomeu-Sánchez and Ximo Guillem-Llobat, "Following Poisons in Society and Culture (1800-2000): A Review of Current Literature," *Nova Època* 9 (2016), 9-36.

⁹ Scott Gabriel Knowles, "Learning from Disaster? The History of Technology and the Future of Disaster Research," *Technology and Culture* 55:4 (2014), 773-784; Kim Fortun et al., "Researching Disaster from an STS Perspective," in Ulrike Felt, Rayvon Fouché, Clark A. Millerand and Laurel Smith-Doerr eds., *The Handbook of Science and Technology Studies, Fourth Edition* (MIT Press, 2016); Scott Gabriel Knowles, "Slow Disasters in the Anthropocene: A Historian Witnesses Climate Change on the Korean Peninsula," *Daedalus* 149:4 (2020), 192-206.

¹⁰ Andy Horowitz, *Katrina: A History, 1915-2015* (Harvard University Press, 2020), 3, 16.

investments from overseas, which contributed to a significant growth of the asbestos textile industry. Asbestos was imagined as an industrial building block and symbol of wealthy rural villages within such backdrops.

If chronology highlights continuity, the trajectories of things, people, money, and knowledge underscores transnationality. Historians Christopher Sellers and Joseph Melling calls asbestos “a primary, sinister example” of how hazardous industries are perpetuated by relocating to different countries which makes the case of South Korea hardly an exception.¹¹ For instance, in Mexico, asbestos manufacturing that began in the 1930 accelerated in the 1970s with the migration of the industry from the U.S. and Europe.¹² To explain why hazardous industries migrate across borders, environmental economics suggests pollution haven hypothesis. It proposes regulation as the decisive factor; regions with weak environmental regulations would invite polluting industries relocating from regions with more strict regulations. In explaining how asbestos manufacturing relocated from Japan to South Korea, Japanese sociologist Shinjiro Minami and Korean public health experts suggest that “exportation of pollution” occurred because of the economic interests and social circumstances engendered an apt circumstance especially for the Japanese asbestos textile industry.¹³

If this explanation considers the movement of hazards and knowledges occurring one-way, recent studies in the history of science and technology examine more dynamic interactions between the global and the local. In exploring the possibilities of crops as a framework of writing history, historians pay attention to the analogy of rootedness in illustrating the significance of local interpretations, adaptations, or appropriations of technology. In that, meanings are grafted in materials, and their degree of “stickiness” with each other provides a fruitful point of analysis in exploring how science and technology moves across borders.¹⁴ Studies on the mode of transnational knowledge exchange pay attention to how the global and the local are reinvented by the transnational collaborations of scientists. The cases of Korean biologists well illustrate how nationalistic science and national territories were formed by

¹¹ Christopher Sellers and Joseph Melling, *Dangerous Trade: Histories of Industrial Hazard across a Globalizing World* (Temple University Press, 2011), 1.

¹² Guadalupe Aguilar-Madrid et. al., “Globalization and the Transfer of Hazardous Industry: Asbestos in Mexico, 1979–2000,” *International Journal of Occupational and Environmental Health* 9:1 (2003), 272-279.

¹³ Shinjiro Minami, “Asbestos Industry Transplants from Japan to South Korea,” in Kenichi Miyamoto, Kenji Morinaga and Hiroyuki Mori eds., *Asbestos Disaster: Lessons from Japan’s Experience* (Springer, 2011), 151-183; Yeyong Choi, Sinye Lim, and Domyung Paek, “Trades of Dangers: A Study of Asbestos Industry Transfer Cases in Asia,” *American Journal of Industrial Medicine* 56 (2013), 335-346; Choi Yeyong 최예용, “Asiaeseo seongmyeonsaneobui gukgagan idong 아시아에서 석면산업의 국가간 이동 (A Study of Asbestos Industry Transfer Cases in Asia),” (Ph.D. Dissertation, Seoul National University, 2013).

¹⁴ Francesca Bray, Barbara Hahn, John Bosco Lourdasamy, and Tiago Saraiva, “Cropsapes and History: Reflections on Rootedness and Mobility,” *Transfers* 9:1 (2019). 20-41.

participating in and creating transnational research networks.¹⁵ In light of these studies, this paper takes into consideration how the material's meanings were locally crafted and how knowledge was (re)interpreted by Korean occupational hygienists. By doing so, this paper provides a fuller picture of how the "exportation of pollution" occurred.

By historicizing the asbestos disaster, this paper proposes hazards and exposures as the key subject that demands further studies in Korean environmental history. A growing literature in Korean environmental history have examined various topics including river, forestry, resources, or animals.¹⁶ Few analyzed why and how pollution occurred, how hazards and their impacts were studied and managed, and how those materials permeated the porous bodies of humans and animals in the Korean peninsula. Historical understanding of pollution and hazardous materials in South Korea thus follows a rather simplified narrative characterizing it as a side effect of industrialization, leaving discussions on scales, materials, or uncertainties of hazards and exposure in a vacuum.¹⁷ In that, this paper invites Korean environmental history and history of science and technology to inquire into the materiality and epistemology of hazards.

Mining Asbestos and Colonial Resource Development

The beginning of the asbestos industry can be traced back to the Japanese colonial period. The asbestos industry, asbestos mining and asbestos manufacturing, was in-

¹⁵ John Krige Ed., *How Knowledge Moves: Writing the Transnational History of Science and Technology* (The University of Chicago Press, 2019). On how Korean scientists formed transnational connections, Hyun Jaehwan, "Between Engagement and Isolation: Population Genetics and Transnational Nationalism in South Korea," *The Korean Journal for the History of Science* 42:2 (2020), 357-380; Moon Manyong, "The Politics of Science in Korean Biology: From the DMZ Ecological Survey to the Nature Conservation Movement," *The Korean Journal for the History of Science* 42:2 (2020), 431-447.

¹⁶ David Fedman, *Seeds of Control: Japan's Empire of Forestry in Colonial Korea* (University of Washington Press, 2020); Joseph Seeley and Aaron Skabelund, "Tigers—real and imagined—in Korea's physical and cultural landscape," *Environmental History* 20 (2015), 475-503; Joseph Seeley, "Liquid Geography: The Yalu River and the Boundaries of Empire in East Asia, 1894-1945" (Ph.D. Dissertation, Stanford University, 2019). For recent special issues on the environmental history of Korea in English, see "Special Theme: New Perspectives from Korean Environmental History," *International Journal of Korean History* 25:1 (2020); Forum on "War and Environment on the Korean Peninsula, 1958-1695," *Journal of Asian Studies* 77:2 (2018), 315-373.

¹⁷ See, for instance, Norman Eder, *Poisoned Prosperity: Development, Modernization and the Environment in South Korea* (The East Gate Book, 1996).

initiated with a colonial interest in resource development and extraction.¹ While several countries were highly interested in mining concessions in the Korean Peninsula since the late 19th century, especially for gold, it was the Japanese who controlled the mining concessions.¹⁸ After the annexation, the Government General of Joseon issued a series of laws in the early 20th century which ended up granting almost exclusive rights in mining to the Japanese.

Deploying advanced scientific knowledge was crucial in this endeavor. First, extensive geological surveys were conducted by Japanese scientists. Between 1885 and 1937, more than nineteen geological surveys were conducted by eighteen different geologists' groups. Based on these surveys, the first modern geological and mineral map, as well as multiple sets of reports on the mining industry in the Korean Peninsula were published.¹⁹ Second, laboratories were established by the Government General which greatly supported the mining industry. Two laboratories, Central Research Laboratory (1912) and the Coal and Ore Laboratory (1923), conducted testing and analysis of mineral samples at the request of both public and private developers, as well as research on smelting and refining technologies.²⁰

Asbestos mines were developed in the 1930s when Japanese mining development reached its peak. If gold and silver were the major interest in the 1910s, coal and graphite in the 1920s, the production of all kinds of minerals greatly increased in the 1930s, even those previously less interested in, miscellaneous minerals such as asbestos.²¹ The discovery of "globally rare asbestos" ore made exciting news. An article published in 1932 in *Donga Ilbo*, for instance, emphasized its use in the military

¹⁸ Lee Bae Yong 이배용, "Guhanmal yeolangui gwangsangiwon hoekdeuge daehan yeongu 구한말 열강의 광산이권 획득에 대한 연구 (Foreign Powers and Mining Concessions in the Late Chosŏn Dynasty)," (Ph.D. Dissertation, Seogang University, 1984).

¹⁹ Kim Seong-Yong 김성용 and Lee Jae-Wook 이재욱, "Haebangijeon oegugine uihan seogusing hanbando jijilgwangsangjosa seonggwagocharyeongu 해방이전 외국인에 의한 서구식 한반도 지질광상조사 성과고찰연구 (A Study on Advanced Geoscientific Research Activities Related to the Korean Peninsula by Foreign Geologists Prior to 1945)," *Economic and Environmental Geology 자원환경지질* 48:1 (2015), 77-88.

²⁰ Lee Taehee 이태희, "1930nyeondae joseonchongdokbu jungangsiheomsoui wisang byeonhwa 1930년대 조선총독부 중앙시험소의 위상 변화 (The Changing Role of the Central Research Laboratory in Colonial Korea during the 1930s)," *Korean Journal of History of Science 한국과학사학회지* 31:1 (2009), 103-137.

²¹ The number of operating mines sharply increased from 385 to 7,256 between 1929 and 1941. The majority of these mines, however, were gold and silver mines; in the same period, gold and silver mines increased from 140 to 3,975, while miscellaneous mines increased from 104 to 2,578. The number of miners, too, shows the same trend. Between 1926 and 1936 the number of all miners increased from 23,299 to 139,934 with miners at gold and silver mines increased from 6,636 to 96,713. For the statistics on the mining industry, see Gukgagirogwon 국가기록원, *Iljmunseohaeje: gwangeommigokpyeon* 일제문서해제: 광업미곡편 (The Bibliographical Information of the Japanese Colonial Documents: Mining and Rice Farming) (National Archives of Korea, 2013); Song Kyujin 송규진, *Tonggyero boneun iljegangjeomgi sahoegyongjesa* 통계로

and navy delivering hopeful messages that the Japanese Empire would achieve independence from foreign import, especially from the U.S., of this important mineral resource.²² According to the Japanese Agency of Industrial Science and Technology, the East Asian Co-Prosperity Sphere Asbestos Mining Field Survey published in 1944 and data from the Government General of Joseon, there were 16 asbestos mines operated by 6 Japanese mining firms. In these six mining operations, a total of 2,707 laborers were working, producing 4,815 metric tons at the peak in 1945.²³

Hirokawa Mine, or Kwangcheon Asbest Mine, was one of those mines developed and operated in the 1930s by the Japanese. Located in Hongseong-gun, Chungnam Province, this mine was arguably the largest asbestos mine in East Asia, which was known to produce 2,306 metric tons annually before the liberation in 1945.²⁴ Taiwanese mines produced, for instance, between 105 to 820 metric tons between 1937 to 1944, which gives a sense of scale in terms of asbestos production in the colonies.²⁵ Hirokawa Mine was owned by Teikoku Asbestos Co. Ltd., which had been founded as a joint venture of three companies (Kyokuto, Taiyo, and Kansai Slate).²⁶ Not much is known about the labor conditions of the Hirokawa mine or other asbestos mines in the region. However, a study on the mining industry during the Japanese Colonial period demonstrates that miners worked under harsh conditions; for instance, more than 81% of the miners worked 10 hours or more, and those who worked 12 hours or more reaches 34%.²⁷

Histories of mining and dam construction during the Japanese colonial period illustrates the colonial corporeality found in engineered environments and sickened

보는 일제강점기 사회경제사 (Statistical Socioeconomic History of the Japanese Colonial Period) (Korea University Press, 2018).

²² “Gaebaldoeneun jihajawon gwijunghan seongmyeondo sanchul 開發되는 地下寶庫 貴重な 石棉 産出 (Underground Treasury Developed, Precious Asbestos is Also Produced),” *Donga Ilbo* 동아일보 (December 10, 1932); “Jeon’gukjeogeuro saengsanjeonmudeun daeseongmyeongwangeul balgyeon 全國的으로 生産全無든 大石綿鑛을 發見 (Large Asbestos Ore Discovered that was Previously not Produced),” *Donga Ilbo* 동아일보 (November 25, 1938).

²³ Shinjiro Minami, *op. cit.*; Jung Keun Choi 최정근, Do Myung Paek 백도명 and Nam Won Paik 백남원, “Urinara seongmyeon saengsangwa sayong min geulloja suwa nochullongdoui byeonhwa 우리나라 석면 생산과 사용 및 근로자 수와 노출농도의 변화 (The Production, the Use, the Number of Workers and Exposure Level of Asbestos in Korea),” *Korean Industrial Hygiene Association Journal* 한국산업위생학회지 8:2 (1998), 242-253.

²⁴ Ministry of Commerce and Industry Bureau of Mines, “Main Asbest Mines in Korea” (1958), (National Archives of Korea, CTA0001659).

²⁵ Harry Yi-Jui Wu, Ro-Ting Lin, Jung-Der Wang, and Yawen Cheng, “Transnational Dynamics Amid Poor Regulations: Taiwan’s Asbestos Ban Actions and Experiences,” *International Journal of Environmental Research and Public Health* 14 (2017), 1240.

²⁶ Shinjiro Minami, *op. cit.*

²⁷ Song Kyujin, *op. cit.*

bodies.²⁸ While little was recorded about labor conditions in the asbestos mines in Chungnam Province, a family history of illnesses provides a glimpse into how miners' and residents' bodies were mobilized and affected. For local residents, the mine was a good workplace. Many male relatives of Mr. Jung's family worked at the asbestos mine. When the mine started operating in the 1930s, his grandfather worked at the mine, and so did other family members in the following years; an uncle, two brothers, and other male relatives in his extended family had worked at the mine crushing, carrying, and packing asbestos-containing rocks. Mr. Jung was not a miner, but as a teenager he helped his brothers at the mining site. "When my older brothers blasted rocks, I brought rubbles with a vein of asbestos to them. Then brothers crushed them to pick asbestos. Then there were no protective gears. No masks, no gloves, all worked with bare hands."²⁹ The case of Mr. Jung indicates the possibility that many residents worked part-time and were exposed to high concentration of asbestos as a result.

Today, more than 37% of the Asbestos Injury Relief recipients are from the vicinity of the Hirokawa Mine in Chungnam Province, making the province irrefutably the largest cluster of asbestos victims in South Korea.³⁰ Because the mine was located near the same-clan village where the Jungs were living for generations, the tragedy of the asbestos mine became that of the Jungs, too. Fourteen male relatives had some experience working at the mine, and six of them received relief for their asbestos-related illnesses. A remaining eight people died early without knowing whether their illnesses or death were related to asbestos exposure. Twelve male and female members of his family who did not work at the mine were also affected by asbestos exposure.³¹ Mr. Jung, too, was diagnosed with asbestosis in 2009, and since

²⁸ Aaron S. Moore, *Constructing East Asia: Technology, Ideology, and Empire in Japan's Wartime Era, 1931-1945* (Stanford University Press, 2013); Victor Seow, "Sites of Extraction: Perspectives from a Japanese Coal Mine in Northeast China," in Ian Miller, Paul Warde, Ariane Tanner, J. R. McNeill, Victor Seow, Conevery Bolton Valencius, and Robert D. Lifset, "Forum: The Environmental History of Energy Transitions," *Environmental History* 24 (2019), 463-533.

²⁹ Park Eun Soo 박은수 "Seongmyeon pihajae seo seongmyeon chubangundonggaro: Jeongjiyeorui 10nyeon 석면 피해자에서 석면추방운동가로: 정지열의 10년," *Hamkke saneun gil* 함께 사는 길 (January 10, 2020) <http://ecoview.or.kr/정책생활안전/특집-석면-피해자에서석면추방운동가로-정지열의-10년> (accessed on June 21, 2021).

³⁰ This is based on the information on the Asbestos Injury Relief Fund recipients as of May 2021. Han'gukhwan'gyeongsaneopgisurwon 한국환경산업기술원 (Korea Environmental Industry and Technology Institute), "Seongmyeonpihae mit teukbyeoryujong injeonghyeonhwang 석면피해 및 특별유족 인정현황 (Approval Status of Asbestos Victim and Bereaved Family)" (May 31, 2021).

³¹ Hwan'gyeongbogeonsiminsenteo 환경보건시민센터 (Asia Citizen's Center for Environmental History, "ACCEH Report #247 2011nyeon ihu han'gugui seongmyeonpihaeja 2,184myeong hwagin 2011년 이후 한국의 석면피해자 2,184명 확인 (2,184 Asbestos Victims Confirmed in South Korea since 2011)," July 5 2016, 7, http://eco-health.org/bbs/board.php?bo_table=sub02_04&wr_id=191&sca=2016년&page=2 (accessed on July 1, 2021). In a recent interview,

then he has become a leading asbestos activist.

The tragedy of the asbestos mining town demonstrates well how asbestos dusts blurred the boundary between the workplace and the environment. The mine was close to the town with open workshops which made dust freely scatter over the residential areas. Also, the town's major infrastructure was used to send asbestos out of the town, causing pollution in nearby areas including the busy outdoor market. Kwangcheon Railway Station, established in 1923, was the major route of transporting asbestos. Residents have been arguing that the railway station should be considered a major source of exposure as well; residents testified that as children, they used to play at a storage yard with asbestos piles.³² Miners often became source of contamination, too, as they return home with their clothes and bodies covered with asbestos dust. According to a study conducted in 2019, secondhand exposure by family members who are working at the asbestos mine is one of the most common routes of exposure among the victims.³³ In the asbestos mining town, workplaces and living spaces were in a continuum.

If asbestos mining was initiated and grew mainly as a colonial resource development project, the growth of asbestos manufacturing occurs in different political and economic backdrops. Asbestos manufacturing began in the last few years of the Japanese colonial period. One of the asbestos manufactures was Nihon Asbestos and Rubber Co. Ltd. (Nihon Asbestos hereafter), which constructed their factory to produce asbestos yarn, gaskets, and insulation materials in Anyang, Gyeonggi Province in 1942.³⁴ It does not seem that Nihon Asbestos and other asbestos manufacturers thrived considering that their operation began at the end of the colonial period. However, Nihon Asbestos continued its legacy as Koryeo Asbestos and Rubber Co. Ltd. as the major supplier of asbestos products in South Korea in the 1950s and 1960s. In the growth of this company, the role of U.S. foreign aid was significant.

Asbestos Manufacturing and the Cold War International Aids

With the end of the Second World War, the Japanese retreated from the Korean Pen-

Mr. Jung mentioned that there are more than 30 victims in his family indicating more family members had been diagnosed since the ACCEH's report was published in 2016. Park Eun Soo, *op. cit.*

³² Nam Won Geun 남원근, "Gwangcheonyeok seongmyeonhachijang jubyeon pihae soksok deureona 광천역 석면하치장 주변 피해 속속 드러나," *Hongjusunmun* 홍주신문 (February 26, 2010) <http://www.hsnews.co.kr/news/articleView.html?idxno=43134> (accessed on June 1, 2021).

³³ Kang Heetae 강희태 et. al, *Seongmyeon Pihaeja Nochul Teukseong Yeongu* 석면 피해자 노출 특성 연구 (A Study on the Characteristics of Exposure among Asbestos Victims) (Ministry of Environment, 2019).

³⁴ In 1981, Nihon Asbestos changed its name into Nichias Corporation.

insula. In 1945, a line on latitude 38 degrees North was drawn in the Korean Peninsula as a result of the Potsdam Conference (July 17 – August 2, 1945). In the North, the U.S.S.R. was going to accept the surrender of the Japan, while in the South, the U.S. was going to, resulting in the division of a country into two. The Korean Peninsula became the forefront of Cold War politics.

A part of that politics was economic. U.S. aid policies on South Korea emphasized economic stabilization and fortifying defense. Relief supplies such as food and medicine, consumer goods, and raw materials were provided after the Second World War and they were used to stabilize the domestic market and to prevent inflation. The counterpart fund, a fund that was made by selling those goods, was mostly spent to support the military. In the mid 1950s, the U.S. officials dispatched in Korea started arguing that long term economic development policies were needed. For instance, William E. Warne, the second Economic Coordinator (1956-1959), emphasized that increasing manufacturing capacity was crucial for South Korea's economic self-help. As the Economic Coordinator, the U.S. official in charge of the aid programs and the economic consultant to the United Nations Command, he had an enormous influence over Korea's economic rehabilitation after the Korean War. Warne's idea on technical assistance and self-help originated from his experience in Iran carrying out the Point Four Project. It was a global project aimed at providing technological assistance to underdeveloped countries in areas including public health, education, agriculture, mining, and industrial development as a part of the ideological battle of the Cold War. The expansion of the Bureau of Rehabilitation Technology within the Office of Economic Coordinator reflects such a shift in discourses on how to plan and spend funds under Warne's leadership.³⁵

Within such political and economic contexts, asbestos manufacturing was able to keep itself in the market in South Korea. Among the first tasks of the U.S. Army

³⁵ Lee Hyun Jin 이현진, “Je 1gonghwagukgi migugui daehangyeongjeweonjojeongchaek yeongu 제1공화국기 美國의 對韓經濟援助政策 연구 (A Study on the Korean Economic Assistance Policy of the United States of America during the First Republic of Korea)” (Ph.D. Dissertation, Ewha Woman's University, 2005); Han Bong-Seok 한봉석, “1950nyeondae miguk daehan gisurwonjoui yeoksajeok han maengnak: je 2dae gyeongjeojeongggwan William E. Warne ui hwal-dong-eul jungsimeuro 1950년대 미국 대한 기술원조의 역사적 한 맥락: 제 2대 경제조정관 윌리엄 원(William E. Warne)의 활동을 중심으로 (The One Aspect in U.S. Technical Assistant to the R.O.K. during 1950's),” *The Research for Korean Historical Figures* 한국인물사연구 23 (2015), 325-364. Here “technical assistance” means less about technology transfer but more about assistance of with managerial techniques by providing “rehabilitation engineering service” including engineering, planning, and management. See Han Bong-Seok 한봉석, “1950nyeondae migugui daehanwonjoeseo jeogaebalguk gaebal(development)ui uimi: migukgye keonsosieom, seumiseu hinchimaen aen geurilseui gisurwonjoreul jungsimeuro 1950년대 미국의 대한원조에서 저개발국 개발(development)의 의미: 미국계 컨소시엄, 스미스 힌치맨 앤 그릴스의 기술원조를 중심으로 (Rethinking development in the context of US Aid to the Korea during 1950s: Focusing on the Technical Assistance of the Smith, Hinchman & Grylls, Inc.),” *The Journal of Korean History* 한국사연구 181 (2018), 267-312.

Military Government in Korea (USAMGIK, 1945-1948) was to confiscate and dispose of enemy properties, real estates and businesses owned by the Japanese during the colonial period. In 1946, together with many other industrial facilities, Nihon Asbestos was confiscated and given to a Korean businessman by the USAMGIK. Soon it changed its name to Koryeo Asbestos and Rubber Co. Ltd (Koryeo Asbestos hereafter) and continued manufacturing asbestos goods.

Funding from the U.S. International Cooperation Administration (ICA, 1955-1961) provided a springboard to Koryeo Asbestos. Reflecting changing discourses among the U.S. officers in South Korea on how to spend aids, the ICA created private industry projects focusing on manufacturing and infrastructure building. According to the report, "Progress Status of Private Industry Projects with ICA Funds," about 19 million dollars were spent to support 90 manufacturers including automobile tires, pesticides, agar-agar, starch, bottle glass, textiles, shipyards, and papermills between 1954 and 1956. Koryeo Asbestos was supported with 305 thousand dollars as one of 63 manufacturers in 1955. With this funding, machinery for the factory would be purchased from overseas to expand their production capacity. Considering that the average amount of funds given to each manufacturer was about 247 thousand dollars, the asbestos plant was one of the largest recipients of the ICA's private industry program.³⁶

The purpose of the private industry program was to reduce the Korean industry's dependence on imports, and each project was evaluated based on that criterion. In the program review committee's report, the reviewer emphasized that Koryeo Asbestos would function as a local provider of asbestos products; "OEC [Office of Economic Coordinator] technical divisions should be made aware of the existence of this new local source of finished asbestos products in order to assure that future project planning is not based on the imports of these products." It further emphasized a need for domestic market analysis and the creation of demand for asbestos products, especially in housing, construction, and railway operation, which would contribute to the asbestos manufacturer's growth. To the OEC's committee, strengthening asbestos manufacturing was considered a way to achieve industrial self-help of South Korea.³⁷

Ironically, achieving this goal would demand import of raw materials and manufacturing facilities. Trading companies intermediated the OEC, the United Nations Korea Reconstruction Agency (UNKRA), the Ministry of Reconstruction, and the recipient Korean companies with companies around the world to import needed goods. For instance, Shriro International based in Ontario, Canada, was one of the

³⁶ Ministry of Reconstruction, "Progressive Status of Private Industry Projects with ICA Funds (FY 1954-1956), As of April 10, 1958" (National Archives of Korea, CTA0001508).

³⁷ Program Review Committee, "Results of Review of First Thirteen Projects Examined by Project Review Committee," November 13, 1957 (National Archives of Korea, CTA0002601).

major trading companies contracted to provide industrial machines and heavy equipment to eleven different factories including an asbestos and rubber processing plant, a limestone crushing plant, large flour mills and a newspaper printer. Unstable and negligent dealings in the private sector often caused problems in carrying out aid programs and so was with the case of the asbestos factory project.³⁸ The involvement of private firms well illustrates the significance of the government-industry alliances in the U.S. aid projects during the Cold War.

Constructing Asbestos Landscape

Domestic asbestos industry grew in tandem with the paced industrialization of South Korea and such growth depended on the raw asbestos import from countries including Canada. The amount of raw asbestos and asbestos products import sharply increased from 1963 and peaked between 1973 and 1995.³⁹ The number of asbestos factories and asbestos workers in this time period allows us to estimate the relative sizes of asbestos manufacturing in different sectors that change over time; in the 1960s and the early 1970s construction was dominant while the size of friction manufacturing continuously increased taking up more than 40% of the total asbestos workers in 1993. The amount of imported raw asbestos consumed, however, demonstrates that asbestos was predominantly used in construction; between 1976 and 1993 the construction sector consumed more than 80% of all imported raw asbestos.⁴⁰

The use of asbestos in buildings and houses was promoted as a rational way of building maintenance. Historian Rachel Maines portrayed asbestos primarily as a safety technology within the context that conflagrations were the most threatening urban disaster in the U.S. in the late 19th century and the early 20th century.⁴¹ Popular discourse on asbestos in South Korea between 1950s and the 1970s suggests it was regarded as a technology for energy saving. In the 1950s, asbestos products were

³⁸ “Letter to Mayer from O. Sebold,” February 8, 1958; “Letter from E. J. Mann to E. Pennell, Unsatisfactory Delivery of Machinery to Korea Asbestos & Rubber Company,” December 18, 1958 (National Archives of Korea, CTA0001508). Negligence in work was a common issue among the foreign workers and engineers of private firms dispatched in South Korea. According to Bong-Seok Han’s study on Smith, Hinchman & Grylls, Inc, an engineering consulting firm in charge of the technical reviews of major U.S. foreign aid programs to Korea, majority of the engineers sent to Korea had issues with negligence—half of the fourteen engineers did not fulfill the work hours or even disappeared. See Han Bong Seok (2018), *op. cit.*

³⁹ Yu-Ryong Yoon et al., “The Asbestos Ban in Korea from a Grassroots Perspective: Why Did It Occur?,” *International Journal of Environmental Research and Public Health* 15:2 (2018), 198.

⁴⁰ Choi Jung Keun, Paek Do Myung and Paik Nam Won (1998), *op. cit.*

⁴¹ Rachel Maines, *op.cit.*

considered significant to South Korea's industrial rehabilitation for their contribution to "heat management" in industrial facilities."⁴² In the last piece of the series "Industrial Rehabilitation Report from the Field" published in *Donga Ilbo* in 1956, Koryeo Asbestos' factory was introduced with a bright forecast for the asbestos industry with a stress on its contribution to saving energy. To the writer, a considerable amount of fuel was wasted in factories, public buildings, power plants, and schools due to a lack of insulation; "It is said that the amount of steam gushing out from 1 square millimeter mounts to 2 tons in one year. This means heat loss of boilers due to the lack of heat management and damaged coverings; this also means losing fuel such as oil or coal... How much of fuel would be lost due to lacking heat loss prevention?"⁴³ Proudly introducing how Koryeo Asbestos received the ICA funds to reconstruct a war-torn factory and how it invested in introducing advanced technologies from Japan, this article concluded with a remark on the necessity of the authorities' leadership and public education in rational heat management.

An emphasis on heat management continues to appear in popular media in the 1970s but the focus moved from industrial facilities to houses. Major newspapers regularly published short articles on house maintenance before the winter season, focusing on insulation. Asbestos and rock wool were the most desirable materials that could be used in walls and ceilings to keep house warm and cut off drafts; with a limited budget one could use sawdust mixed with lime mortar.⁴⁴ Explaining in detail on convection current and heat circulation within houses, an article published in November 1970 underscored that rational energy management was much needed in Korean houses. "Appearances of houses in foreign countries look shoddy, inside is convenient and rational. Korean houses look flashy using marbles but inside is very irrational. Instead of having useless iron gates, investing in asbestos or rock wool in the ceiling will guarantee the long-term thermal insulation of houses."⁴⁵ Within the national agenda of industrial rehabilitation and economic growth, asbestos was portrayed as a material contributing to rational energy consumption.

Saemaoul Movement created a massive domestic market for asbestos products in the early 1970s, especially with roof improvement projects, and asbestos was given

⁴² The idea of rationalizing fuel consumption can be traced back to the Japanese wartime promotion of "low temperature lifestyle" as a part of forestry policy. David Fedman, "Wartime Forestry and the "Low Temperature Lifestyle" in Late Colonial Korea, 1937-1945," *The Journal of Asian Studies* 77:2 (2018), 222-250.

⁴³ "Saneopbuheungsang hyeonjibogo (wan) goryeoseongmyeonpyeon 산업부홍상 현지보고 (완) 고려석면편 (Industrial Rehabilitation Report from the Field: Koryeo Asbestos [Completed])," *Donga Ilbo* 동아일보, November 27, 1956.

⁴⁴ "Salimjip jangman yuuihaljom myutgaji 살림집장만 유의할 점 몇가지 (Purchasing Houses, A Few Things to Consider)," *Maeil Gyungje* 매일경제, October 2, 1971.

⁴⁵ "Han'gyeuleul ddadeuthage, silnaeboon 한겨울을 따뜻하게, 실내보온 (Make Winter Warm, Indoor Thermal Insulation)," *Maeil Gyungje* 매일경제, November 26, 1970.

symbolic meanings in such a backdrop. In this government-led nationwide mobilization for modernization, straightened roads, dikes, and planted trees, and asbestos roofs were used as the marker of rural towns' progress.⁴⁶ While asbestos had various qualities that made desirable construction material, what also mattered was its look. A public educational video made by the Hankook Cement Industry and the Ministry of Interior, for instance, contrasted a village of thatched houses as the symbol of poverty and stagnation with those of asbestos tiled houses as the symbol of prosperity and progress; "We realize the changing rural towns from elegantly polished roofs."⁴⁷ Various asbestos products began to be invented and patented emphasizing improved aesthetics. Newly designed asbestos roofing had a shape identical with traditional roof tiles and a surface colorful and shining. If wavy, grey-colored slate sheets were considered "unrefined" thus used in rural houses, warehouses, or barns, the new asbestos tiles were expected to be popular in both rural and urban towns.⁴⁸ Patented asbestos tile even promised a look "elegant like marble" with a light weight and lower price.⁴⁹

Asbestos roof tiles were promoted as a rational and economical choice as well; asbestos tiles are light, strong, fire-resistant, long-lasting, beautiful, simple to install, and above all, would increase rural household income. According to the calculation provided by the Ministry of Interior, the average price of maintaining a thatched roof was 11,385 KRW and 32,400 KRW would be needed to replace it with asbestos tiles. While it was still a significant investment for a rural household, various uses of rice straws—making sacks and ropes, compost, fodder, or to grow mushrooms—would not only contribute repaying the loan but also increase the income.⁵⁰ It is ironic that

⁴⁶ Choi Moon Soon 최문순, "Nongchonmada jajoui mulgyeol saemaoul undong 농촌마다 자조의 물결 새마을 운동 (Saemaoul Movement, Waves of Self-Help in Rural Towns)," *Kyunghyang Shinmun* 경향신문, February 2, 1972.

⁴⁷ Han'guksimenteuonggeom jusikoesa 한국시멘트공업 주식회사, "Saemaerundonggwa jibung-gaeryang 새마을운동과 지붕개량 (Saemaoul Movement and Roof Improvement)" (circa 1972) (accessed via Saemaoul Undong Archive).

⁴⁸ "Ppuri gipeun namuneun gamumeul taji anatda: Hangukseureteu (ju) 뿌리 깊은 나무는 가뭄을 타지 않았다 - 한국스레이트 (株) (Trees with Strong Roots did not Suffer Draught: Hankook Slate Co. Ltd.)," *Making* 마케팅 6:5 (1972), 28-29.

⁴⁹ Choi Jong Mo 최종모, "Seuleteu munui byukpan 스레이트 무늬 벽판 (Slate Patterned Wall Tiles)," Patent No. 1887 (1966, Korean Intellectual Property Office).

⁵⁰ Han'guksimenteuonggeom jusikoesa 한국시멘트공업 주식회사, *op. cit.* In his analysis of Rural Housing Improvement Project which succeeded Roof Improvement Project in the 1970s, Kim Sung-Jo points out how large-scale consumption of construction materials in the rural areas provided a significant support to the cement industry. He argues that the cement industry formed a cartel controlling prices and distributions putting villagers in rural towns at a disadvantage paying much higher retail prices. Kim Sung-Jo 김성조, "1970nyeondae nongchonjutaekgaeryangsaeobui jeongae 1970년대 농촌주택개량사업의 전개 (The Development of Rural Housing Improvement Project in the 1970s)," *Yeoksawasilhak 역사와실학* 64 (2017), 261-295.

villagers had to borrow money from the government to remodel their roofs with asbestos tiles. Between 1972 to 1981, the government aimed at improving more than 2 million houses' roofs and to achieve this goal, the government provided each household subsidies (5,000 KRW) and an interest-free loan (10,000 KRW).⁵¹ The appearance of a wealthy rural town brought by asbestos-roofed houses was constructed on top of the villagers' debt.

To change the rural landscape from that of thatched roofs to asbestos roofs, villages were put into competition. The government classified villages into "Self-help Village" and "Self-reliant Village" based on the achievement of the movement's specific goals including farm road construction, housing environment improvement, farming base improvement, cooperatives establishment, and income projects. For instance, to be classified as a "Self-reliant Village," the most advanced type, the village should complete constructing main roads, remodeling more than 80% of roofs and fences, building more than two common facilities, and establishing a village fund over 1 million KRW.⁵² According to the Ministry of Home Affairs, nearly 34 thousand villages were classified as Self-reliant villages by the end of 1979. With the government's push, rural towns' landscapes were rapidly filled with asbestos.⁵³

The government-led roof enhancement project engendered an environmental health problem as a legacy. As these buildings age, weathered slates and tiles became the source of contamination risking residents' health. According to the Ministry of Environment's study in 2006, 37.9% of the 981 studied rural houses in 28 villages had asbestos slate roofs, and 88% contained materials suspected as asbestos. This study estimated that the number of rural buildings with asbestos slate roofs would range between 310 thousand and 700 thousand nationwide.⁵⁴ Mostly located in rural areas, slated buildings have been causing health inequalities as these buildings are inhabited by the socially disadvantaged, such as the elderly, the disabled, or individuals with low incomes (Figure 1). Once symbolizing developing, wealthy rural village, asbestos became a hazard that worsens environmental inequality today.

⁵¹ Naemubu 내무부, *Saemaeurundong 10nyeonsa* 새마을운동 10년사 (10-Year History of Saemaeul Movement), (1980); Naemubu 내무부, *Saemaeurundong 10nyeonsa: Jaryopyeon* 새마을운동 10년사: 자료편 (10-Year History of Saemaeul Movement: Data and References) (1980).

⁵² *Ibid.*

⁵³ *Ibid.*

⁵⁴ Hwan'gyeongbu 환경부, "Seongmyeon sayong geonchungmul gwallireul wihan siltaejosa 석면 사용 건축물 관리를 위한 실태조사 (Investigation for the Management of Asbestos-Using Buildings)," (Ministry of Environment, 2006).



Figure 1. A town populated with slate-roofed houses in Busan, South Korea (Photograph by Yeonsil Kang, 2015)

Industrializing Asbestos and the Foreign Investments

In 1966, a new law was passed to escalate the industrialization of the country. With the Foreign Capital Inducement Law, the government tried to foster direct investments from foreign companies to Korean companies rather than development loan funds, which by then had become a significant economic burden. “To effectively invite and protect foreign capital that contributes to economic independence, sound economic development, improvement of international payment,” this law provided benefits in taxes, wages, and labor disputes. Article 15 of the law specified that companies with foreign investment would be exempted from income tax, corporation tax, acquisition tax, and property tax for five years, and these taxes would be discounted for an additional three years. Furthermore, customs tax, commodity tax, and textiles tax on capital goods would also be exempted. In 1970, the new law was passed allowing the government’s active and immediate intervention in labor disputes of the foreign-invested companies.⁵⁵ Korean politics and economy in the 1970s were

⁵⁵ Oegugintujagieobui nodongjoham mit nodongjaengui jojeonge gwanhan imsiteungnyebeop 외국인투자기업의 노동조합 및 노동쟁의 조정에 관한 임시특례법 (Provisional Act on Special Cases Concerning the Foreign Invested Companies’ Labor Unions and Labor Disputes Arbitration, 1970) Article 1 specified the purpose of this law was to set a special case to “facilitate foreign investment by promoting labor-management cooperation of the foreign-invested companies.” This law was repealed in 1986.

wholeheartedly welcoming foreign companies' investment in various sectors of the industry.

Asbestos manufacturing was one of the industries that grew with foreign investments in the 1970s. Major asbestos textile manufacturers, Jeil Asbestos, Dongyang Asbestos, and Korea Rex Asbestos Industrial Company Limited, received investment by foreign asbestos companies, especially from Japan and West Germany. According to a study on the international transfer of the asbestos industry, 21 asbestos companies were established in the 1970s and 1980s, mostly in industrial parks in the south east of the peninsula.⁵⁶

But how did the investment occur? Joint venture agreements between foreign companies and Korean counterparts in the 1970s reveal that technology transfer was the major part. First, technological artifacts were shipped to set up a factory. In establishing Jeil Asbestos Company, for instance, Nihon Asbestos would invest equipment worth 57,774 USD (17,910,000 KRW). The list included eight different machines and auxiliaries that would constitute the entire process of manufacturing asbestos textile consisting of crushing, blowing, carding, spinning, and winding. In 1973, Nihon Asbestos and Jeil Asbestos agreed on an additional investment in recycled and used machines. The contract specified that Nihon Asbestos "should provide manufacturing technology of the products free of charge" and that Nihon Asbestos "should provide operation, conservation, repair of the machine or relevant technology free of charge in order to prevent frequent mechanical troubles, failure with production plans, or degradation of product qualities."⁵⁷ Engineers would be exchanged as well. Upon the request of the Korean company, Nihon Asbestos would dispatch a maximum of three "qualified engineers to consult with and instruct JAC [Jeil Asbestos Company]'s employees in the techniques of engineering and manufacturing of Asbestos Textiles." Engineers in Korea's factory would visit the Nihon Asbestos' plant, too, "for the purpose of studying, observing, and receiving instruction" regarding manufacturing asbestos textile goods. With exchanges of engineers, the two companies would guarantee the products' quality to satisfy the Japanese Industrial Standards.⁵⁸ Machines, engineers, and knowledge were the key parts of foreign investments.

⁵⁶ Choi Yeyong (2013), *op. cit.*

⁵⁷ "Jeiraseubeseuteujusikoesae daehan chuga jeungja gyejakseo 제일아스베스트주식회사에 대한 추가 증자 계약서 (A Contract on the Additional Investment on Jeil Asbestos Company)," 1974 (National Archives of Korea, BA0889817).

⁵⁸ "Joint Venture Agreement" (December 20, 1970), (National Archives of Korea, BA0889753). Technology transfer, however, occurred decades earlier as well. According to the article on Koryeo Asbestos published in 1956, Japanese and West German companies were the major counterparts to Korean companies. While it demands further examinations, the article mentioned West

In return, asbestos goods were exported from Korea to Japan. In promoting foreign investment, the South Korean government was very much concerned with the new industries' contribution to the export trade. In March 1971, the Economic Planning Board authorized the proposal to establish Jeil Asbestos under the condition that all manufactured goods should be exported back to Japan via Nihon Asbestos, the investor. The proposal ambitiously claimed that the factory would "produce 144 metric tons of asbestos products annually, on average, and the whole quantity would be exported back to Japan, acquiring foreign capital worth of \$214,560."⁵⁹ Tax benefits given to the foreign-invested companies were appropriated to enforce these companies to meet export goals.⁶⁰

Nihon Asbestos's investment was also to establish crocidolite production outside Japan. Crocidolite, also known as blue asbestos, is the most toxic type of asbestos fibers and, as a result, it began to be regulated earlier than other types.⁶¹ In the proposal to establish Jeil Asbestos, for instance, use of crocidolite was specified in explaining production processes and costs. The production cost was calculated assuming that the necessary raw materials were crocidolite and oil (fuel); costs of buying crocidolite, which was 210.13 KRW per kilogram, would take up 44.77% of the total production cost.⁶² This supports claims that tightening regulations on asbestos in Japan accelerated the Japanese asbestos industry's move to South Korea. In 1971, the Japanese government established the Specified Chemicals Ordinance, which was to regulate workers' exposure to hazards in workplaces with asbestos listed as one of the targeted materials. In 1975 amendments, stricter regulations were introduced especially on crocidolite and asbestos spraying (spraying asbestos mixed with glue on

German engineers overseeing asbestos manufacturing in its factory in Anyang, Gyeonggi Province. It further highlighted how Koryeo Asbestos invested in advancing technologies by supporting Korean students in Japan who are learning related technologies. Those students would return to Korea and advance technical aspects of the asbestos factory. "Saneopbuheungsang hyeonjibogoryeoseongmyeonpyeon 산업부흥상 현지보고 고려석면편 (The Minister of Reconstruction's Report from the Field: Koryeo Asbestos)," *op.cit.*

⁵⁹ "Seongmyeonjepumjejureur wihan oegugin tuja ingasincheong 석면제품제조를 위한 외국인 투자 인가신청 (A Proposal for the Authorization of Foreign Investment for Asbestos Product Manufacturing)," 1971 (National Archives of Korea, BA0889753); Gyeongjegihoegwon 경제기획원 (Economic Planning Board), "Seongmyeonjejureul wihan oegugin tujainga 석면제조를 위한 외국인 투자인가 (Authorization of Foreign Investment for Asbestos Manufacturing)," March 13, 1971 (National Archives of Korea, BA0889817).

⁶⁰ According to Article 15 of the Foreign Investment and Foreign Capital Inducement Law, companies with foreign investment would be exempted from income tax, corporation tax, acquisition tax, and property tax for 5 years and these taxes would be discounted for additional 3 years. Also, customs tax, commodity tax, and textiles tax on capital goods would be exempted.

⁶¹ On the controversies over chrysotile regulation, see Geoffrey Tweedale and Jock McCulloch (2004), *op. cit.*

⁶² "Seongmyeonjepumjejureur wihan oegugin tuja ingasincheong," (1971), *op. cit.*

building structures) indicating that medical expertise on the health hazard of crocidolite was actively discussed in Japan in the 1970s when Jeil Asbestos was established.⁶³ With the South Korean government seeking means to increase exports and the Japanese company seeking means to evade stricter regulations, the toxic crocidolite factory was established.

Safety concerns, however, emerged as an important topic with other asbestos textile projects a few years later. For instance, a proposal on a joint investment between the West German company Rex Asbestwerke Graf von Rex G.m.b.H. Co. KG (Rex Asbestos) and Song-Lip Industrial Company Limited in 1977 raised concerns on risks within the government. In reviewing documents to establish Korea Rex Asbestos Industrial Company Limited (KRAICO), the Ministry of Science and Technology and the Ministry of Commerce and Industry saw a need for this new joint venture in “introducing advanced manufacturing technology to prevent pollution” of this heavily toxic industry. The Ministry of Science and Technology insisted that the factory should be authorized with a guarantee that the products would satisfy international pollution laws, without specifying what legal standards it should satisfy.⁶⁴ The proposal submitted by the two firms emphasized precisely this point, too; their product would be safer to the workers by achieving “... 0.5 f/cc which is well below the pollution regulation and the products are dust suppressed which can be exported to any developed countries as a standard export...”⁶⁵ In other words, advanced technologies were needed to produce safer products that would appeal in the global asbestos market. Asbestos risk in this regard was a marker of product’s merit rather than public health problem.

Other departments were more concerned with safety in the manufacturing process. The Labor Administration pointed out the pollution level inside the factory. Although the companies submitted the result of an environmental assessment of the factory in Germany, it insisted on a field investigation after all the machines were

⁶³ Air Environment Division Environmental Management Bureau Ministry of the Environment Japan, “Summary of Countermeasures Against Asbestos in Japan,” March 2011, https://www.env.go.jp/en/air/asbestos/summary_caa.pdf; Sugio Furuya and Ken Takahashi, “Experience of Japan in Achieving a Total Ban on Asbestos,” *International Journal of Research and Public Health* 14:10 (2017), 1261.

⁶⁴ “Seongmyeonjepum jejoreul wihan oegugin tuja mit gisuldoipgyeyaginga. Handokseongmyeonsaneop(ju) 석면제품 제조를 위한 외국인 투자 및 기술도입계약인가. 한독석면산업(주) (An Authorization of Foreign Investment and Technology Introduction for Asbestos Product Manufacturing),” December, 1977 (National Archives of Korea, BA0123892).

⁶⁵ Songnimmulsanjusikoesa 송립물산주식회사 (Song-Lip Industrial Company Limited), January, 1977 “Oegugin tuja min gisuldoim gyeyakeogasincheongseo 외국인투자 및 기술도입 계약허가신청서 (Application for the Authorization of Foreign Investment and Technology Introduction Contract),” January 1977 (National Archives of Korea, BA0123892).

set up in Busan because “workplace conditions such as size of the factory and ventilation are unclear.”⁶⁶ The Ministry of Health and Social Affairs voiced most strongly about the possible health consequences inside and outside the factory. The Director of Air Protection especially made it clear that every precaution should be taken to protect workers’ and residents’ health if this factory were to be authorized. “In principle, we cannot agree to establish a joint venture in South Korea because asbestos is a hazardous material which causes malignant lung diseases ... and lung cancer. But if it is necessary to establish the factory for a domestic supply, the location should be completely isolated where residents are not affected by the material.” He continued, “because it is especially hazardous to workers indoors, perfect preventive measures and prevention facilities ... including protective gears should be established.”⁶⁷ Both departments demanded that the factory should satisfy workplace safety limits of Japan, West Germany, the U.K. and the U.S.

This change in a few years demands a careful understanding of how industrial hygiene was institutionalized and practiced. In the 1960s, the government established the Labor Administration and passed the Industrial Accident Compensation Insurance Act laying foundations on protecting workers’ health. Outside the government, experts began to organize to promote safety and health in workplaces. In 1962, the Occupational Medicine Research Institute was established at the Catholic University of Korea, taking initiatives on workplace environment investigations in major industrial facilities such as smeltery, cement facilities, and coal mines. In 1963, industrial hygienists organized the Korean Industrial Health Association to provide services to the workers and workplace safety managers.⁶⁸ The growth of industrial hygiene stagnated in the 1970s, due to political reasons. In his speech celebrating the establishment of the Korean Industrial Hygiene Association in 1990, Lee Kwang-Muk, the president and the head of the Occupational Medicine Research Institute at the Catholic University of Korea, recalled that, unlike the previous decade, only one request on workplace assessment between 1970 and 1987 was made from the business owners and labor unions. Putting economic growth in the forefront of the national policy, Lee asserted, workplace safety and health issues were not investigated as much and suppressed from the public view.⁶⁹

⁶⁶ Nodongcheong 노동청, “Nodongcheong geomtouigyeon 노동청 검토의견 (Review by the Labor Administration),” June 28, 1977 (National Archives of Korea, BA0123892).

⁶⁷ Bogeonsahebu 보건사회부, “Uigyeonjohoe daehan hoesin 의견조회에 대한 회신 (A Reply to the Inquiry),” 1977. 5. 14 (National Archives of Korea, BA0123892).

⁶⁸ Gwon Ihyeok 권이혁 et al., *Bogeonhakgwa Na 보건학과 나* (Public Health and I) (Sinwonmunhwasa 신원문화사, 2008).

⁶⁹ Lee Kwang Muk 이광묵, “Han’gugui saneobwisaenghagui eojewa oneul geurigo naeil 한국의 산업위생학의 어제와 오늘 그리고 내일 (Yesterday, Today, and Tomorrow of the Korean Occupational Hygiene),” *Wolgansaneopbogeon 월간산업보건* 27 (1990), 11-13.

Asbestos regulation in South Korea began in this course of institutionalizing occupational hygiene, emphasizing regulatory limits and technological interventions. In 1981, the Industrial Safety and Health Law was introduced specifying categories of workplace hazards and requiring the employers' responsibilities in conducting working environment assessment and health examination. Asbestos was listed as one of the hazardous materials that employers should measure regularly and manage properly. In 1983, the permissible exposure limit (PEL) for asbestos was announced as 2 f/cc, and in 1987, different regulatory limits were applied to different types of asbestos; for crocidolite 0.2 f/cc, amosite 0.5 f/cc, chrysotile 2f/cc.⁷⁰

The National Research Institute of Labor Science played an important role in setting up the system for the technocratic management of hazards. Established in 1977 as a research arm of the Ministry of Labor, the Institute was interested in the scientific management of workplace safety and health by conducting field investigations on the workplace environment, examining and authorizing protective gears, and establishing analytical methods for hazardous materials.⁷¹ One of the earliest works on asbestos was a technical guideline on local exhaust ventilation systems in asbestos-using workplaces published in 1983. Translating the Japan Industrial Safety and Health Association's publication, the guideline introduced and analyzed various types of ventilation with detailed illustrations on how they should be installed.⁷² The institute researched analytical methods of hazardous materials between 1983 and 1985, coinciding with the announcement of the first official analytical methods by the Workplace Health and Safety Law in 1983.⁷³ Based on these studies, the institute

⁷⁰ "Nodongbu gosi 노동부 고시 (Ministry of Labor Notice) 1 Jageopwhan'gyeong cheukjeongbangbeop 작업환경측정방법 (Workplace Environment Measurement and Analysis Methods)," *Gwanbo* 관보 9349 (January 25, 1983).

⁷¹ Choi Il Gok 최일곡, "Nodonggwahakgwa nodonggwahageongusoui gineung: sinseoldoneun uigineungeul jungsimeuro 노동과학과 노동과학연구소의 기능: 신설되는 <국립노동과학연구소>의 기능을 중심으로 (Labor Science and the Function of the Institute of Labor Science: Focusing on the Role of Newly Established National Institute of Labor Science)," *Nodong* 노동 11:2 (Ministry of Labor, April, 1977), 35-37.

⁷² Gungnimnodonggwahageonguso 국립노동과학연구소 (Ministry of Labor National Research Institute of Labor Science), *Guksobaegijangchihudeuseolchi: seongmyeonchwigeupjageopjang* 국소배기장치후드설치: 석면취급작업장 (Installation of Local Ventilation and Hood: Asbestos Workshops) (Ministry of Labor, 1983).

⁷³ Gungnimnodonggwahageonguso 국립노동과학연구소 (National Research Institute of Labor Science), *Yuhaemuljilcheukjeongbangbeobyongu* 유해물질측정방법연구 (A Study on Measurement Methods of Hazardous Materials), (Ministry of Labor, 1983); Gungnimnodonggwahageonguso 국립노동과학연구소 (Ministry of Labor National Research Institute of Labor Science), *Yuhaemuljilcheukjeongbangbeobyongu* 유해물질측정방법연구 (A Study on Measurement Methods of Hazardous Materials), (Ministry of Labor, 1984); Paik Nam Won 백남원, *Seongmyeonbunjini yuhaeseonggwa cheukjeongbangbeop* 석면분진의 유해성과

sought technological means to accurately measure hazardous materials and keep workplace contamination under the regulatory limit. Standardized analytical methods were announced in 1987, however, delaying the actual practice of the regulatory limits written in the Industrial Safety and Health Law.⁷⁴

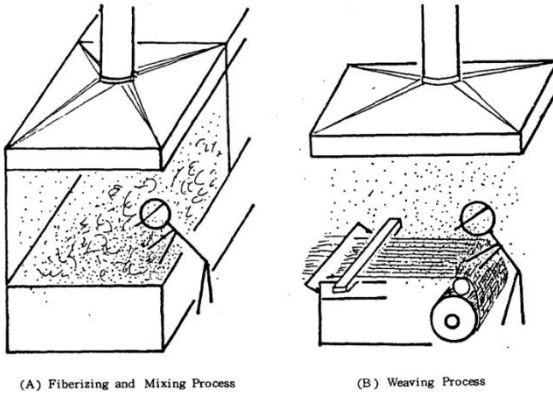


Figure 2. Examples of poorly designed local exhaust systems provided by the industrial hygienists' field investigations in asbestos textile and asbestos slate manufacturing. (Park Doo Yong 박두영 and Paik Nam Won 백남원, 1988).

Did the regulatory limits improve workplace environments in asbestos factories? Despite regulations being established and enforced, workers were exposed to high concentrations of asbestos. Asbestos textile factories were particularly concerning. According to a study conducted by the National Research Institute of Labor Science in 1987, in six out of seven asbestos textile factories' average airborne asbestos concentration ranged from 1.8 f/cc to 15.5 f/cc while asbestos slate factories' measurement showed below the regulatory limit of 2 f/cc. Mixing processes showed exceptionally high asbestos concentration in all factories (average 9.2 f/cc), while other processes such as carding, spinning, twisting, and weaving also had high asbestos

측정방법 (Toxicity and Measurement Methods of Asbestos Dusts), (Ministry of Labor National Research Institute of Labor Science, 1987).

⁷⁴ “Nodongbu gosi 노동부 고시 (Ministry of Labor Notice) 86-45 Yuhaemuljil heoyongnongdo 유해물질 허용농도 (Maximum Allowable Concentration of Hazardous Materials),” “Nodongbu gosi 노동부 고시 (Ministry of Labor Notice) 86-46 Jageopjang cheukjeong bangbeom gongpyo 작업장 측정 방법 공표 (Workplace Measurement and Analysis Method Announcement),” *Gwanbo* 관보 10538, January 17, 1987 (National Archives of Korea, BA0196506).

concentration (5.1-6.5 f/cc).⁷⁵ Later studies consistently demonstrated severe workplace exposure among asbestos textile workers. It was because of dry processes used in asbestos textile factories as opposed to wet processes mixing asbestos fibers with water as used in asbestos slate manufacturing. Improper installation and poor use of ventilation systems was the problem, too. Employers installed ventilations demanded by the Industrial Safety and Health Law, but they were only perfunctory in most factories (Figure 2).⁷⁶ On this gap between the law and the reality, a group of public health experts critically evaluated that the active legislation on workplace safety and health in the 1980s was “a way to legitimize the regime.” In other words, the government’s actions of introducing internationally used regulatory limits or legislations had a stronger political motivation and it was backed by scientific experts interested in technological and medical management of workplace safety and health.⁷⁷

It is not surprising that asbestos textile workers have been among the most affected groups. In 1993, a former worker of Jeil Asbestos received a workers’ compensation for his death caused by mesothelioma, a rare type of cancer almost exclusively caused by asbestos exposure. It was a historical case where occupational cancer was formally recognized and compensated by the authorities for the first time. Reported in major newspapers as a “turning point” in diagnosing and compensating occupational diseases, however, it did little in revealing health damages among the asbestos workers afterward.⁷⁸ It was only in 2005 when former workers of Jeil Asbestos learned their illnesses had a shared cause. Former workers testify their ignorance on

⁷⁵ Gungnimdonggwahagyeonguso 국립노동과학연구소 (Ministry of Labor National Research Institute of Labor Science), “Seongmyeonchwigeupjageopjangui bogeonsiltaejosayeongu 석면취급작업장의 보건실태조사연구 (Research on Public Health Status of Asbestos-Dealing Workplaces),” (Ministry of Labor, 1987).

⁷⁶ Park Doo Yong 박두용 and Paik Nam Won 백남원, “Seongmyeonseulleit jejo mit seongmyeonbangjik saeopjang geullojaui seongmyeonbunjin pongno 석면슬레이트 제조 및 석면방직사업장 근로자의 석면분진폭로 (Worker Exposure to Asbestos Fibers in Asbestos Slate Manufacturing and Asbestos Textile Industries),” *Korea Journal of Environmental Health Society* 한국환경위생학회지 14:2 (1988), 13-27; Yun Im Goung 윤임중 et al., “Seongmyeonchwigeupjageopjangui hwan’gyeong mit geullojae daehan yeokakjosa 석면취급 작업장의 환경 및 근로자에 대한 역학조사 (Epidemiological Survey on the Environment and Health Status In Asbestos Factories),” *The Korean Journal of Occupational Medicine* 대한산업의학회지 5:1 (1993), 137-151; Paik Do-myung 백도명 et al., “Urinara ilbu seongmyeonsaeopjangui seongmyeonpye yubyeongnyul 우리나라 일부 석면사업장의 석면폐 유병률 (Prevalence of Asbestosis in Korean Asbestos Industry),” *The Korean Journal of Occupational Medicine* 대한산업의학회지 7:1 (1995), 46-57; Jung Keun Choi, Do Myung Paek, and Nam Won Paik, *op. cit.*

⁷⁷ Yu-Ryong Yoon et al., *op. cit.*

⁷⁸ “Jigeopseong am gungnae cheot panjeong 직업성 암 국내 첫 판정 (First Recognition of Occupational Cancer in Korea),” *Hankyoreh* 한겨레, October 18, 1993; Kim Young Cheol 김영철, “Jigeopbyeong nollan sae jeongi 직업병 논란 새 전기 (A New Turning Point of Occupational Disease),” *Hankyoreh* 한겨레, October 18, 1993.

asbestos' deadly health effects; "We ate lunchboxes and late-night snacks in the workshop with asbestos dust piled like snow. We often fell asleep using asbestos cloth as a blanket in break times which makes me quiver in horror."⁷⁹ This discovery led to the victims' group organization claiming workers' compensation and raising lawsuits against their former employer for their health damages.⁸⁰ Victims' group included former residents living near Jeil Asbestos's factory built in the middle of the residential area. These victims provide a revealing case of public health crisis inside and outside the factory fences caused by the international transfer of hazardous industries.

Conclusion

In 2008, bereaved families of the two asbestos victims raised an important lawsuit questioning the responsibilities of importing/exporting the hazardous industry. Plaintiffs argued that all three parties involved in establishing and operating the factory in question, Jeil Asbestos (currently Jeil E&S), Nichias (former Nihon Asbestos), and the Korean government, should provide compensation for the victims' death caused by mesothelioma. Their case was unique in that unlike other lawsuits raised by former workers of asbestos factories against their employer, plaintiffs were residents who lived near the Jeil Asbestos' factory in Busan. After a few years of legal disputes over the status of scientific knowledge and asbestos regulation in Japan and South Korea in the 1970s, the intentionality of the Japanese company, and inaction of the Korean government, the Busan High Court ruled that only Jeil Asbestos was responsible.⁸¹

The history of asbestos seen as a slowly progressing disaster suggests otherwise. Within the rapidly changing political and economic contexts of South Korea in the 20th century, various actors had shaped the landscape of asbestos exposure. Multiple projects in both public and private sectors spawned under the banner of colonial resource development, international aids during the Cold War, and the state-led modernization and industrialization contributing to the growth of the asbestos industry and its market. This history highlights the continuity between different "industrial

⁷⁹ *Busan Ilbo* 부산일보, "Seongmyeon syokeu, busani apeuda 석면 쇼크, 부산이 아프다 (Asbestos Shock, Busan is Sick)" <http://shock.busan.com/contents.php> (accessed on June 28, 2021).

⁸⁰ Yeonsil Kang 강연실 and Younghee Lee 이영희, "Hwan'gyeong wiheomgwa saengmulhakjeok simingwon: han'gugui seongmyeon pihaeja bosangundongeul jungsimeuro 환경 위험과 생물학적 시민권: 한국의 석면 피해자 보상운동을 중심으로 (Environmental Risk and Biological Citizenship: The Case of Asbestos Victims' Movement in Korea)," *Siminsahoewa* NGO 시민사회와 NGO 13:1 (2015), 125-162.

⁸¹ Busan High Court Decision 2012Na4367 (부산고등법원 판결 2012나4367).

hazard regimes,” political, economic, and cultural arrangements within which (industrial) hazards are produced and consumed, studied and regulated.⁸² How these arrangements were formed and practiced sheds light on the transnational character of asbestos, whose existence was initiated, sustained, and promoted by money, people, technology, and knowledge that crossed national borders. In the history of asbestos in South Korea, the historical continuity was strongly tethered with the transnationality.

This paper illustrates how policies, economic interests, or cultural imaginations have engendered cumulative biological effects on the exposed bodies over an extended period of time by engaging the victims’ stories and present-day public health problems. A long latency period that is characteristic of asbestos-related diseases brought about the uncertainties with backtracking illnesses with exposure by the occupational hygienists. Recently, non-workplace exposure to asbestos has become an important issue, demanding reevaluations of assumptions based on which occupational hygiene and regulatory science were established.⁸³ Furthermore, the problem of responsibility, as raised in the lawsuit, demands critical examinations of the international transfer of hazardous industries. This study demonstrates that historical understanding of hazards has concrete bearings on unraveling the present-day public health crises.

⁸² Christopher Sellers and Joseph Melling, *op. cit.*

⁸³ Kang Yeonsil 강연실, “Han’gukseongmyeonundongui jisik jeongchi: meonji bunseokbeopgwa seongmyeonoyeom cheukjeong nollaneul jungsimeuro 한국석면운동의 지식 정치: 먼지 분석법과 석면오염 측정 논란을 중심으로 (Politics of Knowledge of Asbestos Activism in South Korea: Settled Dust Analysis and the Controversies over Asbestos Pollution Measurement),” *Journal of Science & Technology Studies* 과학기술학연구 18:1 (2018), 130-175.

Abstract

How do hazardous industries move around the world? Hazardous industries, those that deal with toxic materials or significantly pollute the surrounding environment, have a history of relocating to so-called pollution havens. This paper examines a history of asbestos in South Korea that begins in 1938 when the largest asbestos mine in East Asia started operation and ends in 1993 when an asbestos textile factory worker was recognized as the first occupational cancer case. It highlights how global political and economic regimes introduced, supported, and depended on the asbestos industry. Towards the end of Japanese Colonialism, asbestos mines were developed in the peninsula to support the increasing need in the archipelago. After the Second World War, U.S. foreign aids supported asbestos manufacturing, together with the areas deemed foundational to industrial rehabilitation and self-reliance. Pushing for the modernization of landscapes, and industrialization of the economy, the South Korean government in the 1960s and the 1970s actively promoted foreign investments in the asbestos industry. This paper pays attention to the movements of things, people, and knowledge between borders in following asbestos dust from the present to the past. This paper illuminates how political economic interests intervene in a slowly and steadily progressing disaster by engaging this history of asbestos with today's occupational and environmental health problems.

Keywords: Asbestos, hazardous industry, slow disaster, pollution haven, transnational exchange