CONTAMINATED LAND IN CHINA —THE LEGAL REGIME AND ITS WEAKEST LINKS

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INTRODUCTION

Soil contamination had long been neglected by the environmental regulation in China due to its nature of invisibility and latency compared to air and water pollution. As more isolated incidents of contaminated sites and toxic poisoning were exposed since the beginning of this century and upon completion of the first national soil pollution survey (2005–13),[1] land contamination's threats to the health and safety of human beings have presented urgent demands for immediate and decisive action by the state.

In comparison to the fragmented approach to contaminated land in the early years,[2] a more systematic and comprehensive approach is taken to build a legal regime to prevent and control land contamination. Key legal and regulatory responses include the Action Plan on Soil Pollution Prevention and Control (2016) ("Action Plan"),[3] the Measures on the Management of Soil Environment of

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[1] *Quanguo Turang Wuran Zhuangkuang Diaocha Gongbao* (*全国土壤污染状况调查公报*) [*Report on National Soil Contamination Survey*], MEP & MLR (April 2014), http://www.mee.gov.cn/gkml/sthjbgw/qt/201404/W020140417558995804588.pdf [https://perma.cc/57SZ-44AY]. The first national soil contamination survey, led and coordinated by the previous Ministry of Environmental Protection ("MEP") and the previous Ministry of Land and Resources ("MLR"), was conducted from April 2005 to December 2013.

[2] *See generally* Zhao Yuhong, *Land Contamination in Urban China—Developing a National Cleanup Legal Regime*, 39 HONG KONG L. J. 627, 627–48 (2009); Jian Xie & Fasheng Li, *Overview of the Current Situation on Brownfield Remediation and Redevelopment in China*, WBG (2010); Michael I Jeffery & Xiaobo Zhao, *Developing a National Contaminated Land Liability Scheme in China: the Comprehensive Environmental Response, Compensation, and Liability Act Revisited,* 30 J. ENERGY & NAT. RES. L. 423, 423–465 (2012).

[3] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016, effective May 28, 2016) [hereinafter *Action Plan*]. The Action Plan is also known as the *Ten Provisions on Soil Pollution*, following the *Ten*

Contaminated Sites (for Trial Implementation) (2016) ("Measures on Contaminated Sites"),[4] the Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation) (2017) ("Measures on Agriculture Land"), [5] the Measures on the Management of Soil Environment of Industrial and Mining Land (for Trial Implementation) (2018) ("Measures on Industrial and Mining Land"),[6] and the Law on the Prevention and Control of Soil Pollution (2018) ("SPPCL").[7] They are supported by a range of standards[8] and technical guidelines[9] to implement the regulatory mechanisms of site

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Provisions on Air Pollution (2013) and the *Ten Provisions on Water Pollution* (2015).

[4] Wuran Dikuai Turang Huanjing Guanli Banfa (shixing) (污染地块土壤环境管理办法) <试行> [Administrative Measures for the Soil Environment of the Contaminated Land Parcel (for Trial Implementation)] (introduced by MEP, Dec. 31, 2016, effective July 1, 2017).

[5] Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [Measures for the Administration of the Soil Environment of Agriculture Land (for Trial Implementation)] (introduced by MEP and Ministry of Agriculture (MOA), Sep. 25, 2017, effective Nov. 1, 2017).

[6] Gongkuang Yongdi Turang Huanjing Guanli Banfa (Shixing) (工矿用地土壤环境管理办法<试行>) [Soil Environmental Management Measures for Industrial and Mining Land (for Trial Implementation)] (introduced by the Ministry of Ecology and Environment, May 3, 2018, effective Aug. 1, 2018).

[7] Turang Wuran Fangzhi Fa (土壤污染防治法) [Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), CLI.1.28813 (EN) (Lawinfochina).

[8] The most important standards include the Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018) and the Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

[9] To name a few: Changdi Huanjing Diaocha Jishu Daoze (场地环境调查技术导则) [Technical Guidelines for Environmental Site Investigation (HJ 25.1-2014)] (promulgated by the Ministry Ent. Protection, Feb. 19, 2014, effective July 1, 2014); Changdi Huanjing Jiance Jishu Daoze (场地环境监测技术导则) [Technical Guidelines for Environmental Site Monitoring (HJ 25.2-2014)] (promulgated by the Ministry Ent. Protection, Feb. 19, 2014, effective July 1,

investigation, survey, monitoring, risk assessment, risk control, remediation, and third-party verification of risk control and remediation.

This article examines the newly established contaminated land regime in China and investigates its weakest links that may inhibit timely and effective response to control risk and clean up the contaminated sites. Part I introduces the problem of contaminated land in China with reference to both isolated cases of toxic sites and the comprehensive national soil pollution survey (2005–13). It presents the threat and impact of land contamination to public health and safety. Part II examines the land contamination regime with a focus on legal response to the contaminated sites including the governance structure, the regulatory infrastructure, the legal response process, and risk control and remediation of contaminated agriculture land and development land. Part III investigates the weakest links in the legal regime focusing on the determination of liable parties, the nature of the legal liability, the sources of funding for site remediation, and information transparency and public participation.

I. CONTAMINATED LAND IN CHINA

Soil contamination was initially understood to be a rural environmental problem caused by over-consumption of fertilizers and pesticides (such as DDT and HCH) in agricultural fields and lack

2014); Wuran Changdi Fengxian Pinggu Jishu Daoze (污染场地风险评估技术导则) [Technical Guidelines for Risk Assessment of Contaminated Sites (HJ 25.3-2014)] (promulgated by the Ministry Ent. Protection, Feb. 19, 2014, effective July 1, 2014); Wuran Changdi Turang Xiufu Jishu Daoze (污染场地土壤修复技术导则) [Technical Guidelines for Site Soil Remediation (HJ 25.4-2014)], (promulgated by the Ministry Ent. Protection, Feb. 19, 2014, effective July 1, 2014); Wuran Dikuai Fengxian Guankong Yu Turang Xiufu Xiaoguo Pinggu Jishu Daoze (Shixing) (污染地块风险管控与土壤修复效果评估技术导则 <试行>) [Technical Guidelines for Verification of Risk Control and Soil Remediation of Contaminated Site (for Trial Implementation) (HJ 25.5-2018)] (promulgated by the MEE, Dec. 29, 2018, effective Dec. 29, 2018); Wuran Dikuai Dixiashui Xiufu He Fengxian Guankong Jishu Daoze (污染地块地下水修复和风险管控技术导则) [Technical Guideline for Groundwater Remediation and Risk Control of Contaminated Sites (HJ 25.6-2019)] (promulgated by MEE, June 18, 2019, effective June 18, 2019).

of waste disposal facilities for households and animal farms.[10] Rural land contamination was aggravated in the 1980s and 1990s by fast-increasing but under-regulated industrial and mining operations releasing heavy metals including lead, mercury and cadmium. That explains why China's first Soil Environmental Quality Standard (1995)[11] applied solely to agriculture land and covered eight heavy metals (cadmium, mercury, arsenic, copper, lead, chromium, zinc and nickel) and two organic compounds (DDT and HCH). These toxic contaminants in the soil may be absorbed by the crops grown on the

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[10] State Council Information Office, *Environmental Protection in China (1996–2005)* (2006); *see also* Zhonghua Renmin Gongheguo Guomin Jingji He Shehui Fazhan Di Jiuge Wunian Jihua Gangyao (中华人民共和国国民经济和社会发展第九个五年计划纲要) [The Ninth Five-Year Plan for Economic and Social Development of the People's Republic of China (1996–2000)] (promulgated by the Nat'l People's Cong., Mar. 17, 1996, effective Mar. 17, 1996); Zhonghua Renmin Gongheguo Guomin Jingji He Shehui Fazhan Di Shige Wunian Jihua Gangyao (中华人民共和国国民经济和社会发展第十个五年计划纲要) [The Tenth Five-Year Plan for Economic and Social Development of the People's Republic of China (2001–2005)] (promulgated by the Nat'l People's Cong., Mar. 15, 2001, effective Mar. 15, 2001); Zhonghua Renmin Gongheguo Guomin Jingji He Shehui Fazhan Di Shiyige Wunian Jihua Ganyao (中华人民共和国国民经济和社会发展第十一个五年计划纲要) [The Eleventh Five-Year Plan for Economic and Social Development of the People's Republic of China (2006–2010)] (promulgated by the Nat'l People's Cong., Mar. 14, 2006, effective Mar. 14, 2006) (stating the national plan of environmental protection). *See also* Yang Meng, *The Damaging Truth About Chinese Fertiliser and Pesticide Use*, CHINA DIALOGUE (Sept. 7, 2012), https://chinadialogue.net/en/pollution/5153-the-damaging-truth-about-chinese-fertiliser-and-pesticide-use/ [https://perma.cc/BCW3-HE4L]; Dominique Patton, *China Farm Pollution Worsens, Despite Moves to Curb Excessive Fertilisers, Pesticides, REUTERS* (Apr. 14, 2015), https://www.reuters.com/article/us-china-agriculture-pollution/china-farm-pollution-worsens-despite-moves-to-curb-excessive-fertilisers-pesticides-idUSKBN0N50L720150414 [https://perma.cc/S4CS-ZLJ8].

[11] Turang Huanjing Zhiliang Biaozhun (土壤环境质量标准) [Soil Environmental Quality Standard (GB15618-1995)] (promulgated by the MEE, May 1, 1995, effective May 1, 1995; repealed by the MEE, Aug. 1, 2018). It was lastly replaced by the *Soil Environmental Quality Risk Control Standard for Soil Contamination of Agriculture land* (GB15618-2018); *see* Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

contaminated farmland and enter the food chain. Since the beginning of this century, soil contamination has caught public attention.[12] Media exposure of lead poisoning and cadmium-tainted rice were among the alarms of food safety in China.[13] Lead is especially harmful to children's behavioural and cognitive development while cadmium affects liver function and bone health.[14] The exposure of cadmium-tainted rice in Hunan Province painted a bleak picture of rice paddies contaminated by industrial and mining operation.

In February 2013, Southern Daily reported that ten million tonnes of cadmium-tainted rice found on the dining tables in Guangdong.[15] In May 2013, Guangdong Provincial Food Safety Commission announced that of the 31 batches of cadmium-contaminated rice, 14 batches were from Hunan, four from Guangdong, four from Jiangxi, two from Guangxi and the rest unknown. In the same month, Guangzhou Food and Drug Regulatory Bureau announced that of 18 batches of rice and rice products tested, eight batches had excess cadmium levels in violation of state

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[12] *The Bad Earth—The Most Neglected Threat to Public Health in China is Toxic Soil,* ECONOMIST (June 8, 2017), https://www.economist.com/briefing/2017/06/08/the-most-neglected-threat-to-public-health-in-china-is-toxic-soil [https://perma.cc/L7A7-J5A7].

[13] *Pollutants, Pesticides Threaten Farm Land*, CHINA DAILY (June 12, 2012), https://www.chinadaily.com.cn/business/2012-06/12/content_15496585.htm [https://perma.cc/XCQ4-WTB5]; Sharon LaFraniere, *Lead Poisoning in China: The Hidden Scourge*, N.Y. TIMES (June 15, 2011), https://www.nytimes.com/2011/06/15/world/asia/15lead.html [https://perma.cc/LVV5-CTVX]; Liu Hongqiao, *The Polluted Legacy of China's Largest Rice-growing Province*, CHINA DIALOGUE (May 30, 2014), https://chinadialogue.net/en/pollution/7008-the-polluted-legacy-of-china-s-largest-rice-growing-province/ [https://perma.cc/P8UP-9WRJ]; Chen Huamian et al., *Heavy Metal Pollution in Soils in China: Status and Countermeasures*, 28 ROYAL SWEDISH ACAD. SCI. 130, 132 (1999); Gong Jing (宫靖), *Gemi Shaji* (镉米杀机) [Catastrophe of Toxic Rice Tainted by Cadmium], NEW CENTURY WKLY. (Feb. 14, 2011), http://magazine.caixin.com/2011-02-12/100224834.html [https://perma.cc/99DH-P8XA].

[14] Dustin D. Drenguis, *Reap What You Sow: Soil Pollution Remediation Reform in China*, 23 PAC. RIM L. & POL'Y J. 171, 176 (2014).

[15] Cheng Xi (成希), *Hunan Wenti Dami Liuxiang Guangdong Canzhuo* (湖南问题大米流向广东餐桌) [Ten Thousand Tonnes of Cadmium Tainted Rice from Hunan to be on the Dining Tables in Guangdong], S. DAILY, Feb. 27, 2013, at A13.

standards, and among them, six batches were from Hunan Province.[16] Hunan is famous for its rice yield. By 2012, its annual rice production ranked number four among all provinces, accounting for over 11 percent of national rice production.[17] Hunan is also known for its rich non-ferrous metal resources including lead and zinc. Non-ferrous metal mining generates tailings and wastewater containing cadmium, contaminating the soil and irrigation water of the rice paddies. In addition, heavy-metal smelting discharges cadmium in air emission and generates sludge that further contaminated the paddies.

The public panic over cadmium-tainted rice is not without reason. Cadmium, by-product in the mining of lead and zinc, is a heavy metal that accumulates in the body and causes kidney failure and bone lesions.[18] It is a human carcinogen and one of the 10 most dangerous chemicals for public health according to the World Health Organization.[19] Exposure to high levels of cadmium kills.[20] In the summer of 2009, autopsy reports of two workers of Shuangqiao village in Liuyang, Hunan province recorded their excessively high urinary cadmium levels above the state limits. They both worked at Xianghe Chemical Factory, having occupational exposure to cadmium. In the same village, 208 were diagnosed with cadmium poisoning and 571 were found to have urinary cadmium levels in excess of state limits. Most of those suffering from cadmium poisoning had not worked at chemical factories, but had been exposed to cadmium-contaminated farmland, drinking water, and rice. Fifty kilometres from Shuangqiao village is another cadmium contaminated Xinma village in Zhuzhou, Hunan Province. A six-

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[16] Zheng Dao (郑道), *Zhengjiu Dami* (拯救大米) [Rescue Rice], NEW CENTURY WKLY. (May 27, 2013), http://magazine.caixin.com/2013-05-24/100532361.html [https://perma.cc/3JB6-2TUC]; *see also* He Guangwei, *Special Report: The Legacy of Hunan's Polluted Soils*, CHINA DIALOGUE (July 7, 2014), https://chinadialogue.net/en/pollution/7076-special-report-the-legacy-of-hunan-s-polluted-soils/ [https://perma.cc/9LS2-AQR6].

[17] *Id.*

[18] World Health Organization, *Exposure to Cadmium: A Major Public Health Concern* (2010), https://www.who.int/ipcs/features/cadmium.pdf [https://perma.cc/9BGU-EC6U].

[19] World Health Organization, *Action is Needed on Chemicals of Major Public Health Concern* (2010), https://www.who.int/ipcs/features/10chemicals_en.pdf?ua=1 [https://perma.cc/J4GZ-DLNL].

[20] WHO, *supra* note 18.

year old girl, Liu Bingjie, was certified dead of chronic cadmium poisoning in March, 2008 by a local hospital after two years of treatment.[21] Researchers collected rice samples from one hundred rice paddies located near mining sites throughout Hunan province and found that 65 percent of the samples exceeded the cadmium limit set by the national food hygiene authority. The contaminated rice had entered both local markets and national food supply network.[22]

Land contamination goes far beyond rural regions.[23] China's urbanization movement since the 1990s is characterized by industrial relocation from city centers to the outskirts, real property development and infrastructure building, which exposed the hidden risks of contaminated sites previously used for industrial operation.[24] Industrial relocation was primarily driven by the growth of urban population and increasing demand for residential premises and office buildings and partly in response to the increasing pollution-related disputes between urban residents and industrial operators. Urban land including previous industrial sites is increasingly limited and precious resources for residential or commercial development. The Red Lion (Hongshi) toxic site at SongJiaZhuang in Beijing that poisoned three subway construction workers in April 2004 was the first incident that drew public attention to the historical contamination left by former industrial operators of a pesticide factory and Beijing

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[21] Liu Hongqiao (刘虹桥), *Gebing Jiangzhi* (*镉病将至*) [T*he Coming of Cadmium Epidemic*], NEW CENTURY WKLY. (June 3, 2013), http://magazine.caixin.com/2013-05-31/100535625.html [https://perma.cc/K4BT-YPLZ].

[22] Paul N. Williams et al., *Occurrence and Partitioning of Cadmium, Arsenic and Lead in Mine Impacted Paddy Rice: Hunan, China*, 43 ENV'T. SCI. TECH. 637, 641 (2009).

[23] Li Jing, *Soil Pollution Poisons More than Farmland*, CHINA DAILY, Mar. 10, 2011, http://www.chinadaily.com.cn/2011-03/10/content_12146168.htm [https://perma.cc/7FHG-VCFJ].

[24] *See generally* Zhao, *supra* note 2; Xie & Li, *supra* note 2 (Describe state efforts to transform and upgrade national economic and industrial structure from secondary industrial sector to tertiary service sector. Attention is paid to land contamination following industrial relocation from city centres and residential zones. The relocation of hundreds of old industrial facilities from Beijing to the city outskirts left behind eight million square meters of brownfields in need of redevelopment.).

Red Lion (Hongshi) Paint Co.[25] In February 2007, a construction worker at Heshan property development site in Hanyang District of Wuhan was poisoned and rushed to hospital for emergency treatment. As more workers fell ill on the site, which was contaminated by the relocated Wuhan Pesticide Factory, construction had to be suspended.[26] These isolated cases turned out to be only tips of the iceberg of the vast and serious land contamination in China.

Compared to the acute poisoning of construction workers by sudden exposure to exceptionally high levels of toxins accumulated in the soil, more victims are injured by land contamination quietly in a chronic manner. People with long-term exposure by direct skin contact and/or consumption of contaminated water and food are at high risk. In December 2015, nearly 500 students of Changzhou Foreign Language School fell ill after moving to the new campus in September of the same year. They complained of headaches and skin rashes. Some had been diagnosed with lymphoma and leukaemia. Less than 100 meters away to the north of the school campus was the "Changlong toxic site" undergoing remediation by an environmental service firm organized by the local government. The site had been occupied and seriously polluted by three chemical factories, Changlong, Changyu and Huada since the late 1970s. All had been relocated in 2008 and 2009.[27]

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[25] *See, e.g.,* ZHAO, *supra* note 24; Gao Shengke & Wang Kai (高胜科 & 王开), *Dudi Qianfu* (*毒地潜伏*) [*Hidden Toxic Sites*], CAIJING June 4, 2012, at 56, 69; Liu Wei (刘巍), *Beijing: Ditie Gongren Daoxia Zhihou* (*北京：地铁工人倒下之后*) [*Beijing: After the Subway Workers Fell*], 9 OUTLOOK WKLY. 49, 49-50 (2009); Liu Yang (刘扬), *Dong Tiejiangying Xianjiafang Yongdi Chechu Wuran* (*东铁匠营限价房用地彻除污染*) [*Soil at the Site of Beijing Hongshi Coatings Factory Removed for Incineration*], BEIJING DAILY, Aug. 16, 2007.

[26] *See, e.g.,* Zhang Yanchun (张彦春), *Wuhan Heshan "Dudi" Jiannan Jiedu* (*武汉赫山"毒地"艰难解毒*) [*Wuhan Heshan 'Toxic Site' Cleaned Up at High Cost*], PEOPLE'S DAILY, Jan. 4, 2013, at p.1; *Kaifa Fangdichan Wuhan Heshan "Dudi" Maile 14.4 Yi* (*开发房地产 武汉赫山"毒地"卖了 14.4 亿*) [*Real Estate Development in Heshan, Wuhan Sold "Toxic Land" for 1.44 Billion Yuan*], FIRST FIN. DAILY (Dec. 23, 2014), https://www.yicai.com/news/4055533.html [https://perma.cc/G7ZT-FLZA]; Jeffery & Zhao, *supra* note 2.

[27] *See, e.g.,* Li Jing, *Hundreds of Pupils at School near Toxic Site in East China Fall Ill, Some with Cancer, State TV Reports*, S. CHINA MORNING POST (Apr. 17, 2016), https://www.scmp.com/news/china/policies-politics/article/1936763/hundreds-pupils-school-near-toxic-site-east-china-fall

In addition to reported cases of land contamination in rural and urban China, the first national survey on soil pollution (2005–13) confirms the extreme bleak picture. The survey was led and coordinated by the Ministry of Environmental Protection ("MEP") and the Ministry of Land and Resources ("MLR") and conducted from April 2005 to December 2013. It covers roughly 6.3 million km^2 of land, including all farmland, and part of the forestland, grassland, unutilized land and development land. The MEP and MLR jointly promulgated a brief report entitled the National Soil Pollution Survey Report ("Survey Report") (2014),[28] which started in a pessimistic tone rarely seen in the opening of any government report: "The overall national soil environmental quality does not allow us to be optimistic. Soil pollution in some regions is quite severe. Soil environmental quality of the farmland is of great concern. Soil pollution at the sites historically used by industrial or mining operators are particularly problematic."[29] Of the limited data released,[30] one gains a general understanding of the nature, type, distribution, causes, extent and degree of soil pollution in China. Overall, 16.1 percent of the total monitored spots are in violation of the soil environmental quality standards.[31] More specifically, 19.4

[https://perma.cc/34ER-7NXQ]; Qin Huajiang (秦华江) et al., *Xuexiao Xuanzhi, Jü "Dudi" 100 Mi—Changzhou Xuexiao Huagong Wuran ShiJian Zhuizong* (*学校选址，距"毒地"100 米—常州学校化工污染事件追踪*) [*School Campus 100 Meters from the Toxic Site—Changzhou School Chemical Pollution Incident*], XINHUA (Apr. 19, 2016), http://www.xinhuanet.com//politics/2016-04/19/c_1118673755_3.htm [perma.cc/4UAF-ZYUP].

[28] MEP & MLR, *supra* note 1.

[29] *Id*. at pt. I.

[30] Li Jing, *Report on Mainland China's Soil Pollution a 'State Secret'*, S. CHINA MORNING POST (Feb. 26, 2013), https://www.scmp.com/news/china/article/1158602/report-mainland-soil-pollution-state-secret [https://perma.cc/7ZJJ-YXKS] (finding the government refused to release a full report in detail and raw survey data to the public presumably in order to avoid public concern and even panic over the seriousness of soil contamination in China from rural to urban areas. Public request for information disclosure of the survey data was rejected on the basis of 'state secret'). *See also* Takashi Itakura, *Current Issues with the Regulatory Framework for Managing Soil Contamination in China*, 18 ASIA PAC. J. ENV'T. L. 119, 128–130 (2015) (discussing government data control).

[31] MEP & MLR, *supra* note 1, at pt. I. The standards referred to by the Report include *Soil Environmental Quality Standard* (GB15618-1995), *Environmental Quality Evaluation Standards for Farmland of Edible Agricultural Products*

percent of the farmland, 10 percent of the forestland and grassland, and 11.4 percent of unutilized land are in violation of the relevant standards.[32] Of the 55 farmlands covered by sewage irrigation, 39 were contaminated. Of the 1,378 monitoring spots tested, 26.4 percent were in violation of relevant standards.[33] More serious pollution are found at and near the following sites:[34]

i. Heavy polluting industrial operators: of the 690 heavy polluting enterprises (ferrous metal, non-ferrous metal, tannery, paper making, petrol chemical, coal chemical, pharmaceutical, plastic, mineral production, metal production, electricity, etc.) surveyed, 36.3 percent of the 5,846 monitoring spots were in violation;
ii. Abandoned industrial sites: of the 81 sites that had been used by chemical, mining or refinery operators, 34.9 percent of the 775 monitoring spots were in violation;
iii. Industrial parks: of the 146 industrial parks surveyed, 29.4 percent of the 2,523 monitoring spots were in violation;
iv. Waste disposal sites: of the 188 solid waste disposal sites surveyed, 21.3 percent of the 1,351 monitoring spots were in violation;

(HJ/T 332-2006), and *Environmental Quality Evaluation Standards for Farmland of Greenhouse Vegetable Production* (HJ/T 333-2006). *See* Turang Huanjing Zhiliang Biaozhun (土壤环境质量标准) [Soil Environmental Quality Standard (GB15618-1995)] (promulgated by the MEE, May 1, 1995, effective May 1, 1995; repealed by the MEE, Aug. 1, 2018); Shiyong Nongchanpin Chandi Huanjing Zhiliang Pingjia Biaozhun (食用农产品产地环境质量评价标准) [Environmental Quality Evaluation Standards for Farmland of Edible Agricultural Products (HJ/T 332-2006)] (promulgated by the MEE, Nov. 17, 2006, effective Feb. 1, 2007); Wenshi Shucai Chandi Huanjing Zhiliang Pingjia Biaozhun (温室蔬菜产地环境质量评价标准) [Environmental Quality Evaluation Standards for Farmland of Greenhouse Vegetable Production (HJ/T 333-2006)] (promulgated by the MEE, Nov. 17, 2006, effective Feb. 1, 2007).

[32] MEP & MLR, *supra* note 1, at pt. III.

[33] *Id*. at pt. IV(7).

[34] *Id*. at pt. IV.

v. Oilfield: of the 13 oilfields surveyed, 23.6 percent of the 494 monitoring spots were in violation; and
vi. Mining zones: of the 70 mining zones surveyed, 33.4 percent of the 1,672 monitoring spots were in violation.

Key pollutants in the soil include both organic and inorganic pollutants. Eight major inorganic pollutants found in the soil are cadmium, mercury, arsenic, copper, lead, chromium, zinc and nickel, while major organic pollutants are HCH, DDT and polycyclic aromatic hydrocarbon (PAH).[35] So far as distribution is concerned, more severe soil contamination is found in the south as compared to the north.[36] Southern China and Southwestern China suffer from large areas of heavy metal contamination including cadmium, mercury, arsenic and lead.[37] The Pearl River Delta, Yangtze River Delta and Northeast China have particularly serious soil pollution compared to other regions.[38]

The very brief report and the fact that the authority refused full disclosure of detailed survey result was itself indication of the grave soil contamination threatening both public health and food safety.[39] Soil contamination directly affects the growth and quality of agricultural products. It not only reduces agricultural output but also increases health risks where toxins are absorbed by the plants and enter the food chain.[40] Where contaminated lands are redeveloped for residential, commercial or industrial purposes, people living or working on the premises are subject to health risks

[35] *Id*. at pt. II.
[36] *Id*. at pt. I.
[37] *Id*.
[38] *Id*.
[39] Christina Larson, *Soil Pollution Is a State Secret in China*, BLOOMBERG BUS. WK. (Feb. 25, 2013), https://www.bloomberg.com/news/articles/2013-02-25/soil-pollution-is-a-state-secret-in-china [https://perma.cc/735N-RN5Z]; Jonathan Watts, *The Clean-up Begins on China's Dirty Secret—Soil Pollution*, GUARDIAN (June 12, 2012), https://www.theguardian.com/environment/2012/jun/12/china-soil-pollution-bonn-challenge [https://perma.cc/XX5F-8HV3].
[40] For details on soil pollution, plant uptake and food chain contamination, see Natalia Rodríguez-Eugenio et al., *Soil Pollution: A Hidden Reality,* U.N. FOOD AND AGRIC. ORG. 1, 48–51 (2018), http://www.fao.org/3/i9183en/i9183en.pdf [https://perma.cc/7QVS-WF6D].

due to exposure to toxic and hazardous pollutants in the soil by intake, breath or skin contact.[41] Soil pollution causes loss of normal biological function of the soil and potential contamination of surface water, groundwater and the atmospheric environment. The survey report points to major sources of pollution, including pollution discharge by industrial and mining operations, dumping and piling of toxic and hazardous waste on land, exhaust emission by vehicles, and agricultural activities such as sewage irrigation and over-consumption of fertilizer and pesticides. The survey result has to certain extent driven the establishment of the national regime to regulate and control soil pollution.

II. THE LEGAL REGIME ON SOIL CONTAMINATION

The first regulatory instrument highlighting soil pollution control is the State Council's Decision on Implementing Scientific Development and Strengthening Environmental Protection (2005) ("Decision on Scientific Development").[42] It stipulates key measures to be taken including the national soil pollution survey, comprehensive treatment of contaminated farmland, control of pollution by pesticides, fertilizers and agricultural films,[43] and risk control and remediation of the sites left by relocation of polluting enterprises.[44] The Decision (2005) has taken the important step to start the process of government regulation on soil contamination, leading to the national soil pollution survey (2005–13), the Action Plan (2016) and the SPPCL (2018) and a range of administrative measures, standards and guidelines on soil pollution control.

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[41] *Id*. at 56–60 (discussing human exposure to soil pollution and impact on human health).

[42] Guowuyuan Guanyu Luoshi Kexue Fazhanguan Jiaqiang Huanjing Baohu de Jueding (国务院关于落实科学发展观加强环境保护的决定) [Decision of the State Council on Implementing Scientific Outlook on Development and Strengthening Environmental Protection] (promulgated by the St. Council, Dec. 3, 2005) (providing a plan for implementing a scientific outlook on environmental protections).

[43] *Id*. at pt. IV, § 14.

[44] *Id*. at pt. IV, § 12.

A. State Plans and Measures

As the national soil pollution survey (2005–13) came to a conclusion, the State Council issued the Recent Work Arrangement on Soil Environmental Protection and Comprehensive Treatment ("Recent Work Arrangement") (2013)[45] to address China's dire soil contamination issue. The Recent Work Arrangement (2013) sets short-term targets including "80% of farmland meeting the national soil quality standards by 2015, no further deterioration of soil contamination, and strict protection of farmland and drinking water source reserves (DWSR) from pollution."[46] It lays down basic principles and key tasks for addressing the issue of soil pollution. In accordance with the polluter pays principle, polluters pay for the clean-up of contaminated sites. In case polluters cannot be identified due to bankruptcy or other reasons, or polluters have no capacity to pay, potential investors in the redevelopment of the land bear the cost of site remediation.[47] Key tasks include (i) giving priority to the prevention of new contamination by targeting source control, (ii) designating priority protection zones that cover farmland and DWSR, (iii) applying risk control measures to the use of contaminated sites including farmland and development land, (iv) conducting site clean-up and remediation in select areas and regions, (v) improving the capacity of environmental monitoring of soil quality, and (vi) speeding up the implementation of soil environmental protection projects.[48]

On the basis of the Recent Work Arrangement (2013) and in the course of national legislative drafting on soil pollution, the State Council promulgated the Action Plan (2016) to take measures to improve soil environmental quality, ensure the safety of agricultural products, protect the human environment, and promote long-term sustainable use of soil resources. It sets both short-and medium-term goals:

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[45] Guowuyuan Bangongting Guanyu Yinfa Jinqi Turang Huanjing Baohu he Zonghe Zhili Gongzuo Anpai De Tongzhi (国务院办公厅关于印发近期土壤环境保护和综合治理工作安排的通知) [The Recent Work Arrangement on Soil Environmental Protection and Comprehensive Treatment] (promulgated by the St. Council, Jan. 23, 2013).
[46] *Id.* at pt. I.
[47] *Id.* at pt. III, § 2.
[48] *Id.* at pt. II.

> By 2020, national soil pollution shall be preliminarily contained and the safety of agriculture land and development land shall be basically guaranteed. The safe use rate of contaminated farmland shall be around 90% and the safe use rate of contaminated sites shall be above 90%. By 2030, the national soil environmental quality shall be improved to effectively ensure the safety of both agriculture land and development land. The safe use rate of both contaminated farmland and contaminated sites shall reach over 95%.[49]

The Action Plan (2016) stipulates ten important tasks in ten provisions:

i. Conduct soil contamination survey and investigation to assess the soil environmental quality;
ii. Promulgate soil pollution control legislation, standards and regulations;
iii. Adopt classified management of farmland and ensure the environmental safety of agricultural production;
iv. Implement threshold management over development land to prevent human health risks;
v. Strengthen protection of uncontaminated land and prevent increase of contaminated sites;
vi. Enhance regulatory control of polluting sources to prevent soil pollution;
vii. Conduct pollution treatment and remediation to improve regional soil environmental quality;
viii. Improve research and development and support development of the environmental protection industry;

[49] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), preamble.

ix. Develop a government-led soil environmental protection governance system; and
x. Strengthen environmental performance appraisal and strictly implement accountability mechanisms.[50]

Five key aspects of soil pollution regulatory control are highlighted by the Action Plan (2016). [51] First of all, in-depth survey of soil pollution to generate solid data on the area and distribution of contaminated agriculture land and the impact on agricultural products, and data on the distribution of contaminated sites used by key sectors and enterprises and their environmental risks. Secondly, making and revising laws, regulations, rules, measures and standards on the prevention and control of soil pollution. Thirdly, implementing pilot schemes and demonstration projects of treatment and remediation to establish a technical system of soil pollution prevention and control that includes pollution prevention at the source, risk control, treatment and remediation, and regulatory supervision. Fourthly, clarifying liable parties' responsibilities and regulating service providers engaging in treatment and remediation of the contaminated land. Last but not least, improving information disclosure and public education to establish a soil pollution control regime led by the government, characterized by implementation by the enterprises, participation by the public, and supervision and monitoring by the whole society. To implement the Action Plan (2016), the MEP promulgated the Measures on Contaminated Sites (2016)[52] to provide a regulatory response to contaminated sites that are planned for development of residential premises or commercial or public facilities, MEP and MOA jointly promulgated the Measures on Agriculture Land (2017) [53] to provide classified management of

[50] *See generally* Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016).
[51] *Id.*
[52] Wuran Dikuai Turang Huanjing Guanli Banfa (Shixing) (污染地块土壤环境管理办法<试行>) [Administrative Measures for the Soil Environment of the Contaminated Land Parcel (for Trial Implementation)] (introduced by MEP, Dec. 31, 2016, effective July 1, 2017).
[53] Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [The Measures on the Management of Soil Environment of

agriculture land depending on the degree of contamination to ensure the safety of agricultural products, and the MEE promulgated the Measures on Industrial and Mining Land (2018) [54] to target key polluters and key polluting sectors to prevent and control soil pollution by industrial and mining operations.

Soil contamination was on the agenda of the 13th Five-Year Plan for Economic and Social Development, [55] which stipulates measures to prevent and control soil pollution by category based on degree of contamination, giving priority to the protection of agriculture land to ensure its quality and safety and to the improvement of regulatory control over the soil environments on development land.[56] Key projects for soil pollution control include more frequent soil pollution investigation; 100 pilot contamination treatment projects each for agriculture land and development land; six demonstration zones for soil pollution control; remediation of contaminated sites left by the relocation of chemical enterprises; remediation of ten million *mu* of contaminated farmland and risk control at forty million *mu* of contaminated farmland; and treatment of heavy metal contamination at Xiang Jiang river basin in Hunan province.[57]

B. The SPPCL (2018) and Agencies in Charge

The Twelfth NPC Standing Committee included SPPCL in the law-making plan in 2013,[58] the year the national soil pollution

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Agriculture Land (for Trial Implementation)] (promulgated by MEP and MOA, Sep. 25, 2017, effective Nov. 1, 2017).

[54] Gongkuang Yongdi Turang Huanjing Guanli Banfa (Shixing) (工矿用地土壤环境管理办法<试行>) [Soil Environmental Management Measures for Industrial and Mining Land (for Trial Implementation)] (introduced by the Ministry of Ecology and Environment, May 3, 2018, effective Aug. 1, 2018).

[55] Guomin Jingji he Shehui Fazhan Di Shisange Wunian Guihua Gangyao (国民经济和社会发展第十三个五年规划纲要) [The Thirteenth Five-Year Plan for Economic and Social Development of the People's Republic of China (2016–2020)] (promulgated by the Nat'l People's Cong., Mar. 16, 2016).

[56] *Id.* at pt. X (discussing speeding up the improvement of eco-environment), Chapter 44 (discussing the strengthening environmental governance).

[57] *Id.*

[58] Dishierjie Quanguo Renmin Daibiao Dahui Changwu Weiyuanhui Lifa Guihua (第十二届全国人民代表大会常务委员会立法规划) [Law Making Plan of the 12th Standing Committee National People's Congress], Oct. 30, 2013. According

survey concluded. It took five years to draft and pass the law in 2018.[59] The SPPCL (2018) aims to protect and improve the ecological environment, prevent soil pollution, protect public health, promote sustainable use of land resources, and foster ecological civilization to achieve socio-economic sustainable development.[60] "Soil pollution" is defined as "a phenomenon that a substance is caused to enter soil on the surface of earth by human, leading to the change in the chemical, physical, biological, and other characters of soil, affecting the functions and effective utilization of soil, jeopardizing public health or damaging the ecology and environment."[61] The basic principles of soil pollution prevention and control include: emphasis on prevention, priority given to protection, classified management, risk control, polluter pays, and public participation.[62] The SPPCL (2018) is not purely a site clean-up legislation focusing on historically contaminated land; it gives priority to pollution prevention and protection of uncontaminated land. The SPPCL (2018) sets up a governance system led by the government, participated by enterprises and the public, and supervised by the society. The central government makes laws and plans, sets standards and guidelines, and coordinates among different departments and regions. The provincial governments implement state laws and plans to achieve the targets allocated by the central government. Municipal and county governments are responsible for undertaking soil survey, investigation, monitoring, risk assessment, risk control, remediation, etc., at the local and community level.[63]

The Ministry of Ecology and Environment ("MEE") is the state authority in charge of overall supervision and regulation over soil pollution prevention. Other departments including the Ministry of Agriculture and Rural Affairs ("MARA"), the Ministry of Natural

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to the Plan, SPPCL was listed as Category I legislation, drafts of which were to be deliberated during the term of the 12th NPC.

[59] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019).

[60] *Id*. at art. 1.

[61] *Id.* at art. 2(2).

[62] *Id*. at art. 3.

[63] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. IV, § 28.

Resources (MNR), the Ministry of Housing and Urban Rural Development ("MOHURD") and the National Forestry and Grassland Administration ("NFGA") provide relevant supervision and management.[64] Local bureaus play corresponding functions within local jurisdictions.[65] Local governments at all levels bear primary responsibilities for the prevention of soil pollution and the safe use of land within their jurisdictions.[66] They will implement the Action Plan (2016) by making local work plans to set key tasks and targets. Provincial governments will submit their work plans to the State Council for the record.[67] Local governments at the county level and above will incorporate soil pollution prevention and control into their socio-economic development plans and environmental protection plans.[68] Environmental bureaus at the municipal level and above will work with the relevant bureaus in charge of agriculture and rural affairs, natural resources, housing and urban and rural development, or forestry and grassland to compile "soil pollution prevention and control plans" (SPPCP) in accordance with environmental protection plans, land functions, and the results of land contamination survey and monitoring. The SPPCP will be promulgated for implementation upon approval by the people's government of the same level.[69]

Governments are subject to both internal and external supervision. Internally within the government, the target responsibility regime and performance appraisal mechanism cover soil pollution prevention and control. That is, the achievement of targets for soil pollution control is considered in the performance assessment of both departments and individuals.[70] The State Council

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[64] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 7(1).
[65] *Id*. at art. 7(2).
[66] *Id*. at art. 5(1).
[67] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. X, § 32.
[68] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 11(1).
[69] *Id*. at art. 11(2).
[70] *Id*. at art. 5(2).

will sign agreements with provincial governments to allocate national targets to each province, conduct annual reviews and assessments of the implementation of key tasks by provincial governments, and administer a final review in 2020 to assess the implementation of the Action Plan (2016). The outcome of the assessment will be important consideration in the performance appraisal of both the local administration and individuals.[71] Provincial governments that fail in their annual review will be ordered to rectify by a specified deadline, during which period EIA reviews are suspended. If rectification is not completed by the deadline, the heads of the provincial governments and relevant agencies will be requested to attend "arranged talks" with the MEE.[72] Provincial environmental bureaus will arrange talks to meet with the heads of municipal governments and relevant departments if they fail to tackle serious soil contamination and will request that timely and effective measures be taken. Information on the arranged talks and the rectification measures taken will be disclosed to the public.[73] Externally, governments are subject to supervision by the people's congress of the same level. They will include soil pollution prevention and control in their annual reports on environmental status and achievement of environmental targets, and report to the same-level people's congress or its standing committee.[74]

C. The Regulatory Infrastructure: Standards, Survey and Monitoring

Prior to the State Council's Decision on Scientific Development (2005), there had been very few standards on soil environmental management which were either outdated or too narrowly applied. One example is the Soil Environmental Quality Standard (GB15618-1995), which only applies to agriculture land, pasture, forest land and nature reserves, and not to development land

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[71] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. X, § 35.
[72] *Id*. at pt. X, § 35.
[73] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 76.
[74] *Id*. at art. 75.

in the vast urban areas.[75] The SPPCL (2018) is now supported by a regulatory infrastructure that comprises standards, survey and monitoring. Standards include soil quality standards, technical standards for site investigation, monitoring, risk assessment, remediation, etc. Surveying and monitoring are carried out by local bureaus with the guidance and coordination of state authorities.

The SPPCL (2018) grants standard-setting powers to the state and provincial authorities in charge of ecology and environment and stipulates the standard-setting process, which includes expert review and public consultation as well as follow-up reviews and updates. The MEE will promulgate national land contamination risk control standards in accordance with the relevant land use on the basis of the status of land contamination, risks to public health, ecological risk and the state's capacity in science and technology.[76] Provincial governments may promulgate local standards in respects not regulated by national standards, or promulgate standards that are tighter than national standards. Local standards will be reported to the MEE for the record.[77] The land contamination risk control standards are compulsory standards,[78] the making of which requires expert review and examination and public consultation with relevant departments, trade associations, enterprises and units, and the public.[79] There should be regular assessment of the implementation of the standards, which are subject to amendment as needed.[80] MEE and provincial environmental bureaus will promulgate the standards on their official websites for public access and download free of charge.[81]

Soil quality standards indicate the desired quality for the function of the land, without which it is difficult if not impossible to determine whether the soil is contaminated, whether it is in need of treatment and remediation, and what the targets of remediation are. The Soil Environmental Quality—Risk Control Standard for Soil

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[75] *See* Turang Huanjing Zhiliang Biaozhun (土壤环境质量标准) [Soil Environmental Quality Standard (GB15618-1995)] (promulgated by the MEE, May 1, 1995, effective May 1, 1995; repealed by the MEE, Aug. 1, 2018).
[76] *Id*. at art. 12(1).
[77] *Id*. at art. 12(2).
[78] *Id*. at art. 12(3).
[79] *Id*. at art. 13(1).
[80] *Id*. at art. 13(2).
[81] *Id*. at art. 13(3).

Contamination of Agriculture Land (for Trial Implementation) (GB15618-2018) [82] aims to protect the environmental quality of agriculture land, manage and control the risks of soil contamination of agriculture land, ensure the safety of agricultural products and the normal growth of crops, and protect the ecological environment of the land. The Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018) [83] aims to strengthen soil environmental regulation of development land, manage and control the risks of contaminated sites and their impacts on human health, and ensure the safety of the human environment. Technical standards or guidelines for monitoring, survey, investigation, risk control and remediation are of crucial importance to ensure the accuracy and reliability of monitoring data and assessment reports, and the quality and effectiveness of risk control and remediation. Examples are:

- Technical Guidelines on Environmental Site Investigation (HJ 25.1-2014);
- Technical Guidelines on Environmental Site Monitoring (HJ 25.2-2014);
- Technical Guidelines on Risk Assessment of Contaminated Sites (HJ 25.3-2014);
- Technical Guidelines on Remediation of Contaminated Sites (HJ 25.4-2014);
- Technical Guidelines on Verification of Risk Control and Soil Remediation of Contaminated Site (for Provisional Use) (HJ 25.5-2018); and
- Technical Guidelines on Remediation and Risk Control of Groundwater at Contaminated Sites (HJ 25.6-2019).[84]

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[82] Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

[83] Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

[84] *See supra* note 9.

Surveys conducted by various departments[85] have provided crucial data for preliminary understanding of China's soil pollution problems, but they were carried out over a long period of time using different methods and standards. More accurate and reliable data on the current status of soil pollution is needed for effective regulation, preventing and controlling soil pollution as well as providing proper remediation of the contaminated sites. To ensure data accuracy and timely updates, a national survey of soil environmental quality and soil contamination is institutionalized to be conducted once every ten years.[86] The State Council leads the nationwide general survey on land contamination. The MEE will work with the MARA, the MNR, the MOHURD and the NFGA to conduct a national survey on land contamination.[87] Further investigation may be carried out as needed by state ministries or local governments at the municipal level and above.[88] In addition, in-depth surveys are needed to acquire authoritative, consistent and accurate data. Considering the financial and human resources as well as the time needed to conduct an in-depth survey of soil pollution, the Action Plan (2016) takes a practical approach by focusing on agriculture land and land used by 'key polluting sectors and enterprises' at the initial stage.[89]

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[85] These include the first National Soil Contamination Survey (2005–2013), which covered 6.3 million km^2 of land in rural and urban China. *See* MEP & MLR, *supra* note 1. A smaller scale survey conducted by MLR since 1999 covered 1.5 million km^2 of land including nearly 1.4 billion *mu* of farmland by 2014. The heavy metal contamination survey conducted by the Ministry of Agriculture (MOA) covered 1.6 billion *mu* of farmland that are "major agricultural production sites." *See* Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016).

[86] *See, e.g.*, Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016) pt. I, § 1; Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 14(1).

[87] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 14(1).

[88] *Id.* at art. 14(2).

[89] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council,

Soil environmental monitoring has historically been conducted by three different departments in charge of environmental protection, land resources and agriculture for different purposes. They set up different monitoring stations and followed different methods and frequency.[90] The SPPCL (2018) consolidates the soil environmental monitoring system in order to achieve data consistency, accuracy and reliability, and promotes data sharing for improved enforcement and regulation. It requires the state to establish a land contamination monitoring system,[91] with the MEE in charge of promulgating monitoring guidelines.[92] A national monitoring network shall be established by the MEE, in collaboration with the MARA, the MNR, the MOHURD, the Ministry of Water Resources ("MWR"), the National Health Commission ("NHC"), and the NFGA. They shall jointly plan for the siting of monitoring stations[93] and place special focus on the following: (i) key pollutants of heavy metals, including cadmium, mercury, arsenic, lead and chromium, as well as organic pollutants including polycyclic aromatic hydrocarbon and petroleum hydrocarbon; (ii) key sectors including non-ferrous metal mining, non-ferrous metal smelting, oil exploitation, oil processing, chemicals, coking, electroplating, and

May 28, 2016), pt. I, § 1. By the end of 2018, survey on agriculture land shall be completed to enable a deeper understanding of the scope and distribution of soil contamination of the agriculture land and their impact on the quality of agricultural products. By the end of 2020, the state shall acquire a sound understanding of the distribution of contaminated sites used by 'key polluting sectors and enterprises' and relevant risks, make plans for in-depth investigation and develop relevant technical rules.

[90] MEP Press Conference on Action Plan on Soil Pollution Prevention and Control, MINISTRY ECOLOGY & ENV'T (May 31, 2016), https://english.mee.gov.cn/Events/Special_Topics/regular/2017hhi/201803/t20180308_432186.shtml [https://perma.cc/V34P-JTMZ]. The Ministry of Agriculture (predecessor of MARA) had set up 107 national monitoring stations at farmlands and aims to establish 152,000 monitoring stations to ensure agricultural production safety at farmlands near industrial and mining operations, farmland irrigated by industrial sewage, and suburbs surrounding large and medium-sized cities. The MEP (predecessor of the MEE) had set up 31,367 monitoring stations nationwide covering 90 percent of counties by Dec. 2015.

[91] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 15(1).

[92] *Id*. at art. 15(2).

[93] *Id*.

tannery; and (iii) major grain-producing counties and developed urban areas.[94]

Focused monitoring is required to be conducted at local levels at designated agriculture and development lands.[95] Local agencies in charge of agriculture and rural affairs, and forestry and grassland work with bureaus in charge of environment and natural resources to carry out focused monitoring at these agriculture lands: (i) sites that produce agricultural products contaminated by excessive levels of pollutants; (ii) sites that are irrigated or have been irrigated by sewage; (iii) sites previously used as animal farms, or for storage or landfill of solid wastes; (iv) sites previously used for mining or have incurred grave or severe pollution incidents; (v) sites in the vicinity of facilities for the production, storage, utilization, or disposal of toxic and hazardous substances; and (vi) any other sites as determined by the MARA, the NFGA, the MEE and the MNR .[96] Local environmental bureaus work with agencies in charge of natural resources to conduct focused monitoring of these development lands: (i) sites previously used for the production, utilization, storage, recycling or disposal of toxic and hazardous substances; (ii) sites previously used for storage or landfill of solid waste; (iii) sites that have previously incurred grave or severe pollution incidents; and (iv) any other sites as determined by the MEE and the MNR.[97] With the assistance of technological advancements, the monitoring data shall be updated and transmitted to the national soil environmental data platform,[98] which was set up by the Action Plan (2016) to provide information and scientific bases for effective regulation and decision making of different departments in charge of environmental protection, land resources, agriculture, and public health.[99] Data sharing among

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[94] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. II, § 6.

[95] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), arts. 16, 17.

[96] *Id*. at art. 16.

[97] *Id*. at art. 17.

[98] *Id*. at art. 82.

[99] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. I, § 3.

different departments will improve enforcement, standard setting, and policy making.

D. Risk Control and Remediation

The SPPCL (2018) stipulates the legal response to contaminated sites, with different mechanisms for agriculture land and development land. The critical issues of liabilities and funding remain the biggest challenges. Ideally, contaminated sites should be cleaned up to ensure safe use for any purpose. However, site clean-up and remediation involve complicated and expensive processes. Given the extent and degree of soil contamination in China, as well as the current financial and technological capacities of both the public and private sectors, it is not feasible to request clean-up of all contaminated lands in rural or urban areas. The SPPCL (2018) takes a pragmatic approach based on risk assessment and control to determine whether and to what extent remediation shall be required, considering the future use of the land. Where land is contaminated, measures of risk control and remediation are taken by liable parties which include the following steps: (i) soil pollution site investigation, (ii) soil pollution risk assessment, (iii) risk control or remediation, (iv) assessment of the effects of risk control or remediation, and (v) follow-up assessment and management.[100]

The Statutory Process in General

Site investigation is the first step of the statutory response of risk control and remediation. It is different from the soil pollution survey conducted under Article 14 of the SPPCL (2018) discussed above.[101] Site investigation is a more focused study of soil contamination at designated zones to accurately assess the extent and degree of contamination. Site investigations may be initiated for different reasons as required by SPPCL (2018): (i) where unutilized

[100] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 35.
[101] *Id.* at art. 14 (requiring general soil pollution survey to be conducted nationwide once every ten years).

land or reclaimed land are to be cultivated as farmland;[102] (ii) where agriculture land or development land is found to be at risk of being contaminated based on soil pollution survey, detailed survey, monitoring, or on-site inspection;[103] and (iii) where land use is to be changed to residential housing, public management, and public services.[104] A report is prepared upon completion of the investigation.[105] The "Soil Pollution Site Investigation Report" includes basic information of the relevant sites and whether the pollutants in the soil have exceeded the permissible standards.[106] If the pollution level exceeds the standards, the report must further specify types of pollution, sources of pollution and whether groundwater has been contaminated by pollutants in the soil.[107] Here, the standards for soil pollution risk management and control refers to The Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture Land (for Trial Implementation) (GB15618-2018)[108] and The Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018).[109]

Risk assessment is the second step if the site investigation report finds soil pollutants above the limits set by The Soil

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[102] *Id*. at art. 51. "Unutilized land" refers to wild grassland, salt marshes, swamps, deserts, bare land, bare rock etc. "Reclaimed land" refers to land whose function is restored by remediation after being damaged by production or a natural disaster.

[103] *Id*. at art. 52 (1) (discussing agriculture land); *id*. at art. 59(1) (discussing development land).

[104] *Id*. at art. 59(2).

[105] *Id*. at art. 36(1).

[106] *Id*. at art. 36(2). Here, the "basic information" includes location, area, holder of land use right, actual land use and proposed future use of the land.

[107] *Id.* at art. 36(2). Based on "types of pollution" and "sources of pollution," it is possible to make an initial determination on "parties liable for pollution."

[108] Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

[109] Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture Land (for Trial Implementation) (GB15618-2018) [110] or The Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018). [111] Soil contamination poses risks to the health and safety of humans and the environment. Contamination of agriculture land directly affects the quality of agricultural products and reduces output. The toxic pollutants in the soil may be absorbed and accumulated in the agricultural products, increasing risk to food safety and public health. Contamination of development land endangers the safety of the human environment. The toxins in the land may endanger the health of those who are exposed to them through ingestion, inhalation, or skin contact. Soil contamination poses risks to the safety of the eco-environment in general. Risk assessment focuses on both the health risks and ecological risks of soil contamination and assesses the possibilities of causing ecological damage as well as human injury, disease or death. A report is prepared upon completion of the soil pollution risk assessment. [112] The "Soil Pollution Risk Assessment Report" includes: (i) information of key pollutants; (ii) scope of contamination of the land and groundwater; (iii) safety risk of agricultural products, public health risk, and ecological risk; and (iv) targets and basic requirements of risk control and remediation. [113] Risk assessment aims to gain a deeper understanding of the specific risks and their impacts on food safety, public health, the normal eco-function of the soil environment, and life and growth of animals,

[110] Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

[111] Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018).

[112] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 37(1).

[113] *Id.* at art. 37(2).

plants, and micro-organisms. Toxic pollutants in the soil further contaminate surface water, groundwater, and even the air. These risks need to be assessed and controlled.

Risk control refers to measures to manage and control the risks of soil pollution to prevent harm to human beings. It is a low-cost alternative to site remediation that controls and reduces the risks to human beings by managing the pathways and exposures to soil pollution. Risk control of contaminated agriculture land includes the use of agricultural adjustment, substitute plantation, adjustment of planting structure, returning farmland to forestland and grassland, and designation of special zones that prohibit the growth of agricultural products to ensure safe use of farmland and safety of agricultural products. Risk control of contaminated development land includes setting up warning signs and labels to inform the public, taking measures to contain and prevent spreading of contamination, preventing human entry and interference with the sites, and strictly controlling the use of land to prevent risks posed by development.

Remediation, also known as clean-up, refers to the use of biological, physical, or chemical measures to migrate, absorb, degrade, or transform pollutants in the soil to lower the concentration and toxicity of pollutants. Remediation reduces the risk and harm posed by soil pollution and restores the eco-function of the soil, but it tends to be very costly and time-consuming due to the complex process.[114] Soil remediation relies on technology and qualified professionals to provide the service. The research and development of soil remediation technology in China started during the 10th FYP (2001–05) period. More government support was provided by the special funding for heavy metal pollution prevention and control during the 12th FYP (2011–15) period. This environmental service sector has grown from a dozen enterprises in 2010 to around 1,000 in 2016, and manpower increased from 2,000 to nearly 10,000 during

[114] The cost of remediation varies due to different types of pollution, degree of pollution, and different technologies applied. For example, the cost of remediation of agriculture land varies from several thousand to tens of thousands per *mu*, and the cost of remediation of contaminated sites of development land varies from several hundred to several thousand per cubic meters. *See* MEP, *supra* note 90 (discussing plans for improving remediation).

the same period.[115] It is of crucial importance to prevent secondary pollution caused by site remediation.

The SPPCL (2018) stipulates that any risk control or remediation action shall not cause new contamination to the sites.[116] In principle, risk control and remediation shall be carried out on-site.[117] Measures must be taken to prevent secondary pollution caused by excavation and stockpiling of contaminated soil.[118] Prior to risk control and remediation, local agencies shall have the power to request parties liable for soil contamination or parties with land use rights to take measures to remove the sources of pollution and to prevent proliferation of pollution.[119] During the work of remediation, notice boards shall be set up to inform the public of the nature of the site and project and the environmental protection measures taken.[120] Pollution generated during risk control and remediation including wastewater, air pollutants, and solid waste shall be treated and disposed of in compliance with relevant state provisions and standards.[121] Where solid waste generated by risk control or remediation, or dismantled facilities, equipment, construction, or structures are hazardous waste, they shall be disposed of in accordance with relevant state provisions and standards on toxic and hazardous waste.[122] Where remediation work involves transporting contaminated soil, the remediation operator shall prepare a transport plan, which includes the time, means, and routes of transport, and quantity, destination, and final disposal of the contaminated soil, and submit the plan to local environmental bureaus at both the place of

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[115] *See generally* MEP, *supra* note 90 (discussing progress and future plans with controlling soil pollution).

[116] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 38(2).

[117] *Id.* at art. 38 (1).

[118] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. VII, § 23.

[119] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 39.

[120] *Id*. at arts. 40(3), 65.

[121] *Id*. at art. 40(1).

[122] *Id*. at art. 40(2).

origin and place of destination.[123] Where the contaminated soil to be transported is hazardous waste, it shall be disposed of in compliance with relevant state provisions and standards.[124]

The SPPCL (2018) relies on independent and professional third parties for quality control of the environmental services of risk control and remediation.[125] Third-party verification assesses the effects of the risk control and remediation work.[126] The verification report focuses on whether the targets set in the Soil Pollution Risk Assessment Report for risk control and remediation have been achieved.[127] Where follow-up management is needed, parties liable for the soil contamination shall be responsible for the management.[128]

Agriculture Land

"Agriculture land" refers to farmland, orchards, tea plantations, and pasture.[129] Priority is given to farmland. The Action Plan (2016) and the SPPCL (2018) adopt the classified management of contaminated agriculture land to control risk at an affordable cost.[130] Detailed control mechanisms are stipulated by the Measures on Agriculture Land (2017). The focus of the regulatory regime is on farmland or cultivated land, while relevant mechanisms may also apply to orchards, plantations, grassland, and forest land.[131] Instead

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[123] *Id*. at art. 41(1).
[124] *Id*. at art. 41(2).
[125] *Id.* at art. 65.
[126] *Id*.
[127] *Id*. at art. 42(2).
[128] *Id*. at art. 42(3).
[129] Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 4; Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. III, § 7.
[130] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 39.
[131] Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [The Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation)] (promulgated by the Ministry of

of trying to clean up all contaminated agriculture land, the SPPCL (2018) classifies agriculture land into three categories to ensure the safety of agricultural products and normal growth of crops: (i) priority protection, (ii) safe use, (iii) and strict control.[132] The Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture Land (for Trial Implementation) (GB15618-2018) sets both "risk screening values" and "risk intervention values" for soil contamination of agriculture land by reference to major toxic substances including cadmium, mercury, arsenic, lead, and chromium.[133] The provincial bureaus in charge of agriculture work with environmental protection agencies to classify farmland into three categories and submit the classification to the provincial governments for review and decision.[134] Such classification may be modified resulting from change of land use and the soil environmental quality.[135]

The first category is known as "priority protection." Where the levels of toxins are at or below the "risk screening values," the agriculture land is treated as posing low risk to the safety of agricultural products, the normal growth of crops, and the soil eco-environment, which may be ignored.[136] Agriculture land with negligible risk of contamination shall be offered "priority protection"

Env't Prot. and Ministry of Agric., Sep. 25, 2017, effective Nov. 1, 2017), art. 2(3).

[132] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 49.

[133] Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), preamble.

[134] Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [The Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation)] (promulgated by the Ministry of Env't Prot. and Ministry of Agric., Sep. 25, 2017, effective Nov. 1, 2017), art. 4.

[135] *Id.* at art. 16.

[136] *See* Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准 <试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 3.4.

by local governments as "perpetual basic farmland."[137] It is prohibited to construct new projects that may cause soil pollution in areas designated as a "perpetual basic farmland concentration zone."[138] Existing projects that may cause soil pollution shall be shut down and dismantled by a specified deadline.[139] The State Council has announced the principle that the total area of "perpetual basic farmland" shall not decrease, and that the relevant soil quality shall not decline. If either happens in any county, provincial governments shall issue a warning and take measures such as suspension of EIA review and restricting local development.[140] To ensure farmland of the "priority protection" category will not decrease in area and deteriorate in quality,[141] the Measures on Agriculture Land (2017) imposes strict control over new projects of non-ferrous metal refinery, petroleum processing, chemical, coking, electroplating, and tannery.[142]

The second category is known as "safe use." Where the levels of toxins are above the "risk screening values," the agriculture land may pose risks to the safety of agricultural products, the normal growth of crops, and the soil eco-environment.[143] Safe use measures shall be taken to strengthen soil environmental monitoring and quality inspection and monitoring of the relevant agricultural products.[144] Local agencies in charge of agriculture and rural affairs,

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[137] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 50(1).
[138] *Id.* at art. 50(2).
[139] *Id.* at art. 53.
[140] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. III, § 8.
[141] Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [The Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation)] (promulgated by the Ministry of Env't Prot. and Ministry of Agric., Sep. 25, 2017, effective Nov. 1, 2017), art. 17.
[142] *Id.* at art. 18.
[143] *See* Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准 <试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 3.4.
[144] *Id.*

forestry, and grassland shall make "safe use plans" based on types of major crops and farming practices.[145] The "safe use plans" shall include: (i) agronomic control and alternative farming to lower the risk of agricultural products; (ii) regular monitoring and assessment of both soil environmental quality and quality of agricultural products; (iii) technical guidance and training of farmers, rural collective bodies, and other agricultural production operators; and (iv) other risk control measures.[146] The State Council sets a target of safe-use 40,000,000 *mu* of lightly- and moderately-contaminated farmland by 2020.[147]

The third category is known as "strict control." Where the levels of toxins are above the "risk intervention values," the agriculture land poses a high risk and agricultural products fail to meet the food safety standards.[148] Strict control measures shall be taken.[149] Local agencies in charge of agriculture and rural affairs, forestry, and grassland shall take the following risk control measures: (i) designation of special zones prohibited for specified crops subject to approval by local governments; (ii) regular monitoring and assessment of both the soil environment and the agricultural products; (iii) technical guidance and training of farmers, rural collective bodies,

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[145] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 53(1).

[146] *Id.* at art. 53(2). *See also* Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 6.2; Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [The Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation)] (promulgated by the Ministry of Env't Prot. and Ministry of Agric., Sep. 25, 2017, effective Nov. 1, 2017), art. 20 (setting standards for the monitoring, evaluation, and restoration of construction land).

[147] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. III, § 9.

[148] Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 3.5.

[149] *Id.*

and other agricultural production operators; and (iv) other risk control measures.[150] The designation of zones prohibited for the growth of crops is the power granted to local agencies in charge of agriculture to ensure the safety of agricultural products.[151] These local agencies shall monitor the toxic and hazardous substances in the air, water, and soil, and based on the nature of crops, decide if the relevant farmland is suitable for production of agricultural products.[152] If not, they shall propose to the local governments to ban the growth of crops at the contaminated farmland.[153] As a matter of fact, the State Council in its Recent Work Arrangement (2013) formally adopted the approach of cutting off the contamination pathways by instructing local governments to designate "seriously contaminated farmland" as zones prohibited for agricultural production.[154] Local agencies in charge of agriculture mainly take two measures to control risk at the agriculture land subject to "strict control." One is to propose designated zones where specified crops are banned, and the other is to implement "grain for green" programs to return farmland to forest land and grassland.[155] Governments of all levels shall provide policy incentives to encourage and support any party to take risk control measures at agriculture land subject to "strict management and control," including adjusting farming structure, returning farmland to forest land or grassland ("grain for green"), returning farmland to wetland, crop rotation and leaving fields fallow, and livestock

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[150] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 54(1).

[151] Nongchanpin Zhiliang Anquan Fa (农产品质量安全法) [The Law on the Quality and Safety of Agricultural Products] (promulgated by the Standing Comm. Nat'l People's Cong., Apr. 29, 2006, effective Nov. 1, 2006; rev'd by the Standing Comm. Nat'l People's Cong., Oct. 26, 2018), art. 15.

[152] *Id.*

[153] *Id.*

[154] Guowuyuan Bangongting Guanyu Yinfa Jinqi Turang Huanjing Baohu he Zonghe Zhili Gongzuo Anpai de Tongzhi (国务院办公厅关于印发近期土壤环境保护和综合治理工作安排的通知) [The Recent Work Arrangement on Soil Environmental Protection and Comprehensive Treatment] (promulgated by the St. Council, Jan. 23, 2013), pt. II, § 3.

[155] Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [The Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation)] (promulgated by the Ministry of Env't Prot. and Ministry of Agric., Sep. 25, 2017, effective Nov. 1, 2017), art. 24.

rotation and leaving pasture land fallow.[156] By 2020, there shall be 20,000,000 *mu* of seriously contaminated farmland to have completed farming restructuring or "grain for green" transformation.[157]

As for agriculture land of the categories of "safe use" and "strict control," if the soil pollution has impact or may have impact on the safety of groundwater or drinking water sources, local environmental bureaus shall work with agencies in charge of agriculture and rural affairs, and forestry and grassland, to make plans on pollution prevention and control, and take relevant measures.[158] Parties liable for the contamination of agriculture land in the categories of "safe use" and "strict control" shall take risk control measures in accordance with state provisions and the requirements of the "soil pollution risk assessment report," and report to local agencies in charge of agriculture and rural affairs, and forestry and grassland, on regular basis.[159] Where the agriculture land has produced products with pollution levels in excess of relevant standards and remediation is needed, parties liable for the soil contamination shall prepare remediation plans, report to local agencies in charge of agriculture and rural affairs, and forestry and grassland, for the record, and implement the plans. The site remediation plan shall include groundwater pollution control.[160] Remediation work shall give priority to biological remediation measures without adverse impact on agricultural production or soil productivity and prevent or reduce pollution from entering

[156] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 54(2). *See also* Nongyongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (农用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Agriculture land (for Trial Implementation) (GB15618-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 6.3.

[157] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. III, § 10.

[158] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 55.

[159] *Id*. at art. 56.

[160] *Id*. at art. 57(1).

agricultural products to ensure the safety of agricultural products.[161] All possible measures shall be taken to prevent secondary pollution caused by remediation and treatment.[162]

Rural collective bodies and their members and other agricultural production operators are under a duty to assist the implementation of measures of risk control and remediation.[163] Upon completion of the risk control or remediation work, parties liable for the soil pollution shall entrust third parties to conduct verification of the effects of risk control or remediation, and submit the assessment reports to local agencies in charge of agriculture and rural affairs, and forestry and grassland for the record.[164] The State Council has required those provinces with large areas of contaminated farmland including Jiangxi, Hubei, Hunan, Guangdong, Guangxi, Sichuan, Guizhou, and Yunnan to take the lead in contaminated site treatment and remediation.[165] Other provinces shall follow suit.[166] By 2020, 10 million *mu* of contaminated farmland shall have completed treatment and remediation.[167]

Development Land

"Development land" refers to land used for the construction of buildings or structures, including urban and rural land for residential premises and public facilities, land for industrial and

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[161] *Id*. at art. 57(2); *see also* Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法 <试行>) [The Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation)] (promulgated by MEP and MOA, Sep. 25, 2017, effective Nov. 1, 2017), art. 19(3).

[162] *See* Nongyongdi Turang Huanjing Guanli Banfa (Shixing) (农用地土壤环境管理办法<试行>) [The Measures on the Management of Soil Environment of Agriculture Land (for Trial Implementation)] (promulgated by MEP and MOA, Sep. 25, 2017, effective Nov. 1, 2017), art. 22 (setting standards for the monitoring, evaluation, and restoration of construction land).

[163] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 57(4).

[164] *Id*. at art. 57(3).

[165] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. VII, § 23.

[166] *Id.*

[167] *Id.*

mining operation, land for transport and hydropower infrastructure, land for tourism, and land for military facilities etc.[168] For purposes of risk control and management, development land is divided into two types: "Type I development land" includes land for residential premises, primary and secondary schools, medical services, social welfare facilities, community parks and children's playgrounds etc.[169] "Type II development land" includes land for industrial operation, logistics storage, commercial service, road and transport, public facility, public service, greenery and squares other than those covered under Type I.[170] Where the land use right of "suspected contaminated sites" or "contaminated sites" is reclaimed or will be reclaimed by the governments and the land use is planned for development of residential or commercial premises, or for public facilities including schools, hospitals and elderly homes, measures shall be taken by both the governments and liable parties to control risk or clean up the sites.[171] "Suspected contaminated sites" include the land that has been used for production and operation involving non-ferrous metal refinery, petroleum processing, chemical, coking, electroplating, tannery, etc., and that has been used for the storage, utilization, or disposal of toxic and hazardous waste.[172] "Contaminated sites" refers to those with pollutants reaching the relevant state standards on soil environmental quality.[173] The

[168] *See* Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art 3.1.

[169] *See* Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准<试行>) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art 4.

[170] *See id.*

[171] *See* Wuran Dikuai Turang Huanjing Guanli Banfa (Shixing) (污染地块土壤环境管理办法<试行>) [Administrative Measures for the Soil Environment of the Contaminated Land Parcel (for Trial Implementation)] (introduced by MEP, Dec. 31, 2016, effective July 1, 2017), art. 3.

[172] *See id.* at art. 2(1).

[173] *See id.* at art. 2(2).

regulatory responses include initial investigation of "suspected contaminated sites," detailed investigation, risk assessment, risk control, treatment and remediation, and verification and appraisal of remediation of the "contaminated sites."[174]

Contaminated development land poses risks to human health resulting from long-term exposure to the toxic or carcinogenic pollutants in the soil by people living or working on the development land.[175] The Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018) sets both "risk screening values" and "risk intervention values" for soil contamination of development land by reference to a set of pollutants including heavy metals, inorganic chemicals, volatile organic compounds (VOC) and semi-VOCs.[176] Where the levels of pollutants in the development land are at or below the "risk screening values," the risk to human health may be ignored.[177] Where the levels of pollutants reach the "risk screening values," there may be human health risk and further investigation and risk assessment shall be conducted to determine the scope of contamination and level of risk.[178] Where the levels of pollutants reach the "risk intervention values," there is unacceptable risk to human health. Measures shall be taken to control risk or remediate the contaminated sites.[179] It should be noted that there are two sets of "risk screening values" and "risk intervention values" stipulated for two types of development lands respectively to offer different levels of protection. "Type I development land" tolerates lower levels of pollutants compared to "Type II development land" as the former tends to be occupied by a more vulnerable population

[174] *See id.* at art. 2(3).
[175] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. VII, § 23.
[175] *See* Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准（试行）) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 3.2.
[176] *Id.* at arts 3.4, 3.5.
[177] *Id.* at art. 3.4.
[178] *Id.*
[179] *Id.* at art. 3.5.

(children, elderly and people suffering from illness etc) subject to potentially longer periods of exposure by staying at the relevant premises.[180]

The SPPCL (2018) requires "key entities of soil pollution" with land use rights to conduct site investigations prior to a change of land use, surrender, or transfer of land use rights. The "site contamination investigation report" shall be submitted to the local authority in charge of real property registration, and reported to local environmental bureau for the record.[181] Where local governments plan to reclaim the land use rights of enterprises of non-ferrous metals smelting, oil processing, chemical, coking, electroplating, and tannery and intend to change the land use to development of residential or commercial premises, schools, medical services, elderly housing, etc., the relevant industrial enterprises shall conduct a site investigation and assessment of the soil environmental quality prior to surrendering the land use rights to the governments. Where the land use rights are already reclaimed by the local governments, the governments shall arrange the investigation and assessment of the relevant sites. Where seriously contaminated agriculture land is to be converted to urban development land, local governments shall arrange an investigation and assessment of the relevant site. Results of such investigation and assessment shall be reported to local agencies in charge of environmental protection, urban planning and land resources for the record.[182]

The state implements a catalogue system on the risk control and remediation of contaminated development land.[183] The "catalogue for the management and control of soil pollution risk and remediation" of contaminated development land (the "Catalogue") shall be prepared by the provincial bureau in charge of ecology and the environment in collaboration with the bureau in charge of natural

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[180] *Id.* at art. 5.

[181] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 67.

[182] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. IV, § 12.

[183] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 58(1).

resources, disclosed to the public, and updated in a timely manner.[184] Contaminated sites included in the Catalogue shall not be developed for use as residential, public management, or public service premises.[185] The decision to include a site in the Catalogue by the provincial bureaus is based on risk assessment reports of the contaminated sites conducted by parties liable for contamination or parties with land use rights and shall be reported to the MEE on a regular basis.[186] Where relevant work of risk control and remediation is completed, and the relevant site is assessed to have achieved the risk control and remediation targets set by the "soil pollution risk assessment report," parties liable for pollution or parties with land use rights may apply to provincial environmental bureaus to remove the site from the Catalogue.[187] The removal decision shall be made based on a third party's assessment reports of the effects of risk control and remediation, disclosed to the public, and reported to the MEE.[188]

As for the contaminated sites included in the Catalogue, parties liable for soil contamination shall take measures to manage and control risk and report to the local environmental bureau. Such risk control shall include measures to prevent and control groundwater contamination.[189] Local environmental bureaus may take risk control measures regarding the contaminated sites in the Catalogue, including the designation of isolation zones and monitoring of soil and groundwater quality.[190] Local governments shall set up signposts and issue announcements to inform the public of the relevant contaminated sites and conduct monitoring of soil, surface water, groundwater, and air quality.[191] Where contamination expands, liable parties shall take timely measures to isolate or block

[184] *Id*. at art. 58(2).
[185] *Id*. at art. 61(2).
[186] *Id*. at arts. 60, 61(1). Such risk assessment is conducted on the land for construction use that has been found by the soil pollution investigation report to have contained pollutants in violation of the soil pollution risk control standards.
[187] *Id*. at art. 66(1).
[188] *Id*. at arts. 65, 66(2).
[189] *Id*. at art. 62.
[190] *Id*. at art. 63.
[191] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. IV, § 12

such pollutants from spreading beyond the contaminated sites.[192] For contaminated sites not yet to be developed for any use, risk control measures mainly focus on the prevention of the spreading of contamination,[193] including timely removal or treatment of sources of pollution, taking measures to insulate and stop the spreading of contamination, monitoring of soil, surface water, groundwater, and air quality, and taking measures to contain contamination if spreading occurs.[194]

Given the extent and degree of site contamination in China and limited financial capacity to provide costly remediation, the central government gives priority to those sites planned for the development of residential premises, commercial buildings, schools, hospitals, and homes for the elderly.[195] Liable parties shall prepare remediation plans, report to the local environmental bureau for the record, and implement the plan.[196] The remediation plan shall include the prevention and control of groundwater pollution.[197] The remediation target shall be set in accordance with the Technical Guidance on Risk Assessment of Contaminated Sites (HJ25.3-2014) and the Technical Guidance on Remediation of Contaminated Sites (HJ25.4-2014), and the pollutants' levels shall be lower than the risk intervention values for soil contamination of development land.[198]

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[192] *Id. See also* Wuran Dikuai Turang Huanjing Guanli Banfa (Shixing) (污染地块土壤环境管理办法<试行>) [Administrative Measures for the Soil Environment of the Contaminated Land Parcel (for Trial Implementation)] (introduced by MEP, Dec. 31, 2016, effective July 1, 2017), art. 21 (entities with land use rights must "take environmental emergency measures in a timely manner").

[193] Wuran Dikuai Turang Huanjing Guanli Banfa (Shixing) (污染地块土壤环境管理办法<试行>) [Administrative Measures for the Soil Environment of the Contaminated Land Parcel (for Trial Implementation)] (introduced by MEP, Dec. 31, 2016, effective July 1, 2017), art. 18.

[194] *Id.* at art. 20.

[195] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. VII, § 23.

[196] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 64.

[197] *Id.*

[198] *See* Turang Huanjing Zhiliang Jianshe Yongdi Turang Wuran Fengxian Guankong Biaozhun (Shixing) (土壤环境质量建设用地土壤污染风险管控标准

Upon completion of the work of risk control and remediation, parties liable for soil pollution shall engage a third party to conduct verification of the effects of relevant work and submit the verification reports to local environmental bureaus.[199] Where the land use right has already been reclaimed by the local government, and the party liable for soil pollution is the former holder of the land use right, the local government shall be responsible for organizing the work of risk control and remediation of the contaminated sites.[200]

The SPPCL (2018) and the Action Plan (2016), supported by standards and measures, have established the contaminated land legal regime in China. The soil environmental governance structure is set up with government agencies in charge, polluters responsible for pollution prevention, risk control, and remediation, and the public exercising supervision over both governments and polluters. There are, however, some gaps in the regime that may delay or inhibit effective treatment of the contaminated sites.

III. WEAKEST LINKS OF THE CONTAMINATED LAND REGIME

A closer examination of the contaminated land legal regime in China reveals a few weakest links that deserve attention. Firstly, the SPPCL (2018) uses the term "parties liable for soil contamination" without defining it, leaving a difficult issue for the MEE to address through administrative measures. Secondly, the SPPCL (2018) does not expressly stipulate the nature of the legal liability for clean-up of historical contamination. Thirdly, the lack of robust funding mechanisms to cover the prohibitively high clean-up cost will inevitably delay the remediation of contaminated sites or restrict clean-up options to cheaper alternatives. Last but not least, the lack of information transparency and public participation remains a valid concern. Without a legal guarantee of public access to accurate and

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（试行）) [Soil Environmental Quality—Risk Control Standard for Soil Contamination of Development Land (for Trial Implementation) (GB36600-2018)] (promulgated by the MEE & State Admin. for Mark. Reg., June 22, 2018, effective Aug. 1, 2018), art. 5.3.6.

[199] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 65.

[200] *Id*. at art. 68.

reliable soil pollution data or public supervision over both governments and liable parties, it is difficult to ensure sound decision-making by the agency and quality control over the site clean-up.

A. Parties Liable for Soil Pollution?

"A person liable for soil pollution" shall take measures to carry out risk control or remediation of the contaminated sites.[201] They bear the costs of soil pollution site investigation, risk assessment, risk control, remediation, third-party verification, and follow-up management.[202] Where a liable party has changed its legal status, the entity or individual who has inherited its rights and duties shall be deemed as the liable party under duty to conduct risk control or remediation of the contaminated sites and bear the relevant costs.[203] Thus, any unit or individual that has caused soil contamination shall bear the liability for treatment and remediation of the contaminated site.[204] The former land use right holder is liable for the land contamination that it caused during the time of its use.[205] Such liability exists throughout the lives of the polluters.[206]

In circumstances where it is impossible to ascertain the party liable for the contamination, holders of land use rights of the contaminated sites shall undertake risk control and remediation.[207] Where needed, local governments and local agencies may organize

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[201] *Id*. at art. 45(1); *see also* Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. VII, § 21.
[202] *Id*. at art. 46.
[203] *Id*. at art. 47; *see also* Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. VII, § 21.
[204] Wuran Dikuai Turang Huanjing Guanli Banfa (Shixing) (污染地块土壤环境管理办法<试行>) [Administrative Measures for the Soil Environment of the Contaminated Land Parcel (for Trial Implementation)] (introduced by MEP, Dec. 31, 2016, effective July 1, 2017), art. 10(1).
[205] *Id.* at art. 10(5)
[206] *Id.* at art. 10(6).
[207] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 45(1).

the implementation of risk control and remediation work.[208] In practice, it is often the current land use right holder that is required to take all measures in response to the contaminated sites,[209] including initial investigation of the suspected contaminated site, preparation of the investigation report,[210] detailed investigation of the contaminated site, and preparation of the detailed investigation report,[211] followed by risk assessment,[212] risk control,[213] and remediation.[214] In China, most contaminated sites in cities were exposed by industrial relocation dating back to the 1990s.[215] In most cases, the current land use right holder is either the local government or property developer that has obtained the land use right by auction.[216] Therefore, local governments either undertake remediation work and pass the clean-up cost to land transferees or require the land transferees to clean up the site under governmental supervision. Either way, the cost of site remediation is borne by the developer of the land and passed onto home buyers instead of polluters, i.e., former industrial operators who caused the pollution.

The toxic poisoning of three subway construction workers in Beijing exposed contaminated land in urban China for the first time

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[208] *Id*. at art. 45(2).

[209] Wuran Dikuai Turang Huanjing Guanli Banfa (Shixing) (污染地块土壤环境管理办法<试行>) [Administrative Measures for the Soil Environment of the Contaminated Land Parcel (for Trial Implementation)] (introduced by MEP, Dec. 31, 2016, effective July 1, 2017), art. 9.

[210] *Id*. at art. 13.

[211] *Id*. at art. 16.

[212] *Id*. at art. 17.

[213] *Id.* at arts. 18, 19, 20.

[214] *Id.* at arts. 23, 24, 25.

[215] *See supra* note 24.

[216] A recent study examined 174 contaminated sites in provincial capitals in China and found that, by October 2018, 60 percent of the sites were held by the local governments and 25 percent by developers who have acquired the land use rights from the local governments. *See* Bao Hang (保航) et al., *Zhongguo Chengshi Wuran Dikuai Kaifa Liyong Zhong de Wenti Yu Duice* (*中国城市污染地块开发利用中的问题与对策*) [*Issues and Responses in the Development of Contaminated Sites in Urban China*], GREENPEACE & NANJING U. RSCH. INST. OF ECOLOGY AND ENV'T (NURIEE) (绿色和平和南京大学（溧水）生态研究院) (Apr. 2019), https://www.greenpeace.org.cn/wp-content/uploads/2019/04/中国城市污染地块开发利用中的问题与对策-终版.pdf [https://perma.cc/NHL3-VQLV], at 16.

and forced the SEPA to investigate and address historical contamination.[217] It issued the Circular on Earnestly Accomplishing Pollution Prevention Work in the Enterprise Relocation Process ("SEPA Circular"),[218] ordering industrial enterprises and laboratories generating hazardous waste and other bodies generating or disposing hazardous waste to entrust qualified environmental monitoring firms with conducting site assessments and preparing site contamination reports, including types of pollutants, the extent and degree of soil and groundwater contamination when they terminate operation, and the land use changes. The site assessment report shall be submitted to the provincial EPBs for examination.[219] An environmental remediation plan shall be prepared based on the assessment report and implemented under the supervision of local EPBs.[220] In principle, it is the responsibility of the entities that have operated on the site and caused contamination to clean up and restore the function of the soil.[221] But in practice, it is not always feasible to make polluters pay. Those former industrial operators may either cease to exist or do not have the financial capacity to pay. In contrast, the potential land transferees and property developers tend to be more financially capable of bearing the high cost of site remediation.[222] The Beijing Red Lion ("Hongshi") site was an example where the government expressly required developers to clean up the contaminated site to the satisfaction of the environmental authority prior to redevelopment of the land in the bidding documents.[223] The initial assessment found high levels of DDT and HCH in the soil. The site was previously used by a pesticide factory established in the 1970s and then by the

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[217] *See supra* note 25.

[218] SEPA issued the *Circular on Earnestly Accomplishing Pollution Prevention Work in the Enterprise Relocation Process* on 1 June 2004. *See* Guanyu Qieshi Zuohao Qiye Banqian Guocheng Zhong Huanjing Wuran Fangzhi Gongzuo de Tongzhi (关于切实做好企业搬迁过程中环境污染防治工作的通知) [The Circular on Earnestly Accomplishing Pollution Prevention Work in the Enterprise Relocation Proces] (promulgated by the Gen. Off. St. Env't. Prot. Admin., June 1, 2004, effective June 1, 2004).

[219] *Id.* at art. 1.

[220] *Id*.

[221] *Id.* at art. 3.

[222] *See generally* Michael G. Faure & Liu Jing, *Compensation for Environmental Damage in China: Theory and Practice*, 31 PACE ENV'T L. REV. 226, 226–309 (2014).

[223] *See* Gao & Wang, *supra* note 25.

Beijing Red Lion ("Hongshi") Paint Factory until November 2005, when the land use right was reclaimed by the Beijing municipal government to implement a large-scale industrial relocation plan.[224] The former industrial site was designated for redevelopment of a fixed-price residential housing project, and the land use right was auctioned in. All parties interested in bidding for the site were informed of the site contamination and were required to submit site remediation proposals for approval by the Beijing EPB.[225] Beijing Vanke, one of China's biggest property developers, acquired the land use right of the site for ¥590,000,000, way above the initial asking price of ¥352,000,000 by the Beijing Municipal Land Reserve Center.[226] The first task for Vanke was to remove the contaminated soil for safe disposal by incineration, as recommended by the Soil Research Institute of the Chinese Academy of Science, to the satisfaction of the Beijing EPB at the cost of ¥100,000,000.[227] The Beijing approach works in other first-tier cities, including Shanghai, Guangzhou, and Shenzhen, where the property markets have promised lucrative returns for decades.

In less-developed cities, such as Wuhan in central China, property developers are less willing or able to bear the cost of contaminated site clean-up, as in the case of the Wuhan Heshan toxic site legal dispute.[228] The 242 *mu* Heshan site was auctioned by the

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[224] *See, e.g.*, ZHAO, *supra* note 2, at 630; Gao & Wang, *supra* note 25; Liu Wei, *supra* note 25, at 49–50; LIU YANG, *supra* note 25; PAN, *supra* note 25.

[225] *See* Gao & Wang, *supra* note 25. *See also* Xu Huiying (许慧颖), *Wanke Shouci Huiying Xianjiadi Wuran Zhiyi* (*万科首次回应限价地污染质疑*) [*Vanke's First Response to Contamination of the Limited Price Land*], FIRST FIN. DAILY, Aug. 17, 2007.

[226] Liu Yuxin (刘宇鑫), Fangchan Dae Jingbiao Dierpi Liangxianfang ("房产大鳄"竞标第二批两限房) [Big Developers Bid for Second Batch of Two Limits Housing Sites], BEIJING DAILY, July 12, 2007; Xu Huiying (许慧颖), *Dierpi Liangxianfang Zhaobiao Jiexiao Wanke Beijing Shouci Zhongbiao* (*第二批"两限"房招标揭晓万科北京首次中标*) [*Vanke Won the Second Batch of Two Limits Housing Bids in Beijing*], FIRST FIN. DAILY, July 27, 2007.

[227] *Id. See also* Wang Weimin (王伟民), *Beijing Guotuju Huiying Dudi Churang Zhiyi (北京国土局回应"毒地出让"质疑)* [*Beijing Land Bureau Responds to Query over Toxic Site Transfer*], CHINA REAL PROP. NEWS, Aug. 20, 2007; Xu, *supra* note 225.

[228] *See, e.g.*, Zhang, *supra* note 26; Zhou Fang (周芳), *Wuhan "Dudi" Chongsheng* (*武汉"毒地"重生*) [*Wuhan "Toxic Site" Reborn*], FIRST FIN.

Wuhan Land Reserve Centre to a local property developer, Sanjiang Aerospace Property Co. (Sanjiang), at the price of ¥405,500,000 in 2006.[229] By February 2007, Sanjiang became aware of the seriousness of the extent and degree of toxic contamination, as many workers fell ill on the construction site with symptoms of toxic poisoning.[230] Sanjiang suspended construction and requested cancellation of the transaction.[231] In 2010, Sanjiang returned the site to the Wuhan Land Reserve Centre for a refund of ¥405,500,000 and was paid compensation of ¥120,000,000.[232] It took the local government over three years to complete the site remediation at the actual cost of over ¥280,000,000.[233] Thanks to the continuing boom of China's property market from first-tier to second-tier cities, the Wuhan Land Reserve Centre was able to auction the land use right in 2014 to Shanghai Huiye Enterprise Ltd. at the initial asking price of ¥1,440,000,000.[234]

In both cases of the Beijing Red Lion ("Hongshi") site and the Wuhan Heshan site, the "polluters" causing land contamination ceased to exist or had no capacity to pay. The "orphan sites" were cleaned up by the developers or local governments before they were redeveloped for safe use as commercial or residential premises. Yet, the Changlong toxic site is not an "orphan site" where polluters cannot be ascertained or no longer exist. Three former operators, Changlong, Changyu, and Huada chemical factories, were relocated but were still in operation.[235] They were relocated in 2008 and 2009,

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DAILY, Dec. 25, 2014. *See* Jeffery & Zhao, *supra* note 2, at 424–425 (2012) (referring to the case as China's first land contamination litigation).

[229] *Id.*

[230] *Id.*

[231] *Id.*

[232] *Id.*

[233] Zhang, *supra* note 26; Zhou, *supra* note 228.

[234] Zhou, *supra* note 228.

[235] *See generally* Beijing Shi Chaoyang Qu Ziran zhi You Huanjing Yanjiusuo, Zhongguo Shengwu Duoyang Xing Baohu yu Lüse Fazhan Jijinhui yu Jiangsu Chang Moumou Gong Youxian Gongsi, Changzhou Shi Chang Mou Huagong Youxian Gongsi deng Ershen Minshi Panjueshu (北京市朝阳区自然之友环境研究所、中国生物多样性保护与绿色发展基金会与江苏常某某工有限公司、常州市常某化工有限公司等二审民事判决书) [Friends of Nature et al. v. Changlong Chemical et al.] (Jiangsu High Court, Dec. 26, 2018). *See also* Ma Xiaohua (马晓华), *Changzhou Yisi 'Dudi' 50 Nian Wuran Shi* (*常州疑似'毒地'50 年污染史*) [*Fifty Years of Pollution History of Changzhou Suspected 'Toxic*

surrendering the land use rights to the Changzhou Xinbei Land Reserve Center.[236] Serious contamination of the soil and groundwater was discovered in 2011, when the Xinbei District Government planned to change the site's land use for residential development.[237]

Friends of Nature and the CBCGDF sued Changlong, Changyu, and Huada, seeking remedies including (i) elimination of pollution in the soil and groundwater at and around the Changlong site; (ii) payment of the cost of site remediation, which was ¥370,000,000; (iii) offer of public apologies for site contamination in national, provincial, and municipal media; and (iv) compensation to plaintiffs to cover the cost of litigation, including the investigation fee, testing fee, appraisal fee, remediation plan drafting fee, lawyers' fee, expert consultation fee, court case acceptance fee, etc.[238] The defendants denied liability on the ground that they had surrendered the land use rights to the local government years before site contamination was discovered in 2011, and the government-organized site remediation had been underway since 2013. At first instance, the Changzhou Intermediate Court rejected all claims of the two NGOs and ordered them to pay a court acceptance fee of ¥1,891,900.[239] The land use right of the Changlong site was

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Site'], FIRST FIN. DAILY, Apr. 22, 2016; Chen Yang (陈阳), *Changzhou 'Dudi' Shijian Beihou de 'Zui yu Fa'* (*常州'毒地'事件背后的'罪与罚'*) [*'Crime and Punishment' behind the Changzhou 'Toxic Site' Incident*], CHINA ECON. NEWS, Apr. 29, 2016; Liu Zhaopu (刘照普), *Changzhou 'Dudi' Shijian Diaocha* (*常州'毒地'事件调查*) [*Investigation of Changzhou Toxic Site*], CHINA ECON. WKLY., May 2, 2016, at 26–29.

[236] *Id.*

[237] *Id.*

[238] *Id.*

[239] Court acceptance fees are charged in accordance with the *Measures on Payment of Litigation Fees* (2006). Where plaintiff makes claim of monetary payment in cases of property dispute, fees are charged under article 13(1), which sets a percentage to the amount of claim. For instance, 50 yuan is charge for claims up to 10,000 yuan. 2.5 percent is charged to the amount over 10,000 yuan to 100,000 yuan, 2.0 percent is charged to the amount over 100,000 yuan to 200,000 yuan, and so on so forth. Changzhou Intermediate Court calculated court acceptance fees based on plaintiffs' claim of projected site remediation cost of 370 million yuan. Under article 29(1), the party who loses the case shall pay litigation fees. *See* Susong Feiyong Jiaona Banfa (诉讼费用交纳办法)

reclaimed by the government and included in the Changzhou Xinbei Land Reserve Centre in 2009. Prior to this litigation, both the Changzhou government and the Xinbei government had started site remediation based on site investigation and risk assessment. It was practically impossible to ask the three defendants to replace the governments in implementing the remediation plan. In addition, the plaintiffs failed to prove the extent and percentage of the liability of the three defendants and their predecessors that had jointly caused the site contamination since the 1970s. Upon appeal, the Jiangsu High Court overturned the first-instance judgment and clarified the important issues on legal liabilities for site contamination. The three respondents had caused pollution to the soil and groundwater by industrial operation and toxic waste disposal on the Changlong site. The polluter pays principle requires polluters to bear the cost of pollution. Changlong, Changyu, and Huada are liable parties for site clean-up as polluters. The fact that they are no longer holders of land use rights does not exempt them from their liabilities as polluters. However, site remediation was already underway, led by the local governments, and it would be undesirable to order the three respondents to initiate site remediation. It is impossible to order payment of remediation expenses, as the process is ongoing. The local governments have the right to recover the cost of remediation from the three polluters in due course. The court ordered Changlong, Changyu, and Huada to issue public apologies in national media and pay ¥230,000 to each appellant to cover their cost of litigation, including the lawyers' fee, travel expenses, etc. The court acceptance fees were revised to ¥100 for the first-instance trial and ¥100 for the appeal.[240] They shall be jointly paid by the three companies.[241]

The Changlong case has exposed the gap between the principle of polluters pay and the practice of governments pay. It is especially true when the contaminated site is to be used for public

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[Measures on Payment of Litigation Fees] (promulgated by the St. Council, Dec. 8, 2006, effective Apr. 1, 2007), CLI.2.82815(EN) (Lawinfochina).

[240] *Id.* *See* Friends of Nature v. Changlong Chemical, *supra* note 235. The court acceptance fee was revised to 100 yuan for the reason that plaintiffs requested defendants to carry out site remediation to clean up soil and water contamination. It was not a monetary claim and the court acceptance fee shall be charged under article 13(2) of the *Measures on Payment of Litigation Fees* (2006), which is charged 50 yuan to 100 yuan per case.

[241] *Id.*

greenery rather than commercial development. One study on the remediation of contaminated sites in urban China found that polluters were liable for remediation and treatment of thirty-three percent of the contaminated sites.[242] The rest were paid by local governments and developers.[243] This practice has placed undue financial burdens on the local governments, which results in less costly response measures, such as "capping" as a substitute for remediation and clean-up to remove the toxins from the soil. What is missing from the contaminated land regime is an effective mechanism to implement the polluter pays principle and hold polluters liable for the cost of site remediation.

The SPPCL (2018) leaves the crucial task of determining "parties liable for soil contamination" to the MEE, which has been working on administrative measures to clarify the concept for implementation by local agencies. The draft Measures on Identifying Parties Liable for Soil Contamination of Development Land (for Trial Implementation) and the draft Measures on Identifying Parties Liable for Soil Contamination of Agriculture Land (for Trial Implementation) was circulated in September, 2019 for public consultation.[244] According to MEE, "parties liable for contaminated development land" include any units or individuals that have discharged, dumped, piled up, landfilled, leaked, scattered, permeated, ran off, or spread pollutants or any other toxic and hazardous substances since the implementation of EPL (for Trial Implementation) (1979) on September 13, 1979, causing land contamination.[245] "Parties liable for contaminated agriculture land" include (i) any units or individuals that have discharged, dumped, piled up, landfilled, leaked, scattered, permeated, ran off, or spread

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[242] *Id.* *See* Bao Hang et al., *supra* note 216, at 20.
[243] *Id.*
[244] Both draft measures were published on the official website of MEE on Sept. 17, 2019 for public consultation until Nov. 5, 2019, accessible at http://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/ [https://perma.cc/WB2Q-3YTF].
[245] MEE, Jianshe Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (建设用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Construction Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), http://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734052.shtml [https://perma.cc/B8QF-YHPF], at art. 3.

pollutants or any other toxic and hazardous substances since the implementation of EPL (for Trial Implementation) (1979) on September 13,1979, causing contamination of agriculture land; (ii) manufacturers and sellers who engage in illegal production or sale of sub-standard pesticides, fertilizers and other agricultural inputs that cause contamination of agriculture land; and (iii) agricultural production and operation organizations who engage in illegal use of sub-standard pesticides, fertilizers and other agricultural inputs that cause contamination of agriculture land.[246] Note that the user is limited to agricultural production and operation organizations and does not cover individual farmers or individual rural households.

The administrative process of determining "liable parties" can be very time-consuming, involving investigation (up to ninety working days and a special extension of thirty working days, not counting re-investigation),[247] examination of the investigation report (up to fifteen working days),[248] and agency approval of the examination opinion (up to fifteen working days and a special extension of thirty working days).[249] The process can be prolonged

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[246] MEE, Nongye Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (农业用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Agricultural Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), https://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734043.shtml [https://perma.cc/RPR9-DGZL], at art. 3.

[247] MEE, Jianshe Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (建设用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Construction Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), http://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734052.shtml [https://perma.cc/B8QF-YHPF], at art. 20. Re-investigation takes another 30 working days under art. 24; *see also id.* at arts. 17, 21.

[248] *Id.* at art. 22; *see also* MEE, Nongye Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (农业用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Agricultural Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), https://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734043.shtml [https://perma.cc/RPR9-DGZL], art. 19.

[249] MEE, Jianshe Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (建设用地土壤污染责任人认定办法（试行）（征求意

even further since the agency approval decision is subject to administrative review and judicial review if relevant parties including parties liable for soil contamination and parties with land use rights disagree with the agency's determination on liable parties.[250] Actual site clean-up will not begin until the parties in dispute have exhausted all administrative and judicial processes to sort out their legal liabilities.

B. Nature of the Clean-up Liability: Strict and Retroactive?

The design of a liability regime often serves the purpose of ensuring that there is an adequate number of liable parties capable of bearing the financial responsibility for site remediation. That explains the strict and retrospective "joint and several" liability clause imposed on potentially liable parties under the US superfund legal regime. China has clearly taken a different approach. The liability regime proposed by the MEE under SPPCL (2018) is a complex mixture of strict liability and fault-based liability, which can be either

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见稿）[Measures on Identifying Parties Liable for Soil Contamination of Construction Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), http://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734052.shtml [https://perma.cc/B8QF-YHPF], art. 25; *see also* MEE, Nongye Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (农业用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Agricultural Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), https://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734043.shtml [https://perma.cc/RPR9-DGZL], art. 22.

[250] MEE, Jianshe Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (建设用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Construction Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), http://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734052.shtml [https://perma.cc/B8QF-YHPF], art. 27(3); *see also* MEE, Nongye Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (农业用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Agricultural Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), https://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734043.shtml [https://perma.cc/RPR9-DGZL], art. 24(2).

retroactive or non-retroactive depending on the liable parties. The draft Measures (2019) are still pending approval for promulgation and implementation. The key points include drawing a cut-off date for retrospective application of the legal liability of polluters, and making a distinction between "industrial and mining operators" and "manufacturers and sellers of pesticides and fertilizers" in the application of strict liability.

Where "parties liable for soil pollution" are industrial and mining operators, the legal liability is strict and retrospective back to September 13, 1979, when EPL (for Trial Implementation) was implemented.[251] China's first environmental statute stipulates that "all enterprises and institutions shall take measures to prevent environmental pollution and destruction in their siting, design, construction and operation." [252] "Entities that have caused environmental pollution or other public hazards shall make plans and provide treatment in accordance with the polluter pays principle."[253] Since all industrial and mining operators causing land contamination have been regulated by the EPL (for Trial Implementation) (1979), they shall be liable for the soil contamination caused by their discharge, dumping or emission of pollutants, waste, or wastewater regardless of fault or violation of law. In other words, operators are not liable for contamination caused before the regime was implemented on September 13,1979.

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[251] MEE, Jianshe Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (建设用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Construction Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), http://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734052.shtml [https://perma.cc/B8QF-YHPF], art. 3; *see also* MEE, Nongye Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (农业用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Agricultural Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), https://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734043.shtml [https://perma.cc/RPR9-DGZL], art. 3.

[252] Huanjing Baohu Fa (Shixing) (环境保护法 <试行>) [Environmental Protection Law (for Trial Implementation)] (promulgated by the Standing Comm. Nat'l People's Cong., Sep. 13, 1979, effective Sep. 13, 1979, amended Dec. 26, 1989, Apr. 24, 2014), art. 6(1).

[253] *Id.* at art. 6(2).

Where "parties liable for soil contamination" are those involved in the production, sale and use of sub-standard pesticides, fertilizers, and other agricultural input, the liability is fault-based and non-retrospective. Their activities potentially cause contamination of agriculture land but they were not regulated under the same EPL (for Trial Implementation) (1979). It would be unfair to impose retroactive liability on these parties for historical contamination. The purpose of including them as liable parties is to change their behaviour to prevent future contamination of agriculture land. Their legal liabilities arise only if they are in violation of law and cause land contamination after the implementation of SPPCL (2018) on January 1, 2019.[254]

Unlike the "joint and several" liability clause stipulated by the Comprehensive Environmental Response, Compensation, and Liability Act of the US, MEE suggests liability by share. Where multiple parties are identified as liable parties, they are encouraged to reach an agreement on the apportionment of liability based on each party's contribution to the contamination. In the absence of agreement, all parties bear the liability in equal shares.[255]

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[254] MEE, Nongye Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (农业用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Agricultural Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), https://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734043.shtml [https://perma.cc/RPR9-DGZL], art. 3.

[255] MEE, Jianshe Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (建设用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Construction Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), http://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734052.shtml [https://perma.cc/B8QF-YHPF], art. 7; *see also* MEE, Nongye Yongdi Turang Wuran Zerenren Rending Banfa (Shixing) (Zhengqiu Yijiangao) (农业用地土壤污染责任人认定办法（试行）（征求意见稿）[Measures on Identifying Parties Liable for Soil Contamination of Agricultural Land (for Trial Implementation) (Draft for Consultation)] (Sept. 17, 2019), https://www.mee.gov.cn/ywgz/trsthjbh/trsthjgl/201909/t20190917_734043.shtml [https://perma.cc/RPR9-DGZL], art. 7.

C. Financing the Clean-up

Soil contamination in China will remain one of the biggest environmental challenges in the coming years as industrial relocation continues. Shortage of financial resources to fund the remediation is expected. It is unrealistic to expect the governments or liable parties to have the financial capacity to clean up the contaminated agriculture land or urban land not for commercial development. There must be additional resources to support the operation of the clean-up regime. The SPPCL (2018) requires the state to take measures including fiscal, tax, price, and other financial policies to attract private investment to fund soil pollution prevention, control, and remediation.[256] Financial institutions are encouraged to increase loans to projects focused on risk control and remediation of contaminated sites, and to investigate site contamination in its mortgage approval of land use rights.[257] Tax reduction or exemption should be offered to entities conducting risk control and remediation of contaminated sites.[258]

In addition, the SPPCL (2018) stipulates that special funding ear-marked for soil pollution control should be mainly used for prevention and control of contamination of agriculture land, and risk control and remediation of "orphan" sites where liable parties cannot be ascertained.[259] In the absence of liable parties, parties with land use rights may apply for special funding to carry out risk control and remediation.[260] This ear-marked special funding was set up by the Central Government from its general budget to implement the tasks

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[256] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 69.
[257] *Id.* at art. 72.
[258] *Id*. at art. 73.
[259] *Id.* at art. 71(1). Under the Action Plan (2016), the central government shall establish the special soil pollution prevention and control fund by consolidating the existing special fund on prevention and control of pollution caused by heavy metals. *See* Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. IX, § 28.
[260] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 71(2).

under the Action Plan (2016).[261] It mainly supports: (i) investigation and monitoring of soil pollution; (ii) risk control of contaminated land; (iii) remediation and treatment of contaminated land; (iv) remediation and treatment of the soil eco-system of key eco-engineering projects; and (v) capacity building of soil environmental supervision and improvement of soil environmental quality.[262] The central government's budget alone is far from adequate. The SPPCL (2018) encourages provincial governments to set up an investment fund by public finance budget in partnership with social capital to provide additional financial resources for soil pollution control.[263] As an incentive, any province that has set up the soil pollution prevention and control fund by January, 2021 will receive financial support from the Central Government's special funding on soil pollution control.[264] The provincial fund is mainly used for: (i) soil pollution prevention and control of agricultural land; (ii) risk control and remediation of contaminated land where liable parties or parties with land use rights cannot be identified; and (iii) other matters as provided for by the governments.[265] It should be noted that one contaminated soil pollution project shall not be funded by both the Central Government's special funding and the provincial fund.[266]

Despite the incentive for early set-up of the provincial fund by January 2021, progress seems to be slow. At the end of August, 2020, less than a dozen provincial governments had local regulations and measures ready to set up a provincial fund.[267] Social capital makes investment decisions based on expected return. Such

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[261] MOF & MEP, Turang Wuran Fangzhi Zhuanxiang Zijin Guanli Banfa (财政部环境保护部《土壤污染防治专项资金管理办法》) [Measures on the Management of Special Funding for Soil Pollution Prevention and Control], 2016, at art. 2.

[262] *Id*. at art. 5.

[263] MOF, MEE, MARA, MNR, MOHURD & FGB, Turang Wuran Fangzhi Jijin Guanli Banfa (土壤污染防治基金管理办法) [Measures on the Management of Soil Pollution Prevention and Control Fund] (Jan. 17, 2020), https://www.mee.gov.cn/xxgk2018/xxgk/xxgk10/202002/W020200228749071508840.pdf [https://perma.cc/4HAC-TEGG], at art. 2.

[264] *Id.* at art. 8.

[265] *Id.* at art. 9(1).

[266] *Id.* at art. 9(2).

[267] A search on the legal database (www.pkulaw.cn) generates the eight items: Hunan, Tianjin, Shandong, Shanxi, Guizhou, Henan, Hebei, and Guangdong Provinces.

investment fund may attract private investors in provinces that promise potential profits from redevelopment of contaminated land. Guangdong Province is actively studying the set-up of a provincial fund to support soil pollution control and remediation.[268] However, such a fund will not work in regions such as Gansu Province, where the cost of risk control and remediation of contaminated sites is much higher than potential return from land redevelopment and remediation of agriculture land barely makes any profit.[269] Where a provincial investment fund based on public-private partnership fails to attract social capital, the provincial government will have to bear all the costs.[270] What is missing from the funding schemes so far is compulsory contribution from industrial operators of key polluting sectors. Imposing a surcharge at the appropriate rate on all key operators potentially causing soil pollution and making them contribute to the funding schemes not only substantially increases the sources and size of funding but also implements the polluter pays principle. These high-risk operators have a legal duty to bear the cost of soil pollution control and remediation and to share the financial burden with provincial governments.

D. Information Transparency and Public Participation

Public supervision over both governments and liable parties promotes sound agency decision making, effective regulation of land contamination, and quality site remediation and risk control. Public supervision is impossible without information transparency. Governments, liable parties, and land use right holders have strong

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[268] Cheng Jingwei (程景伟), *Guangdong 78 Ge Dikuai Turang Wuran Chaobiao Jiangshe Shengji Fangzhi Jijin* (*广东 78 个地块土壤污染超标 将设省级防治基金*) [*Guangdong Has Seventy-eight Contaminated Sites with Pollutants Over the Limit, Will Set Up Provincial Fund*], CHINA NEWS (June 23, 2020), http://www.chinanews.com/gn/2020/06-23/9220178.shtml [https://perma.cc/M6DL-CMTR].

[269] *See* Zhu Ningning (朱宁宁), *Turang Wuran Zhili Mianlin Shengtai Shehui Jingji Sanfang Xiaoyi Kaoliang* (*土壤污染治理面临生态社会经济三方效益考量*) [*Land Contamination Treatment Considers Ecological, Social and Economic Efficiency*], LEGAL DAILY (Aug. 25, 2020), http://www.legaldaily.com.cn/environmental_protection/content/content_8287068.html [https://perma.cc/DZX4-JS3G].

[270] *Id.*

motivation to keep land contamination information confidential. Many residential neighbourhoods and villages are built on or near toxic sites. Information disclosure potentially leads to compensation claims by injured residents, depreciation of property value, and a shrinking market for local agricultural products.

Lack of information transparency in the government's handling of the first national soil pollution survey (2005-2013) has already raised public concern. The survey was conducted in strict confidence and concluded with the release of a very brief summary report not disclosing details of land contamination. Even the very limited disclosure was made under the pressure of an information disclosure request filed by Dong Zhengwei, a Beijing lawyer. Information on the soil contamination survey had been tightly sealed off from the public. Government agencies remained silent and all participants had been requested to sign non-disclosure undertakings.[271] Dong asked the MEP to disclose the survey method and soil pollution data in accordance with the Regulation on Government Information Disclosure (RGID)[272] on January 30, 2013. The MEP replied in February and refused to disclose the relevant information, citing to "state secret" as an exception for information disclosure under Article 14 of the RGID (2007).[273] That is, the national soil pollution survey data was treated as a "state secret." Dong applied to MEP for administrative review of the "non-disclosure" decision. MEP's review decision in May supported the non-disclosure decision and elaborated why the preliminary and incomplete survey data were treated as "state secrets" temporarily to avoid potential adverse impact made by disclosure of inaccurate or incomplete data. The relevant information would eventually be

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[271] Chen Yang (陈阳), *Soil Contamination Data: Is It Really An "Unspeakable Secret"?* (*土壤污染数据：真是"不能说的秘密"？*), CHINA ECON. NEWS, Mar. 2, 2013, at C02.

[272] Zhengfu Xinxi Gongkai Tiaoli (政府信息公开条例) [Regulation on the Disclosure of Government Information] (promulgated by the St. Council, Apr. 5, 2007, effective May 1, 2008; rev'd by the St. Council, Apr. 3, 2019, effective, May 15, 2019), CLI.2.331244(EN) (Lawinfochina). The regulation aims to promote government transparency by imposing legal duties on the government to disclose information on its own initiative and upon public request.

[273] Qie Jianrong (郄建荣), *Huanbaobu Yi Guojia Mimi Weiyou Buyu Gongkai* (*环保部以国家秘密为由不予公开*) [*MEP Refused Disclosure on Basis of State Secret*], LEGAL DAILY, Feb. 25, 2013, at 006.

disclosed by the state.[274] Although Dong failed to obtain the soil pollution data from the MEP, his application, along with the media reports, put tremendous pressure on the state ministry to release the summary survey results a year later.[275]

The SPPCL (2018) in principle acknowledges the public right of access to information on soil contamination and pollution control measures.[276] It imposes a duty of disclosure on environmental bureaus and other departments in charge of soil contamination prevention and control.[277] The MEE promulgates the information on national soil environment, while provincial environmental bureaus promulgate information on local soil environment. Where key soil environmental information relates to agriculture land for cultivation of crops for human consumption, timely notice must be conveyed to the agencies in charge of agriculture and rural affairs, public health, and food safety.[278] The SPPCL (2018) requires a national soil environmental information platform be set up for timely uploading of all relevant reports including soil contamination survey reports, monitoring reports, investigation reports, risk assessment reports, and third-party verification reports on risk control and remediation.[279] In addition, key polluters of designated industrial sectors shall disclose their pollutants, means of discharge, concentration levels and total amount of discharge, and installation and operation of pollution control facilities.[280] While progress is being made, the level of transparency is still far from ideal. One study published in 2019

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[274] *See, e.g.,* Zhang Yuan (张媛), *Huanbaobu: "Turang Wuran Shuju shu Mimi" Hefa* (环保部："土壤污染数据属秘密"合法) [*MEP Lawful in Treating Soil Pollution Data as State Secret*], NEW BEIJING NEWS (May 9, 2013), http://www.bjnews.com.cn/news/2013/05/09/262731.html [https://perma.cc/4JHZ-D8DR].

[275] *See* MEP & MLR, *supra* note 1.

[276] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 81(3).

[277] *Id.* at art. 81(1).

[278] *Id.* at art. 81(2).

[279] *Id.* at art. 82; *see also* Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. IX, § 30.

[280] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. IX, § 30.

revealed that twenty-seven municipal governments in provincial capitals and cities directly under the Central People's Government disclosed the existence of 174 contaminated sites, but only forty-four percent of the sites have information on soil environmental assessment, treatment, remediation, and verification.[281] Six cities had disclosed full information relating to the contaminated sites, five had disclosed none and the disclosure of others varies in between.[282]

Apart from soil environmental quality data and pollution data, information on the quality of services provided by environmental firms that produce reports on soil pollution survey and investigation, risk assessment, and verification of risk control and remediation and those who undertake remediation work has important value for quality control of contaminated site remediation. The SPPCL (2018) requires provincial environmental bureaus to establish credit records of units and individuals providing such environmental services, register any violations in the records, and upload the records to the national credit information sharing platform and the national enterprise credit information disclosure system for easy public access.[283] It remains to be seen as to whether and how these platforms can be easily accessed by the general public after implementation.

Public participation is another weak link in the land contamination regime. The SPPCL (2018) provides for rights of public participation and supervision[284] without necessary statutory guarantees of the means and venues for the public voice to be heard by bodies determining "parties liable for land contamination" and bodies in charge of the design and implementation of the contaminated site remediation plans. Public participation as stipulated under SPPCL (2018) remains very limited and superficial. For instance, anyone may report acts of land contamination to environmental agencies.[285] They may report by post, email, online

[281] *See* Bao Hang et al., *supra* note 216, at 20–22.
[282] *Id.*
[283] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 80.
[284] *Id.* at art. 81(3).
[285] *Id.* at art. 84. Agencies should publicly announce means of public reporting and facilitate the filing of such reports. Agencies have duties to timely follow up the case upon receiving public report and keep the identity of the informant

submission through government websites or WeChat platforms, or calling hotline "12369."[286] The SPPCL (2018) also supports media supervision over acts of soil pollution by providing that any units or individuals subject to media supervision shall not take revenge by any means.[287] These are the only means for the public or the media to help monitor polluters.

What is lacking from the legal regime is statutory guarantee of in-depth and meaningful public participation throughout the process of regulatory response to contaminated land. The public should be involved and consulted for comments at all key stages including the listing and removing of the contaminated sites on the Catalogue, the determination of "parties liable for land contamination", and the making and implementation of the risk control and remediation plans. The parties in charge of relevant decision making should keep the public well-informed, allow adequate time for public comments, provide feedback to public comments as to measures taken to directly address the public concerns, ensure the quality of risk control and site remediation, and build public confidence in the legal response to contaminated land.

CONCLUSION

China is building a regulatory infrastructure to prevent and control soil pollution and has institutionalized the statutory response to contaminated land in order to control and remove risks to public health and safety. There are, however, some weakest links in the contaminated land regime that deserve immediate attention and necessary reform. The design and operation of the liability regime, funding mechanism, information disclosure, and public participation fail to ensure that all unacceptable risks to human health and the environment posed by contaminated land will be identified and removed.

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strictly confidential. Agencies should reward informants upon verification of the cases to encourage public supervision over polluters.

[286] Turang Wuran Fangzhi Xingdong Jihua (土壤污染防治行动计划) [The Action Plan on Soil Pollution Prevention and Control] (promulgated by the St. Council, May 28, 2016), pt. IX, § 30.

[287] Turang Wuran Fangzhi Fa (土壤污染防治法) [The Soil Pollution Prevention and Control Law] (promulgated by the Standing Comm. Nat'l People's Cong., Aug. 31, 2018, effective Jan. 1, 2019), art. 83.

Where there is a serious shortage of funding, choice of response to contaminated land is limited and the degree of site clean-up is constrained. The sources and size of the funding determine the speed, scope, and standards of remediation. China's heavy reliance on commercial development to fund contaminated site remediation only works well in cities with a booming property market. In the absence of developers, limited government funding raises serious concerns over the standard of clean-up of contaminated agriculture land and contaminated urban sites planned for public facilities. In the case of the Changlong toxic site, the local government opted for on-site capping instead of excavation of toxic soil for treatment after it decided to change the use of the site from residential development to public greenery. The query remains whether capping is adequate to ensure the health and safety of its neighbours.

To substantially expand the funding for soil pollution control and remediation, the liability regime should maximize the chance of making polluters pay by stipulating strict and retrospective "joint and several liability" among multiple polluters in dealing with historical contamination. Setting a cut-off date at September 13, 1979 for retrospective legal liability means that polluters are not liable for pollution caused prior to that date, placing a much heavier financial burden on both governments and land use right holders. In addition, the funding mechanism should be reformed to make all potential polluters with high risks of soil contamination contribute by imposing a surcharge on the designated chemical, mining, pesticide and fertilizer manufacturing, and hazardous waste disposal sectors.

There is an urgent need to improve information transparency and public consultation and deliberation to build public confidence in China's contaminated land regime. Too little information is disclosed, and no meaningful public participation is guaranteed in the process of surveying, investigating, designating contaminated sites, determining parties liable for soil pollution control and remediation, and the making and implementation of the site remediation plans. Public participation and scrutiny of contaminated land decision-making and actions taken will ensure and improve the quality of both government decision-making and actual site remediation.