China chemical safety case study:
Industrial waste dumping on farmland in Miyun

In the frame of the EU-funded project: Strengthening the capacity of pollution victims and civil society organizations to increase chemical safety in China (China Chemical Safety Project)

IPEN and Green Beagle
June 2013

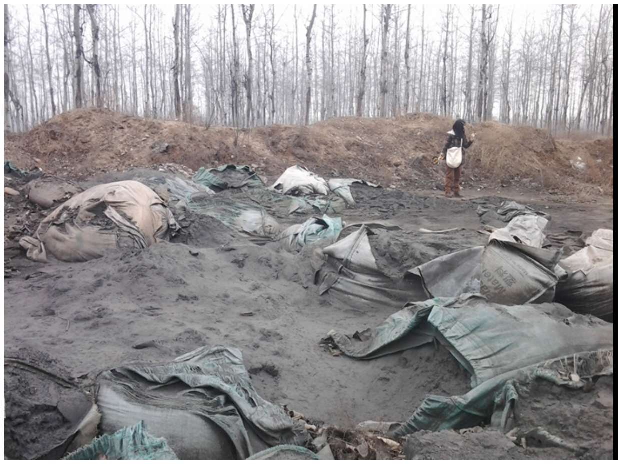
Introduction

This case study explores contamination of farmland with toxic metals and illustrates key problems with waste management, information disclosure, and liability and compensation. The case involves dumping of wastes from a brake pad manufacturer containing toxic metals on private farmland. Neither the company nor the local Environment Protection Bureau disclosed information about the identities or levels of contaminants. The responsible party, Korean company KB Autosys, refused to compensate the land owner even though they admitted dumping hundreds of tons of waste on the land over a period of five years. The case study also illustrates the broader issue of contaminated farmland in China. According to the Ministry of Environmental Protection, 10 million hectares, or 8.3% of farmland in China is polluted.[1] In 2006, the Ministry (then known as the State Environmental Protection Administration), noted that, "China faces 'grave' soil pollution jeopardizing its ecology, food safety, residents' health and the sustainable development of agriculture."[2] [3]

Korean brake pad manufacturer dumps toxic waste on farmland

In 2011, Miyun resident, Liu Yuying, found a large number of opened bags filled with an unidentified gray powder dumped on a plot of land that she was planning to use for agriculture.[4] The waste came from KB Autosys, a Korean company producing 300,000 sets of auto brake pads each year and whose main clients are Hyundai, GM, KIA, and Renault Samsung.[5] [6] [7] In 2013, the company admitted to dumping waste at the site since 2008. According to government reporting, the waste was dumped in numerous pits measuring four meters deep and 30 meters wide.[8] No grass could grow nearby and the bark of nearby trees was scarred and cracked.

At first, the company promised to test the soil, compensate Liu, and clean up the waste. Later, KB's Vice President at the Miyun plant denied these promises. Ironically, the company describes its mission as, "Value creating corporation for safety of mankind and global environment."[9] Liu reported the issue to Miyun environmental authorities who took a sample of the waste. In February 2012, the Miyun authorities wrote to Liu, confirming violation of environmental rules, but did not reveal the sampling data. Authorities fined the company ¥180,000 (€22,487) in early 2012, but Liu was not compensated.[10] Note that KB Autosys generated significant sales in 2012 totaling 119,852,516,789 Korean Won (€83,257,400). [11]



Waste from brake pad manufacturing dumped on private land in Miyun along with dumped brake pads.

In 2012, Liu took the matter to court and filed suit. She lost the first lawsuit because the court said she could not prove that the waste had affected the ability to grow agricultural products. During the second trial in March 2013, KB Autosys admitted to hiring a company for waste handling who subsequently sub-contracted the job to a local man who proceeded to dump it on Liu's land and on village property.

Sampling shows toxic metals in wastes

The Project focused on providing the affected landowner and community the one thing that no one seemed to be able to help with: information about the nature of the contamination. Project participants also raised awareness about the case in news media, drawing public attention to violation of Chinese law.

Since brake pad manufacturing involves the use of metal lubricants, the Project performed a preliminary sampling study of metals at the site by contracting a certified laboratory, SGS, to take samples at the site and analyze them for metal content.[12]

The results showed antimony levels in wastes at the site ranged from 7700 ppm – 11,900 pm (see Annex 1). These levels were 640 - 990 times higher than regulatory limits in China. The data also showed that wastes had contaminated soils with antimony at levels ranging from 102 ppm – 10,500 ppm, 8.5 – 875 times higher than Chinese regulatory limits. To provide another comparison for the levels measured at Miyun, note that antimony levels considered to be "significantly elevated" at 13 ewaste recycling villages in Guiyu, Guangdong Province ranged from 6.1 – 232 ppm in dust, far below the levels measured in many samples at Miyun.[13]

Antimony is routinely used in brake pad manufacturing where it serves the function of a lubricant and produces small particles that are readily inhaled.[14] Animal studies show that exposure to antimony causes skin irritation, fertility problems, and lung cancer.[15] The USA State of California classifies antimony trioxide as a carcinogen.[16] Toxic side effects of antimony treatment for leishmaniasis and schistosomiasis in humans include cardiotoxicity and pancreatitis.[17] Antimony can also mimic estrogen in laboratory experiments.[18] Finally, antimony appears to be toxic to plants including suppression of plant development.[19]

Levels of copper in wastes at the Miyun site ranged from 35,700 ppm – 56,300 ppm. These levels were 89 to 140 times higher than Chinese regulatory limits. The data also showed that wastes had contaminated soils with copper at levels ranging from 2490 ppm – 34,900 ppm, 6.2 – 87 times higher than Chinese regulatory limits. In contrast to these high levels measured at the Miyun site which was to be used for agriculture, typical copper concentrations toxic to crops range from 15 ppm – 51 ppm. [20]

Copper is toxic to all plant cells, harming both the roots and leaves.[21] [22] Copper is toxic to a variety of important food crops at low concentrations including rice (51 ppm); bean (37 ppm); corn (48 ppm) soybean (15 ppm); and wheat (51 ppm).[23] In humans, copper is readily absorbed into the body and immediate effects include nausea, vomiting, and/or abdominal pain.[24] Other effects on humans include damage to the liver and immune system. Copper is toxic to aquatic organisms and can affect survival, reproduction, and growth in fish, invertebrates, plants, and amphibians.[25]

Other metals were also found at the Miyun site. All of the waste samples and some of the soil samples exceeded Chinese regulatory limits for chromium (Annex 1). Strontium was also found at the site, though it is not known if the isotopes were stable or radioactive.[26]

The information on the contaminants was provided to Liu Yuying and made publically available to the wider community. The Project also provided expertise to the community by engaging the help of Dr. Chen Nengchang, a well-known soil pollution scientist, to visit the site for an evaluation.[27] After examining the area, Chen called for proper research on the site and noted to the Global Times that, "This is a serious case of chemical elements being dumped by a foreign company and ruining the land."[28]

Questionable management of the Miyun wastes

On 3 April 2013 without notice, local environmental officials suddenly removed 500 tonnes of the waste gray powder containing toxic metals from the site. In response to Project inquiries, the authorities noted that the waste was destined for burning in a nearby cement kiln. Project personnel participated in a follow-up meeting with the cement kiln company and brought a Professor He Mengchang, Beijing Normal University, who specializes in antimony studies. The professor raised concerns about possible antimony emissions from burning the waste. Company officials noted that the Miyun waste would be mixed with contaminated soil from other chemical plants and assured the group that "only" 1% of the antimony would be emitted to air. However, emissions from cement kilns depend on a variety of factors including where the waste is fed. If the waste enters the cold end of the kiln, then all volatile compounds could be easily released. The group agreed that the company would provide information on the waste management plan and a public comment period. However, the company did not provide public information and in early May 2013, 400 tonnes of the 500 tonnes of the waste were burned without notice.

The Miyun site remains contaminated after "cleanup"

To assess the degree of cleanup from the contaminated land, Project personnel measured various parts of a dumping site that was also "cleaned up" by KB Autosys using a portable XRF device. Table 4 (Annex 1) shows that 12/15 samples (80%) still exceeded regulatory limits for antimony – the highest by 55-fold. Two-thirds of the samples still exceeded Chinese regulatory limits for copper.

Conclusion

The dumping of wastes containing high concentrations of toxic wastes on farmland violates Chinese law. Note that in June 2013, the Supreme Court of China updated China's criminal code to include environmental crimes involving illegally dumping 3 tons or more hazardous waste. The Miyun site involved dumping more than 500 tons of hazardous waste. The Miyun dumping also violates the Solid Waste Law, which requires that hazardous waste must be shipped to qualified disposing facilities and strictly monitored by the Environmental Protection Bureau for the entire disposal process. As the responsible party, KB Autosys did not fulfill its complete duty of care throughout the entire manufacturing lifecycle. The company also refused to pay any compensation to the landowner after dumping more than 500 tons of toxic metal-containing wastes on the farmland over a period of five years. Neither the government nor the company ever revealed the identity or the danger of the wastes to the landowner or surrounding community.

The Miyun case study provides opportunities for improvements in several areas:

Private sector waste management practices

Manufacturers should take responsibility for the full lifecycle of their operations – and that includes wastes generated during industrial processes. In the Miyun case, the company washed its hands of the waste issue by contracting the problem without insuring full compliance with Chinese law. It appears that this was the cheaper option for the company, but highly costly for the local government, landowner, and the environment. Companies should also take aggressive measures to prevent formation of wastes in the first place. Both Republic of Korea and China are Parties to the Basel Convention which obligates Parties to take appropriate measures to ensure that the generation of hazardous wastes and other wastes is reduced to a minimum.

Enforcement of waste management laws

Rigorous enforcement of Chinese law would have identified this problem much sooner rather than letting it continue for five years. One relevant law is the Solid Waste Law, which requires that hazardous waste must be shipped to qualified disposing facilities and strictly monitored by the Environmental Protection Bureau for the whole disposal process. Going forward, rigorous enforcement of dumping laws should lead to criminal prosecution. As mentioned above, in June 2013, the Supreme Court of China updated China's criminal code to include environmental crimes involving illegally dumping 3 tons or more hazardous waste. The Miyun site involved dumping more than 500 tons of hazardous waste.

Information disclosure

Public right to know is a key principle of chemical safety but neither the landowner nor the community was ever informed about the identity or possible danger of hundreds of tons of toxic metal waste openly dumped on farmland. Public access to plant emissions including wastes should be regularly provided via an accessible, free, pollutant release and transfer registry. Ironically, KB Autosys has to provide this information at its manufacturing facilities in the Republic of Korea but avoids doing so in China. Another key aspect to information disclosure is the Environmental Impact Assessment (EIA) report of the KB Autosys facility. According to Chinese law, this report should be freely available to the public, however so far, neither the company nor the local Environmental Protection Bureau has agreed to provide it after requests from Green Beagle.

Effective remediation
At the Miyun site, the dumped waste was scooped up without precautions and haphazardly destroyed in a cement kiln which cannot "burn" and destroy a toxic metal. Sampling at a site after the "cleanup" showed it was still highly contaminated. Effective remediation requires careful evaluation of the site, professional methods for removal, sampling to insure cleanliness of the remaining soil, and sound management of the wastes.

Liability and compensation
Liability and compensation is a key principle of chemical safety.[29] In 2010, the Governing Council of the United Nations Environment Programme (UNEP) developed guidelines for national legislation on liability and compensation.[30] Both China and Korea participated in the meeting and its consensus decision to endorse the guidelines. The decision acknowledges Rio Principle 13 and seeks to operationalize Rio Principle 16, the polluter pays principle. Company responsibilities include strict liability for damages either by commission or negligence. The Guidelines grant both individuals and public authorities the right to claim compensation including for damage to property and economic loss. According to Chinese Civil Law, for environmental pollution cases if the plaintiff can prove the existence of polluting activities and damage to property and health, then the defendant should take the responsibility to disapprove the causal relationship between the pollution and damage. However in the Miyun case, the court did not require the defendant (KB Autosys) to do so and it did not designate a body that could do the evaluation. This improper action blocked the ability for the plaintiff to receive deserved compensation from a pollution case and this problem applies to many other cases in China. Clearly, the company should pay for its waste dumping – both to the landowner and the authorities who spent public money cleaning up the company's dumped waste.

Media reports
http://blog.sina.com.cn/s/blog_a2632b1f010176nb.html
http://www.wbsbnet.com/view.asp?id=4107
China News Service, 13 March 2013, "Korean company polluted soil: NGO"
Global Times, 1 April 2013, "Soil experts inspect pollution in Miyun" Yin Yeping
China.org, 2 April 2013, "Korean company in toxic waste scandal" Chen Xia
Flanders-China Chamber of Commerce, 18 April 2013, "Supervision of hazardous waste disposal to be strengthened"

About the China Chemical Safety Project

This is an EU-funded project of IPEN with partner Green Beagle that aims to strengthen the capacity of civil society organizations and communities impacted by pollution to increase chemical safety in China. The Project (also known as the China Chemical Safety Project) is being implemented in China over two years with total EU funding of €344,580 and EU contribution of 77.84% of the total cost.

The Project includes:

- Improving capacities of impacted communities and civil society organizations for involvement in policy making
- Training on public participation in environmental impact assessment
- Generating new publicly available data about pollution and impacted communities that contribute to increased implementation of local and national chemical safety policies
- Raising awareness on emissions-related pollution

European Union

Strengthening the capacity of pollution victims and civil society organizations to increase chemical safety in China (China Chemical Safety Project) is funded by the European Union. The contents of this report are the sole responsibility of the IPEN and Green Beagle and can in no way be taken to reflect the views of the European Union.

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In addition, IPEN would like to acknowledge that this document was produced with financial contributions from the Swedish International Development Cooperation Agency through the Swedish Society for Nature Conservation (SSNC), along with other donors. The views herein shall not necessarily be taken to reflect the official opinion of any of these donors, including SSNC or its donors.

Annex 1. Metal content at the Miyun site

Table 1. Antimony content in samples collected from the Miyun site

Sample ID	Type	Antimony (ppm) 锑	China[a] regulatory limit for antimony in soil (ppm)	Czech[b] regulatory limit for antimony in soil (ppm)
13-00983-01	Waste	11900	12	1/25/80
13-00983-02	Waste	10600	12	1/25/80
13-00983-03	Waste	7700	12	1/25/80
13-00983-04	Soil	4220	12	1/25/80
13-00983-05	Soil	10500	12	1/25/80
13-00983-06	Soil	1600	12	1/25/80
13-00983-07	Soil	1720	12	1/25/80
13-00983-08	Soil	102	12	1/25/80
13-00983-09	Control	4	12	1/25/80
13-00983-10	Control	3	12	1/25/80
13-00983-11	Control	2	12	1/25/80
13-00983-12	Waste	7900	12	1/25/80

[a] Standard of Soil Quality Assessment for Exhibition Sites (HJ350-2007). There is no regulatory limit for antimony in soil other than this in China.
[b] There are no EU-wide limit values for metals in soil; the antimony limits provided are for Criteria A (signal that environment is contaminated); Criteria B (contamination level that may have negative effects on human health and environment); and Criteria C (clean-up action purposes for an industrial area due to the possibility of significant risk to human health and the environment)

Table 2. Copper content in samples collected from Miyun site

Sample ID	Type	Copper (ppm) 铜	China[a] regulatory limit for Copper in soil (ppm)	Czech[b] regulatory limit for Copper in soil (ppm)
13-00983-01	Waste	35700	400	60/100
13-00983-02	Waste	43000	400	60/100
13-00983-03	Waste	56300	400	60/100
13-00983-04	Soil	30000	400	60/100
13-00983-05	Soil	34900	400	60/100
13-00983-06	Soil	10100	400	60/100
13-00983-07	Soil	2770	400	60/100
13-00983-08	Soil	2490	400	60/100
13-00983-09	Control	15	400	60/100
13-00983-10	Control	12	400	60/100
13-00983-11	Control	10	400	60/100
13-00983-12	Waste	37200	400	60/100

[a] Standard of Soil Quality Assessment for Exhibition Sites (HJ350-2007). There is no regulatory limit for antimony in soil other than this in China.
[b] These are limits for agricultural land for light soils/other soils.

Table 3. Chromium content in samples collected from Miyun site

Sample ID	Type	Chromium (ppm) 铬	China[a] regulatory limit for chromium in soil (ppm)	Czech[b] regulatory limit for chromium in soil (ppm)
13-00983-01	Waste	1710	300	100/200
13-00983-02	Waste	982	300	100/200
13-00983-03	Waste	4170	300	100/200
13-00983-04	Soil	53	300	100/200
13-00983-05	Soil	55	300	100/200
13-00983-06	Soil	498	300	100/200
13-00983-07	Soil	410	300	100/200
13-00983-08	Soil	105	300	100/200
13-00983-09	Control	36	300	100/200
13-00983-10	Control	37	300	100/200
13-00983-11	Control	43	300	100/200
13-00983-12	Waste	570	300	100/200

[a] Standard of Soil Quality Assessment for Exhibition Sites (HJ350-2007). There is no regulatory limit for antimony in soil other than this in China.
[b] These are limits for agricultural land for light soils/other soils.

Table 4. Metals in soil samples at the Miyun site after "cleanup"

Sample ID	Type	Antimony[a] (ppm) 锑	Copper[b] (ppm) 铜
#2	Soil gray powder still visible	194	842
#3	Soil gray powder still visible	40	218
#4	Soil gray powder still visible	5652	18346
#5	Soil gray powder still visible	6068	21534
#6	Soil gray powder still visible	6657	63899
#7	Soil gray powder still visible	3322	9561
#8	Soil gray powder still visible	1095	10230
#9	Soil gray powder still visible	5805	14654
#10	Soil gray powder not visible	10	67
#11	Soil gray powder not visible	13	42
#12	Soil gray powder not visible	0	23
#13	Soil gray powder not visible	22	77
#14	Soil gray powder not visible	329	640
#15	Soil gray powder still visible	730	1789
#16	Soil gray powder still visible	3174	10289

[a] The regulatory limit for antimony in soil in China is 12 ppm
[b] The regulatory limit for copper in soil in China is 400 ppm

References

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[27] Dr. Chen Nengchang is the Deputy Director of the Soil Pollution and Remediation Committee of the Guangdong Society of Soil Sciences.
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