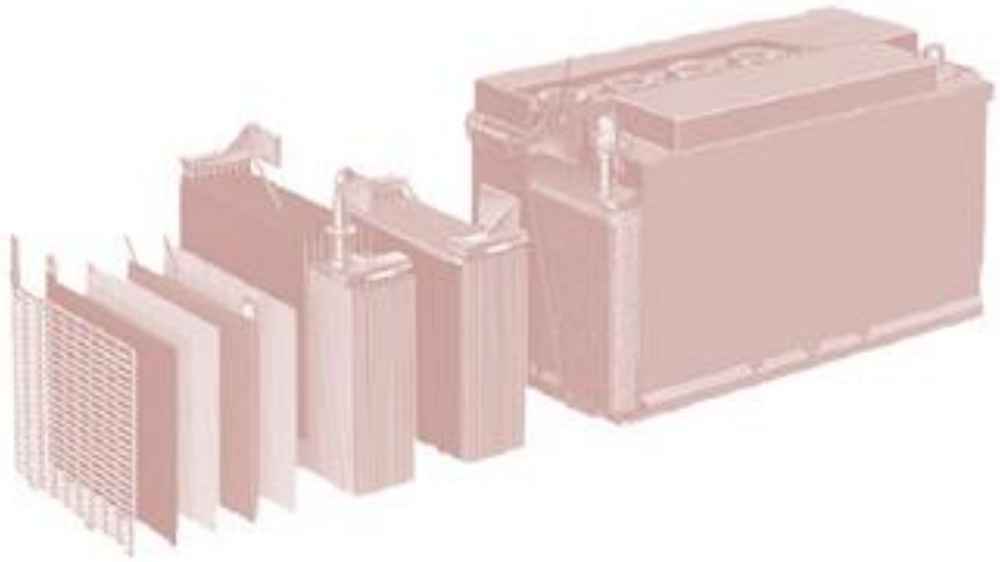
Health & Environmental Impacts from Lead Battery Manufacturing & Recycling in China

Occupational Knowledge International
Global Village of Beijing
Institute of Public & Environmental Affairs

2011



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About OK International

Occupational Knowledge International (OK International) is a non-governmental organization (NGO) dedicated to improving public health in developing countries through innovative strategies to reduce exposures to industrial pollutants. Based in the U.S., the organization works in partnership with governments, businesses and NGOs to address inequities in environmental standards. The focus of our work includes efforts to prevent lead poisoning from exposures to lead battery manufacturing, battery recycling, and mining, and to eliminate the use of lead in paint. OK International worked cooperatively with the lead battery industry and other stakeholders to develop the Better Environmental Sustainability Targets (BEST) certification standard to reward battery companies that meet minimum standards for emissions and product stewardship. The organization also brings the technical resources to measure exposures, find solutions, and clean up the environment in order to protect public health.

www.okinternational.org

About Global Village of Beijing

Founded in 1996 as one of the first environmental NGOs in China, Global Village of Beijing (GVB) is a non-government, non-profit organization dedicated to environmental education and public participation. GVB's mission is to advance sustainable development in China through the creation of an environmental culture. Over the past 15 years GVB has successfully carried out numerous programs to elevate the level of environmental health awareness and improve the environment culture in China by working with local communities, the media, and government agencies. GVB' s main programs include Chemical Safety and Environmental Health Program, Green Urban Community Program, Sustainable Energy Journalist Forum Program, and Eco-village Development Program.

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About the Institute of Public & Environmental Affairs

The Institute of Public and Environmental Affairs (IPE) is a registered non-profit organization based in Beijing. Since establishment in May 2006, the IPE has developed two pollution databases (water & air) to monitor corporate environmental performance and to facilitate public participation in environmental governance. The IPE's aim is to expand environmental information disclosure to allow communities to fully understand the hazards and risks in the surrounding environment, thus promoting widespread public participation in environmental governance. The IPE is a member of a coalition of NGOs throughout China, promoting a global green supply chain by pushing large corporations to concentrate on procurement and the environmental performance of their suppliers. This 'Green Choice Alliance' consumer initiative takes into consideration the environmental performance of manufacturing enterprises while exercising their purchasing power to make green choices.

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Executive Summary

As the demand for lead batteries in China increases due to the growth in telecommunications, renewable energy, motor vehicle and e-bike production, environmental controls are lagging behind leading to widespread pollution and lead poisoning. Lead poisoning is a serious environmental and occupational health threat and lead battery production and recycling operations are now the most significant source of lead exposures in China. Many mass lead poisoning incidents have been reported in recent years around lead battery and manufacturing facilities in China. Several of these incidents have lead to riots and significant damage to the targeted facility.

The Chinese government has taken some initial steps to address the environmental violations, including closing a total of 583 lead battery manufacturing and recycling plants as of July 2011.But this is not enough as there are significant deficiencies in Chinese environmental standards, inadequate enforcement, and no uniform system with financial incentives for collecting used lead batteries from consumers or businesses.

Efforts must be made by Government to seek improvements, but the private sector can also play a significant role in addressing lead emissions from lead battery manufacturing and recycling operations in order to reduce the impact on public health and the environment. A group of NGOs has begun this effort by opening a dialog with major lead battery purchasers starting with the telecommunications industry. This report outlines our effort to make these companies aware of their suppliers' violations and to consider such information in purchasing new lead batteries. We also plan to work constructively with companies in other sectors reliant on lead batteries to encourage them to engage their battery suppliers to improve their environmental performance and reduce occupational exposures.

Additional findings include:

- China is the world's largest manufacturer of lead batteries. From 2004 to 2010, lead battery production in China increased 133%.

- Since 2005, at least 27 serious mass lead poisoning incidents have been reported around lead battery manufacturing and recycling facilities throughout China. Most of these poisoning incidents occurred near Chinese manufacturing and recycling companies, but reports of lead poisonings have also emerged in the community adjacent to a plant owned by Johnson Controls (USA) in an area near Shanghai.

- The average lead recycling efficiency of secondary smelters in China is approximately 80%-85% compared to 95% and higher efficiency rates in developed countries. China produces only 32% of its refined lead from secondary (recycled) sources compared to more than 80% in some developed countries.

- The ambient air standard for lead in China is ten times that of the U.S. level and Chinese workers are permitted to have much higher lead exposures.

1. Introduction

Demand for lead batteries in China is rapidly increasing due to expanding car, motorcycle, electric bike (e-bike), telecommunications, and photovoltaic solar markets. The manufacturing of lead batteries and the recycling of used lead batteries are known to release large quantities of lead into the environment. This toxic metal is then available for human absorption while airborne, before settling in dust and soil. Environmental contamination of ground and surface water is also common around these industries.

Since 2005, at least 27 serious mass lead poisoning incidents have been reported around lead battery manufacturing and recycling facilities throughout China including six incidents during the first half of 2011. In one incident, at least 300 people living near a motorcycle and e-bike battery manufacturer in Zhejiang Province were found with blood lead concentrations that were up to seven times the acceptable limit.

These problems are particularly difficult to resolve in China because of the large number of small enterprises involved in manufacturing and recycling lead batteries. It is estimated that 70-80% of China's used lead batteries are collected and recycled by hundreds of informal smelters. [1]

In response to these poisonings, China's Ministry of Environmental Protection recently announced a project that sets emission-reduction targets for lead and four other heavy metals as part of the government's "12th Five-Year Plan." The battery manufacturing and lead smelting industries are being targeted as part of this effort. Production at a large number of factories was temporarily idled in 2011 to allow government authorities to conduct environmental performance checks and close those plants that are operating without appropriate licenses. The goal of these efforts is to curtail future emissions from a large number of polluting plants as required under Chinese law.

While recent efforts of the Chinese government recognize the critical need to establish regulations and programs to manage pollution from this industry, detailed guidelines specific to the collection and recycling of used batteries are needed to improve the environmental performance of this industry. Furthermore, enforcement of existing laws, enhanced penalties for violations, consumer awareness, and greater transparency will support improvements in the industry.

It must also be noted that even lead battery manufacturing and recycling plants that follow all applicable laws can still do more to reduce lead emissions and occupational exposures. Our review of the Chinese standards has demonstrated that there are significant gaps in the standards between China and the U.S. in some cases.

This report examines the structure of China's lead battery and recycling industry. It outlines the major stakeholders, including manufacturers, recyclers and purchasers of lead batteries, and summarizes the environmental laws and regulations most pertinent to the industry. The report also outlines the negative impacts of poor environmental management practices and lax government oversight on public health and the environment. The report provides recommendations to reform the industry and details the environmental and economic benefits of improved lead battery collection and recycling.

2. Human and Environmental Impacts of Lead Battery Manufacturing and Recycling

Lead poisoning is the most serious environmental health threat to children and one of the most significant contributors to occupational disease. Lead causes symptoms ranging from the loss of neurological function to death depending upon the extent and duration of exposure. In children, moderate lead exposure is responsible for a significant decrease in school performance, lowering IQ scores, and is linked with hyperactive and violent behavior.

Lead battery production and recycling are now the most significant source of lead exposures in China. Average exposure levels in children residing near battery plants in developing countries are four times the current level of concern established by the World Health Organization (WHO) and the average worker blood lead levels (BLLs) in these plants in developing countries are approximately twice the recommended level at which workers should be removed from working around lead.[2]Another 2010 study among 135 workers in lead

battery manufacturing plants in China and found that the average BLL of these workers was 43ug/dL, over four times the appropriate level.[3]A recent Chinese review paper found that 24% of children in China have BLLs exceeding the WHO level of concern.[4]

With the growth in demand for lead batteries by the vehicle, telecommunications, and solar industries both in China and around the world, the lead battery production industry in China has grown at such a rate that sufficient environmental controls have lagged behind. This has led to hundreds of violations of emission standards and thus, widespread environmental contamination and lead poisoning in the vicinity of battery production and recycling facilities.

Mass Poisonings Threaten Human Health and Child Development

Although in most cases ongoing exposure to lead causes chronic lead poisoning, there have been several recent reports of localized acute lead poisonings affecting large numbers of people in various regions of China. Since 2005 at least27serious lead poisoning incidents have been reported in China, affecting thousands of residents (including children) and workers around lead battery manufacturing and recycling facilities. For example, in July 2011, one-third of employees at a Taiwanese-owned battery plant in Jiangsu province were found with BLLs between 28-48 ug/dL.[5]Descriptions of these incidents, along with specific locations and companies associated with these poisonings are listed in Appendix A of this report.

Many involved in these incidents feel that the local officials have not been transparent regarding the scope and severity of these poisonings and in many cases have not imposed adequate penalties on the owners and operators of these facilities. Reports indicate that the government has denied blood lead testing and medical treatment to a number of concerned individuals and their children igniting riots and civil unrest. In one incident in 2011 in Anhui province, more than two hundred children were found with elevated BLLs.[6] In response, hundreds of local residents participated in a sit-in protest outside the factory gates of the battery manufacturer known to be the source of the poisonings.

Environmental Costs of Poor Management Practices

In 2010, the Ministry of Environmental Protection, State Statistics Bureau, and the Ministry of Agriculture jointly released the first National Pollution Census to identify the total emissions of major air and water pollutants. Data from the census indicates that 900 metric tons of lead, mercury, chromium, cadmium, and arsenic were discharged into the environment in 2007.[7]

In addition to airborne emissions that result from melted lead fumes released into the air that eventually settle in dust and soil, effluent lead emissions may be released into sewers and then eventually flow into surface and ground water. Food crops that grow in water such as rice, a staple food source for China, may then be contaminated. Fish and other organisms living in lead containing water will also absorb lead from their environment.

These lead emissions are also a global problem that crosses borders. A 2010 study documents that approximately 30% of airborne lead particulates in parts of California are being transported from Asia.[8]

Government Action

In response to environmental concerns and violations in this industry, Chinese authorities suspended operations and even closed a number of plants. In May 2011, at least 300 battery manufacturers in Zhejiang and Guangdong provinces were closed for inspection. In Anhui province, more than 80% of battery manufacturers were temporarily idled, with 27% of the province's 97 lead battery manufacturers permanently closed.[9] As of August 2011 a total of 583manufacturing and recycling plants throughout China have been closed.[10]Furthermore, press reports have indicated that power and water supplies to some of these plants have been shut off to presumably prevent them from reopening.

3. China's Lead Battery Market

Lead batteries are used in a range of applications. In China, the e-bike industry consumes approximately 37% of the country's total battery output. The car and motorcycle industries are the next largest consumer of lead batteries in China, utilizing 33% of total battery production.[11] Lead batteries are also widely used to provide energy storage in the telecommunications industry (e.g. cell phone towers), photovoltaic (PV) solar systems, wind turbines, and other renewable energy systems. Uninterrupted power supplies (UPS) systems, forklifts, railways, and other miscellaneous applications account for a smaller share of the total battery production.

E-bikes and Electric Vehicles

The use of e-bikes has exploded in China over the past decade. Fueled by consumer demand for inexpensive, convenient, and energy efficient transportation, China is the largest market for e-bikes. By the end of 2010, there were around 120 million e-bikes on the road in China--approximately 30% more e-bikes than cars. According to the China Bicycle Association, China produced around 30 million e-bikes in 2010.[12]

E-bike batteries are approximately the same size as a typical car battery (containing around 10 kilograms of lead) and require replacement approximately once per year. Demand for e-bike batteries includes the primary (original battery sold with a new e-bike) and secondary (replacement batteries) markets. Around 70% of e-bike batteries are classified as replacement batteries.[13]Government subsidy programs and continued domestic consumer demand is expected to further increase the market for e-bikes and the need for e-bike batteries.

The government has also incorporated the development of electric and hybrid vehicles into national policy to expand renewable technologies. The government is expanding a pilot project encouraging alternative energy vehicles in public transit to 20 cities, thus significant growth of this market is expected.[14] Although much of these new applications will rely on lithium ion batteries, lead batteries are expected to also play a role due to their lower cost.

Cars and Motorcycles

As the automotive industry continues to expand in China, increasing in both production and domestic consumption, the battery market will grow to meet this demand. China is currently the largest car manufacturing and consuming country in the world, producing 18.3 million cars in 2010.[15] Approximately 60%-70% of current lead battery production is used in newly manufactured vehicles, while the remaining 30%-40% are sold as replacement batteries.[16]

National policy efforts to spur domestic consumption have created a healthy market for motorcycle sales. In 2009, the "Motorcycle Subsidy Program for Rural Areas" was initiated, providing a 13% subsidy up to $100 USD on the purchase of a new motorcycle. In 2010, motorcycle ownership in China was roughly 100 million with 27.6 million new motorcycles manufactured.[17, 18] According to the China Association of Automobile Manufacturers, 8.4 million of these motorcycles were exported.[19]

Renewable Technologies

China has set a goal to obtain 15% of its power from renewable sources by 2020. Recent policy developments, including the "National Middle and Long Term Plan for Science and Technology (2006-2020)", supporting this goal will significantly expand the adoption of PV solar and wind power generation.[20] Many of these alternative energy applications are being deployed off the grid in rural areas and in areas with an insufficient electricity grid that will therefore require on site storage capacity. Approximately 75% of PV solar systems in China are reliant on lead batteries.[21]

The China Battery Industry Association estimates that by the end of 2011, 10% of the overall lead battery market will be comprised of batteries for use in PV systems and predicts that lead used in this kind of energy

storage battery will grow from 0.16 million metric tons in 2010 to 0.4 million metric tons in 2015.[22] The lifespan of energy storage batteries is approximately 3.5 years, thus about 30% of these batteries are replaced each year.[23]

As part of China's goal to obtain 15% of its power from renewable sources by 2020, China proposes adding 1.6 GW of battery-supported solar power.[24] It is estimated that storage for these systems will use 801,951 metric tons of lead batteries.[25]

Other Applications

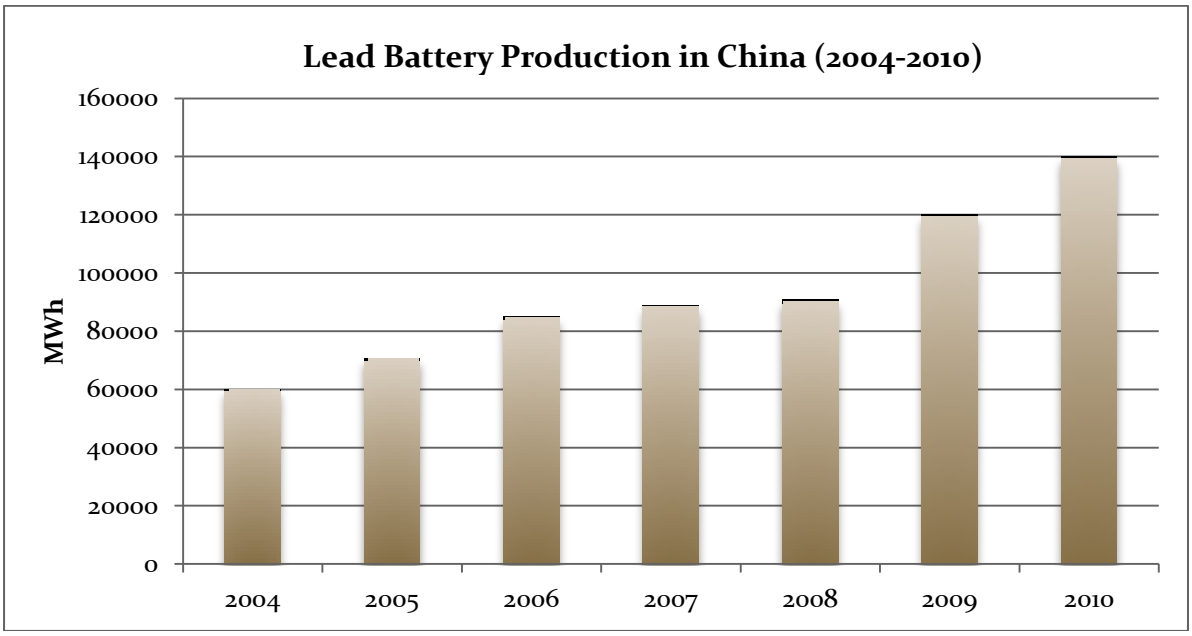
Apart from vehicles and renewable energy applications, the Chinese government uncovered its plan to increase investment in railways and telecommunications. Railway signaling systems, train illumination systems and air conditioning are reliant on power from lead batteries.

The telecommunication industry is expected to receive 300 billion USD for capital investment in the government's "12th Five-Year Plan".[26] As lead batteries are widely used as power storage for cell phone towers, we can expect growing demand from this sector.

4. Lead Battery Production

China is the world's largest manufacturer of lead batteries. From 2004 to 2010, lead battery production in China increased 133%, from 60,170megawatt hours (MWh) to 140,000MWh as demonstrated in Figure 1 below.

Figure 1:



Source: Qi Wang, Re-production of Lead-acid Battery and Pollution Control, Chinese Research Academy of Environmental Sciences, 2010.[27]

Production is expected to continue to grow rapidly in the coming years. It is estimated that China will produce 240,000 MWh of lead batteries in 2015, which is an average annual growth rate of 16.7% from 2009.[28] If this goal is realized, China's lead battery industry will consume more than 4 million metric tons of lead in 2015.

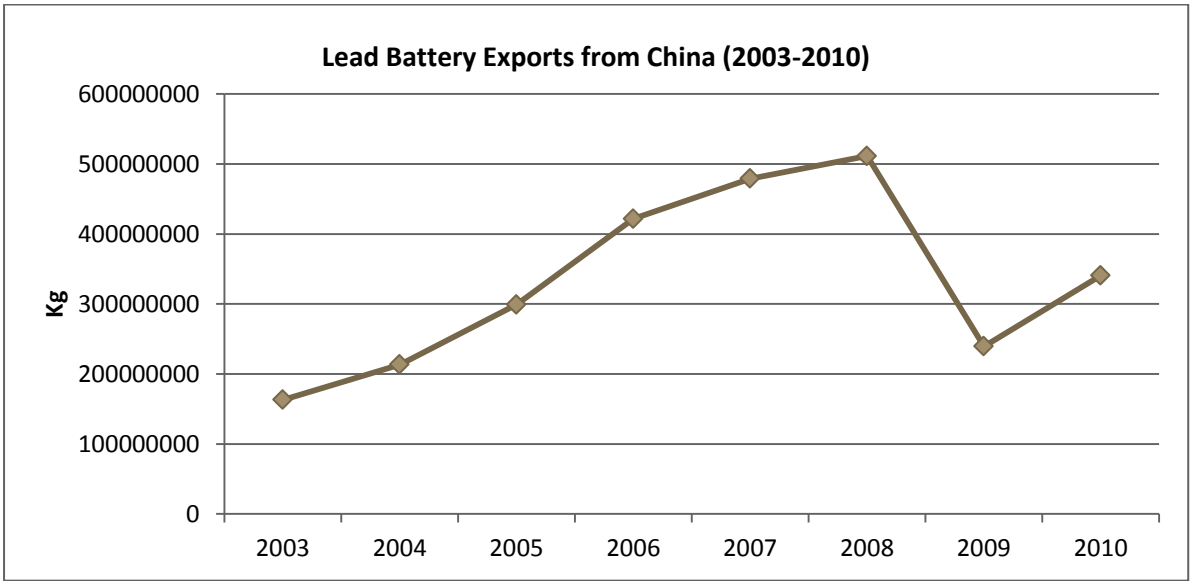
In 2003, approximately 3,000 licensed lead battery manufacturers operated in China. The implementation of various policies to better regulate the lead battery industry, including the "11th Five Year Plan," reorganized the industry, decreased the number of authorized manufactures to 1,134 in 2007.[29]The largest concentration of manufacturers is located in Jiangsu, Zhejiang, Guangdong, and Shandong provinces.

In 2008, 75% of all lead production was used to make lead batteries.[30] At least half of this lead may be lost during a battery's lifecycle, due to poor mining practices, low efficiency of most smelters that process lead ore and inadequate battery recycling.

Exports

In addition to being the largest manufacturer of lead batteries, China is also the largest exporter of lead batteries. From 2003 to 2010, China's total exports of lead batteries increased nearly 110%.[31] In 2008, exports of lead batteries reached a record high of 511,369,090 Kg.[32] Exports in 2009 experienced a drastic decrease due to the global economic downturn that affected demand abroad, however since 2010 there has been a resurgence in demand as indicated in Figure 2 below.

Figure 2:



Data from the U.S. International Trade Commission indicates that lead battery imports to the U.S. from China increased 300 percent from 2000 to 2010.[33]In 2010, China's top export market for lead batteries was the U.S. (44% of all exports), followed by India (21%), and various European countries.[34]

Sources of Raw Material

Lead consumption in China is driven primarily by the growth in manufacturing batteries, which in turn has necessitated a significant expansion in mining and smelting. Since 1999, domestic consumption of lead has increased by around 20% each year.[35] China leads the world in lead production; in 2010 the country produced 4.2 million metric tons of refined lead.[36] With lead batteries comprising nearly 75% of total lead consumption, approximately 3,150,000metric tons of domestic lead was used to manufacture lead batteries in China in 2010.

Due to the rapid growth experienced in this industry, China also relies on imported lead and lead ore to sustain lead battery production. Since 2008 Chinese imports of lead ore from the U.S. increased by 160%.[37] Major importing partners include the U.S, Peru, and Australia, accounting for 50% of total imports of lead ores and concentrates. According to United Nations Comtrade data, China imported 1,602,895 metric tons of lead ore and concentrates in 2010.[38] In the same year, China imported 21,534 metric tons of refined lead.[39]

Leading Lead Battery Producers

Although China's lead battery industry is highly fragmented, with a large number of small and medium producers, several companies have a significant market share in particular sectors. The following provides some limited information summarizing the largest manufacturers in the UPS, telecom, auto, e-bike and motorcycle sectors.

UPS:

- **China Shoto** is the largest supplier of batteries for back-up power with 20% of the market share.[40]
- **Leoch International** has 3.7% market share in this sector. The company is also the largest lead battery exporter, with annual gross production value exceeding 7 million kVAh.[41]
- **Coslight Newgen** is also a major manufacturer of batteries for UPS.[42]

Telecom:

- **Narada** and **Wuhan Intepower** are the top manufacturers for the telecommunications battery market.

Industrial and Transportation:

- **Baoding Jin Fengfan Storage Battery Company Limited** is the largest manufacturer of industrial and transportation batteries in China with market share exceeding 20%.[43]
- **Camel Group Company Limited** has around 15% of the auto battery market share. The company is currently in a three-year plan to double its production capacity.[44]

E-bike:

- **Chaowei Power Holding Limited** has the largest market share (18.3%) in revenue in China's electric bike motive battery market.[45]

Motorcycle:

- **Zhejiang Haijiu Battery Company** is one of the largest lead battery manufacturers for motorcycles, producing 800,000 units per month. The company supplies more than 20% of Mainland China's motorcycle batteries.[46]

Foreign Lead Battery Companies

Foreign lead battery companies have expanded rapidly over the past decade and hold a significant market share in China. The following table lists some of the largest foreign lead battery companies.

Table 1: Foreign Lead Battery Companies with Production Facilities in China

Company and Headquarters	Primary Markets	Plant Location(s)
Enersys (Switzerland)	Automotive, UPS, Telecom	• Jiangdu • Chaozhou • Shenzhen
C&D Technologies (USA)	UPS, Telecom	• Shanghai
Johnson Controls (USA)	Automotive	• Shanghai • Fuling (under construction) • Changxing • Chongqing
Panasonic (Japan)	UPS	• Liaoning
B&B Battery (USA)	UPS, Telecom	• Raoping
Fiamm (Italy)	Automotive, UPS, Telecom	• Wuhan
Hoppecke (Germany)	UPS, Telecom, Railway	• Wuhan • Shanghai
Hitachi (Japan)	Automotive	• Dongguan
GS Yuasa (Japan)	Automotive	• Tianjin • Zhangqiu • Shunde
Changzhou Ri Cun Battery Technology Co., Ltd. (Taiwan)	Motorcycle, UPS, Telecom	• Jiangsu Province

5. Used Battery Collection

In 2010, China produced 2.6 million metric tons of used lead batteries.[47] Therefore the country is in an excellent position to collect back a significant portion of these used batteries so that they can be economically processed at large and efficient lead battery recycling plants. However, there is no centralized system for collection, or mandatory financial incentive, which has resulted in a large number of dealers selling used batteries to a range of recyclers including facilities without legal authorization.

While the "Technical Policy for Pollution Prevention of Discarded Batteries" issued in 2003 states that manufacturers and importers are responsible for the collection of used lead batteries, and the "Circular Economy Promotion Law" extends producer responsibility for taking back used batteries, neither designates specific provisions for how this is to occur. In addition, it is not clear which government department will supervise collection nor impose penalties for noncompliance. As a result, there is no effective implementation and no nationally organized program for used lead battery collection in China.

Battery manufacturers, recycling companies, secondary lead smelters, and individual households are involved in collecting used lead batteries. Individual households account for 60%; battery retailers account for 18%; automotive repair shops and 4S (a professional auto service chain) account for 5%; secondary lead recycling companies account for 9% and battery manufacturers only directly take back approximately 8%. Following collection, it is estimated that 17% of used batteries will go to lead battery manufacturers, 41% to small-sized smelters and 42% to large-sized lead battery recycling plants.[48]

In countries where there are no formal collection programs to consolidate used lead batteries, there is a disincentive to invest in large scale, environmentally sound, battery recycling. A secured large supply of lead batteries is needed to justify such expenditures. As small-scale operations avoid costly pollution controls, taxes, permits, and other costs, they are generally able to offer a higher price to purchase used lead batteries and therefore negatively impact the supply for more efficient formal sector businesses. The success of any regulatory effort to improve lead battery recycling is dependent upon structuring an incentive program to encourage the collection of large numbers of lead batteries.

Currently, at least three lead battery manufacturers including Chaowei Power Company, Shuangdeng Group, and China Camel, operate their own used lead battery collection system. Shuangdeng Group, for example, is signing contracts with buyers that require that the buyers return the used lead batteries to Shuangdeng's recycling facility. China Camel has approximately 1,000 sales centers throughout China that serve as their used lead battery collection centers. The company has an agreement with a large smelter, Yuguang Gold- Lead Group, to sell their collected, used lead batteries for processing. Yuguang then provides China Camel with refined lead for battery manufacturing.

6. Lead Battery Recycling

Recyclable components, including the lead, metallic grids, and plastic, account for around 85% of a lead battery, with the lead being the most valuable recyclable component.[49] With the expected market demand for vehicles and other applications, the lead battery industry will continue to experience significant growth increasing the demand for lead. This rising demand will create greater economic incentives to improve the efficiency of lead recycling operations.

China Nonferrous Metals Industry Association statistics show that in 2010 China's total refined lead production totaled 4.2 million metric tons.[50]However, recycled lead supplies only a small percentage of this output when compared to that from primary production from lead ore. According to statistics for 2010, only 32% of China's lead production comes from secondary sources.[51] In some developed countries, used lead batteries supply more than 85% of refined lead production.[52]

This situation highlights the inefficiencies in lead battery recycling in China, which if not corrected will hamper the long term development of the lead battery industry. Due to the inadequate collection channel for lead batteries and other factors, most lead battery-recycling plants are small with antiquated technology and equipment. According to available statistics, there are over 300 recycling plants in the secondary lead industry and small companies account for 50% of capacity. This situation creates a gap in China's ability to meet key indicators for energy consumption, emissions, and recycling efficiency.[53] Some of the barriers to improved lead battery recycling are outlined below.

According to China Recycling Resource Association, most secondary lead smelters are located in Jiangsu, Shandong, Anhui, Hebei, Hubei, and Hunan provinces. Approximately half of these smelters are unlicensed and are not legally permitted by the Chinese government to recycle used lead batteries.[54]The actual number of smelters is assumed to be much larger since the small informal facilities are under counted.

China's largest lead battery recycling facility is Huaxin Lead Group, located in Anhui province. The company recycles approximately 450,000 metric tons of used lead batteries and lead containing waste, producing 330,000 metric tons of secondary lead per year.[55] Other large facilities with annual lead output greater than 100,000 metric tons include Jinyang Smelting Company (Hubei province), Chunxing Shengke Company (Jiangsu province), Yuguang Jinqian Company (Henan province), Yubei Jinqian Company (Henan province), and Anxin Huacheng Nonferrous Alloy (Hebei province). Facilities that annually produce between 10,000 and 70,000 metric tons of secondary lead include Beijing Eco-Island Science and Technology Company, Tianjing Toho Lead Resource Company, and Shanghai Feilun Nonferrous Smelting Company.

Recycling Process

The average lead recycling efficiency of secondary smelters in China is approximately 80%-85% compared to 95% and higher efficiency rates in developed countries.[56] The Chinese government has set national standards to increase the efficiency of recycling operations. At least one large facility, Hebei Anxin Huacheng Nonferrous Alloy claims to exceed these standards with a recycling efficiency of 98.5%.

Large smelting facilities mechanically crush batteries and generally employ dust controls and treat the exhaust. In contrast, small smelters usually crush batteries manually, in an uncontained environment, and do not use pollution control equipment. As they use low efficiency reverberators and blast furnaces to melt the lead, their energy consumption is between 500 kgce/t to 600kgce/t of secondary lead, far exceeding the national standard of 130kgce/t for secondary lead smelting.[57]

Plants with annual production above 10,000 metric tons generally have more advanced technology that increases energy efficiency. Huaxin Lead Group, the largest used lead battery recycler in China, developed a technology with higher heating capability, which has enabled the plant to significantly lower their energy consumption from 130kgce/t to 87.5kgce/t.[58]

Although large smelters mechanically crush used lead batteries, many lack the separation technology, which is crucial to obtain high quality refined lead.[59]At present, crush-separation equipment used in China that is considered adequate for this process is supplied by a U.S. company, M.A. Industries, as well as an Italian company, Engitec Technologies. Shanghai Feilun Nonferrous Smelting Company uses theM.A. Industries crush-separation equipment while Beijing Eco-Island Science & Technology employs the Engitec system.[60]

Desulfurization is another essential step of recycling a lead battery. Although this can be achieved through different methods, the primary purpose is to avoid decomposition of lead sulphate and emissions of sulphur dioxide into atmosphere.[61]Some companies use a technology that adds sodium carbonate into a lead paste to react with the lead sulphate to produce lead sulphite. Lead sulphite has a lower melting point and can be decomposed into lead oxide. Lead oxide is then easily converted into lead. This process helps smelters to save energy and produce high quality refined lead.

Greenhouse Gas Emissions and Energy Consumption of Lead Battery Recycling

Improvements in lead battery recycling can have significant advantages in reducing energy consumption and greenhouse gas emissions. We conducted an analysis to estimate potential energy savings and greenhouse gas emission reductions that can be realized from modernizing China's lead battery recycling industry. Our calculations, based on 2008 data, indicate that the use of recycled lead (from the formal sector) over using mined (primary) lead has the potential to cut energy use and greenhouse gas emissions by 40%. These findings are even more significant in light of the 160% increase in the export of lead ore from the U.S. to China from 2008 to 2010.[62]

7. Summary of Applicable Regulations

China has a significant body of legislation and regulation on the environmental and occupational aspects of the manufacturing and recycling of lead batteries. In recent years, a series of national environmental standards addressing lead pollution have been published, including some intended to close smaller, less efficient operations in order to consolidate this industry. If these laws are fully enforced and intended punishments for violating companies are employed, improvements in the industry may be realized. Recent press reports have indicated that a large number of lead battery manufacturing and recycling facilities were shut down under these laws, which may be an indication of renewed enforcement in this area.

Although Chinese environmental and occupational regulations for lead are generally similar to other international standards, there are significant gaps between Chinese and U.S. regulations in at least two key

areas. The ambient air quality standard for lead in China is ten times that of the U.S. level. Workers in China are not removed from work with lead until their symptoms are severe while in the U.S., they are removed when their blood lead level reaches 50 ug/dL, regardless of symptoms. The U.S. Occupational Safety and Health Administration regulations also provide workers with ongoing medical monitoring during the removal period, specific provisions on when removed workers can return to working with lead, and other protections that are not explicit in the Chinese requirements.

Outlined below are key provisions of some of China's laws and regulations that relate to the manufacture, collection, transportation, and recycling of lead batteries:

Environmental Regulations

Cleaner Production Standard for the Lead Battery Industry (HJ 447-2008) was formulated to implement the Environmental Protection Law and the Cleaner Production Promotion Law. The Standard provides requirements for pollution controls in lead battery manufacturing and is divided into five categories:

- Production technology and equipment requirements;
- Resource and energy usage targets;
- Product standards;
- Pollutant production targets; and
- Environmental management requirements.

Additional requirements include:

- Specific calculation formulas for operational efficiencies, water consumption, water reutilization, electricity consumption (during manufacturing), and wastewater discharge.

The Chinese version of the standard is available here: http://bit.ly/bXCQ6Y

Technical Specifications of Pollution Controls for the Treatment of Lead Acid Batteries (HJ 519-2009), effective March 1, 2010, was formulated to implement the Environmental Protection Law and the Solid Waste Pollution Prevention Law. It outlines the requirements for the collection, transportation, storage and disposal (recycling) of waste lead batteries and provides guidance to recyclers on site selection and management of facility pollution controls. The regulation extends producer responsibility with mandatory collection of used lead batteries and mandates that collected battery waste can only go to recycling facilities approved for operation by the government.

Additional requirements include:

- Battery recycling facilities must have a lead recovery rate of 95% for existing factories and at least 97% for new factories;
- Existing recycling facilities must have a capacity of at least 10,000 metric tons per year;
- New factories must have a capacity of at least 50,000 metric tons per year; and
- Recyclers must have appropriate worker training, supervision, and assessment.

The Chinese version of this standard is available here: http://bit.ly/9fAr1v

Health Protection Zone Standard for Lead Battery Plants (GB 11659-89) sets the minimum distance between battery manufacturing facilities and residential areas. In mountainous regions, these requirements may vary according to the local geography.

Admittance Condition of Lead and Zinc Industry (National Development and Reform Commission Policy No. 13, 2007), effective October 1, 2007addresses the conditions for approving lead and zinc smelters and sets the minimum capacity for these plants. The expansion of existing secondary lead recycling plants must increase production capacity to at least 20,000 metric tons/year. Secondary lead recycling plants must crush and separate lead battery containers mechanically in a contained environment. For newly built lead smelters,

recycling efficiency for the initial smelting process must be 97% and the efficiency for refining lead must be 99%. The waste slag must contain less than 2% lead.

The Chinese version of this law is available here:
http://www.datian.gov.cn/Article/zwgk/bmxx/fgj/zcfg/200804/20080424170555_1307.htm

Standards on Hazardous Waste

Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste (Order 31 of President), effective April 1, 2005, outlines the government, producer, and consumer responsibility of reducing solid waste output and encourages the proper disposal of waste. Control and prevention of hazardous waste is also described. Facilities that collect, store, transport or dispose of hazardous waste must have hazardous waste signage. The law aims to formalize these processes through certifying qualified facilities.

The Chinese version of this law is available here:
http://www.gov.cn/flfg/2005-06/21/content_8289.htm

National Catalogue on Hazardous Waste (Environmental Protection Ministry and National Development and Reform Commission, Order 1), effective August 1, 2008, divides waste into different categories according to *The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes*. Four hazardous characteristics are identified in the catalogue: corrosivity; toxicity; ignitability; and reactivity. Used lead acid batteries are included as hazardous waste due to their toxicity.

The Chinese version of this catalogue is available here:
http://www.gov.cn/flfg/2008-06/17/content_1019136.htm

Technical Policy for the Pollution Prevention of Discarded Batteries Environmental Protection Ministry and National Development and Reform Commission Policy No. 163, 2003), effective October 9, 2003, provides guidance on used lead batteries. Lead battery manufactures, battery importers, manufactures using batteries in their products, and companies entrusting other manufactures with their battery trademark are responsible for the collection of used lead batteries.

Additional provisions include:
- During the collection and transport of used lead batteries, the battery cover should be intact;
- Enterprises that collect and transport used lead batteries are required to have emergency procedures in place to address potential accidents;
- In the process of dismantling batteries, lead plates and other lead-containing material should be separated from waste acid and plastic;
- New lead smelters must have a production capacity more than 50,000 metric tons/year; and
- Existing secondary lead facilities' production capacity must be at least 10,000 metric tons/year, facilities that are expanded must be at least 20,000 metric tons/year, and new secondary smelters at least 50,000 metric tons/year.

The Chinese version of the policy is available here:
http://bz.mep.gov.cn/bzwb/wrfzjszc/200611/t20061120_96225.htm

Circular Economy Promotion Law, effective January 1, 2009, establishes six systems to reduce the consumption of resources, and promotes reuse and recycling in order to improve environmental protection. The law assigns specific responsibilities to producers and other in the life cycle of regulated products. It includes:

- Recycling planning system;

• System to control resource waste and emissions;
• System to assess and audit recycling;
• Extended producer responsibility;
• Monitoring system for companies that consume large amounts of energy or water; and
• Enhanced economic measures.

The law indicates that companies must use advanced or appropriate recycling technologies, techniques, and equipment. The dismantling and recycling of special products, including used lead batteries, must comply with the provisions of relevant laws and regulations. When any producer consigns any seller to recover the waste product, or consigns any waste recycling or disposal enterprise to reuse or dispose the said waste articles, the consignee is responsible for the recovery, reuse or disposal in accordance with relevant laws, regulations and agreements. Full implementation of this law is pending the release of more specific guidance and regulations.

The Chinese version of this law is available here:
http://www.gov.cn/flfg/2008-08/29/content_1084355.htm

Emission Standards

Integrated Wastewater Discharge Standard (GB8978), effective January 1, 1998, implements the Environmental Protection Law on Prevention and Control of Water Pollution and Marine Environmental Protection Law in order to control water pollution and to protect the quality of surface and groundwater. The standard provides the maximum limit for 69 pollutant concentrations, including lead, and sets the total allowable wastewater discharge for various industries. The discharge limit for lead is: 1.0mg/L.

The Chinese version of the standard is available here:
http://cer.jlu.edu.cn/shuiwen/Gfbz/wshzhpf.pdf

Integrated Emission Standards of Air Pollutants (GB16297), effective January 1, 1997, specifies the emission standards for stack emissions of 33 air pollutants. The limit for lead (and lead compounds) measured at the exhaust stack is: 0.90 mg/m^3.

The Chinese version of the standard is available here:
http://www.watergasheat.com/shuibzgf/GB16297-1996.pdf
Ambient Air Quality Standard (GB3095), effective October 1, 1996, sets the requirements for ambient air quality monitoring including the limits for lead concentrations in the air. There are three grades of ambient air quality areas but only one requirement is applicable to all lead industries. The lead limit (for all grades) is: 1.50 ug/m^3 (quarterly average) and 1.00 ug/m^3 (annual average).

The Chinese version of the standard is available here:
http://www.nthb.cn/standard/standard03/20030411161748.html

Emission Standard of Air Pollutants for Industrial Kilns and Furnaces (GB 9078), effective January 1, 1997, sets the emission limits for various industrial kilns and furnaces. The provisions regarding lead emissions are in the table below. The three grades in the table correspond to the three regions in the Ambient Air Quality Standard (GB3095-1996).

Table 2: Emission Standards for Industrial Kilns and Furnaces

Pollutant		Grade	Furnace installed before January 1, 1997	Furnace installed or re-installed after January 1, 1997
			Emission concentration (mg/m^3)	Emission concentration (mg/m^3)
Lead	Smelting	Grade 1	5	No emission
		Grade 2	30	10
		Grade 3	45	35
	Other processes	Grade 1	0.5	No emission
		Grade 2	0.10	0.10
		Grade 3	0.20	0.10

The Chinese version of the policy is available here:
http://wenku.baidu.com/view/0de1560103d8ce2f0066236e.html?from=related

Emission Standard of Pollutants for Lead and Zinc Industry (GB 25466), effective October 1, 2010, covers pollution discharge limits in wastewater and exhaust air in the primary lead and zinc smelting industry (the secondary lead industry is not included in this standard). For existing facilities, it sets new requirements for compliance after January1, 2012. Facilities that are located in regions in need of special environmental protection have lower pollution discharge limits for wastewater. Environmental protection administrations at the local county level are responsible for implementing this standard. See lead discharge limits below:

Table 3: Emission Standards for Lead and Zinc Industry

Facilities	Total lead in waste water* (mg/L)		Lead and its compounds in exhaust gas** (smelting) (mg/m^3)	Lead and its compounds in air of facilities' boundary*** (mg/m^3)
Existing facilities	Before 2012	1.0	10	0.006
	After 2012	0.5	8	
New facilities	0.5		8	
Facilities in special regions	0.2			
* The test point for lead in water is at facilities' wastewater discharge point. **The test for lead in exhaust gas is at the discharge point of air cleaning equipment. ***Lead and its compounds limit in the air of facilities' boundary refers to the average lead level during any hour chosen for test.				

The Chinese version of the policy is available here:
http://www.mzepb.gov.cn/flhbz/zxfg/201010/P020101018376215462136.pdf

Occupational Safety and Hygiene Standards

Safety and Hygiene Code for Working with Lead (GB13746-1992) sets the safety requirements for working with lead. It covers a wide range of industries including lead battery manufacturing. It sets requirements for processing equipment during lead battery manufacturing and specifies that at the entrance and exit of the equipment, there must be exhaust and purification devices.
The Chinese version of the code is available here:
http://wenku.baidu.com/view/ea9ffacda1c7aa00b52acbe6.html

Occupational Exposure Limits for Hazardous Agents in the Workplace (GBZ2-2002) applies to various facilities that manufacture, use or generate hazardous agents. It has detailed requirements on hygiene in the workplace, and monitoring and testing for these pollutants. The limit in the work place for lead fume is 0.03mg/m^3 and the limit for lead dust: 0.05mg/$m^{3.}$

The Chinese version of the standard is available here:
http://www.china-osh.com/bzh/35.html

Biological Limit Value for Occupational Exposure to Lead and its Compounds (WS/T112-1999)provides biological monitoring targets for blood lead levels, limit values, monitoring measures and test measures for occupational exposure to lead. It requires biological monitoring of blood lead levels on workers with occupational exposure to lead. Blood lead levels that exceed 400ug/L indicate that the worker has excessive exposure to lead.

The Chinese version of the policy is available here:
http://www.wwwstandard.cn/index.php?doc-view-81795.html

Diagnostic Criteria of Occupational Chronic Lead Poisoning (GBZ37-2002) sets the criteria to determine if a worker has chronic lead poisoning. In order to be considered to have lead poisoning, the worker must have occupational contact with lead as well as:

- lead in urine ≥ 7.04ug/dLor 9.94ug/dL/24h
- blood lead ≥ 39.34 ug/dL

Table 4: Diagnostic Criteria for Degree of Lead Poisoning

	Blood/urine lead level	Symptom or feature
Mild	Blood lead ≥600μg/L *or* Urine lead≥ 120μg/L	1.(ALA)≥8000μg/L *or* 2. (EP)≥ 2000μg/L *or* 3. (ZPP)≥ 13.0μg/gHb *or* 4. abdominal distension, constipation
Moderate	Not indicated	***Based on the mild intoxication***, the worker should have one of the additional symptom 1.abdominal pain *or* 2.anemia *or* 3. peripheral neuropathy
Severe	Not indicated	Worker has one of the features 1.lead paralysis or 2.toxic encephalopathy

Workers with sever intoxication must be removed from lead exposure. Those with mild or moderate intoxication may return to work.

The Chinese version of these criteria is available here:
http://www.hbsafety.cn/article/318/322/331/200806/44860.shtml

Code of Dust and Poison Control for Lead Smelting (GB/T 17398-1998) outlines the requirements for primary and secondary lead smelters to monitor and minimize airborne lead during the smelting processes. Provisions include:

- Factory floor must be smooth and easy to clean;
- Dust control measures must be incorporated into the overall factory management plan;
- Tests to monitor airborne lead must be conducted regularly and records of the tests filed in an archive;
- Technical training programs for employees should be established; and
- Pre-employment health checks and regular health checks for employees working with lead should be conducted.

The Chinese version of the code is available here:
http://www.docin.com/p-200013358.html

Technical Specifications for Occupational Health Surveillance (GBZ188-2007), effective October 1, 2007, introduces the basic principles of occupational health surveillance and includes all industries working with lead. The employer must provide laborers working with lead with a pre-employment physical examination and a post-employment examination. All employees must also receive an annual physical exam.

The Chinese version of the specifications is available here:
http://dir.dda.gov.cn/uploads/1568/files/201003240902120348.pdf

8. Environmental Violations

Although China has many challenges in enforcing environmental regulations, a central system is in place to collect and summarize the data from environmental violations that are issued by local or provincial level environmental agencies. This information is released by local environmental agencies and is then collected by the Institute of Public & Environmental Affairs (IPE) and included in a searchable database on their web site.[63]

The government records violations from lead battery manufacturing and recycling companies broadly into four categories:

- Wastewater;
- Air emission;
- Solid waste; and
- Procedure violations (concerning siting criteria, permits and other approvals).

Based on the violation records in the lead battery manufacturing and recycling industry since 2004, there were a total of 361 companies that received 403 violations. Table 1 shows the number (and percent) of each violation type issued by local environmental agencies.

Table 5: Summary of Environmental Violations in the Lead Battery Manufacturing and Recycling Industry (2004 – 2011)[64]

Violation Type	Total No. Violations	Percent of Violations
Wastewater	310	77
Air Emissions	44	11
Solid Waste	20	5
Procedure Violation	29	7

According to the estimates from the Ministry of Industry, in 2009, more than 12 million metric tons of wastewater containing heavy metals was discharged by the battery industry, of which more than 10 million metric tons came from the lead battery industry.[65]Table 1 indicates that wastewater emissions make up the vast majority of the reported violations in the lead battery manufacturing and recycling sector. The wastewater treatment facilities in most of these enterprises are incompletely constructed or not functioning for long periods. In many cases wastewater and sewage are discharged directly to freshwater causing the build- up of high levels of lead in the rivers, lakes, and groundwater. As a result, there is a significant danger of polluting the drinking water for the residents who live close to these facilities.

Lead battery recycling companies also have many wastewater violations. Although the violation records generally do not provide specific pollution concentration levels, we can assume that the lead in the wastewater discharged of these companies exceeded the national standard of 1.0 mg/L.

The second most common violation found in the database concerns air emissions. A number of companies fail to collect and/or filter the exhaust from the production process, and instead discharge directly into the air. Lead fumes, dust, and sulfuric acid mist are generated in the process of manufacturing and recycling lead batteries and contaminate the environment and increase exposures in these locations. It is possible that these air emission violations may have a greater impact on the environment and human health than the other violation categories.

Solid waste violations are the third most common. In 2009, there was more than 220,000 metric tons of solid waste containing heavy metals produced by all types of battery companies. Ninety-five percent of the solid waste generated by this industry (210,000 metric tons) contained lead.[66]The lead battery recycling industry in particular generates a large volume of slag. The solid waste violations for lead battery companies that we reviewed were issued for lacking appropriate permits; improper disposal of lead waste outside the factory; failing to store hazardous wastes according to the standard, and other deficiencies.

The fourth most common type of violation that we reviewed concerned the siting criteria for plant location, improper or missing permits, and other approvals. Some companies with these types of violations did not follow the "Three Simultaneous" system for design, construction and launching new facilities under Article 26 of the Environmental Protection Law that states that pollution prevention and control measures for a facility must be in place at the end of the main construction project and not installed retroactively. Other procedural violations were given for not following Environmental Approval Procedures, initiating construction without approval, and for making changes in the production line without permits.

Another serious procedural violation that has repeatedly been seen in the database is for not maintaining an adequate distance from the plant to residential areas as stipulated for battery manufacturing and recycling companies to protect nearby residents. There are several reasons that lead battery companies often do not meet this standard including the failure of the local government to fulfill its promise to move residences. In addition, some have received violations for putting plants into production without fulfilling all environmental requests. For example, in the case of one lead poisoning incident reported in Deqing, Zhejiang province, the local government promised to complete the work within one and half years, but failed in the end.[67]

Local government or other relevant departments sometimes change the designated use of the land surrounding these battery plants leading to violations of the health protection distance. For example, in one lead poisoning incident reported in Huaining, Anhui, the residential community was separated from the battery plant by only a small road, while environmental protection regulations require that battery plants be built at least 500 meters away from residential communities.[68] In addition, some plants were constructed in locations that qualified under the law when first built, but with the expansion of surrounding residential areas, the battery companies found themselves in violation. This is also a consequence of inadequate planning for a growing population and the lack of enforcement of the existing zoning criteria by local governments.

9. Lead Battery Supply Chain

With the rapid development of Chinese market economy, the approximate number of lead battery manufacturers had reached 1,500 by January 2011 and approximately 1,300 of these had obtained a production license.[69] The lead battery industry plays an important role in the national economy supplying starting batteries to a wide range of industries and support significant international trade. Most of the industries that rely on lead batteries are growing rapidly in China.

Based on the experience of some companies in developed countries in monitoring their suppliers, major purchasers can provide significant guidance to their lead battery suppliers to encourage improvements in cleaner production. In some cases companies can provide technical assistance to suppliers or require them to seek environmental certifications or open their facilities for audits from independent third parties. In all cases companies can use the leverage of their purchasing power to bring attention to significant environmental health and safety issues that may not otherwise be a priority to the lead battery producer. Below we summarize our research into some of the key suppliers to major Chinese and foreign companies that are reliant on lead battery technology.

According to the information from the official web site of Yixing Faam Industrial Co., Ltd, a number of well-known auto companies, including Audi, Volkswagen, and Toyota are major purchasers of their products. However, their battery manufacturing facilities in Yixing, China, have violated multiple environmental regulations. In the motorcycle and electric bike industries, a number of Chinese and international motorcycle companies purchased batteries from Zhejiang Haijiu Co., Ltd, which was linked to a mass lead poisoning incident in Deqing, Zhejiang province.[70]

In the telecommunication industry, publicly available information indicates that China Mobile, China Telecom, and China Unicom have sourced lead batteries from Heyuan Sanway Battery Co., Ltd and Foshan China Commercial Guotong Electric Co., Ltd. Illegal emissions from the Heyuan Sanway Battery Co., Ltd. were shown to be the exposure source for 70 people with lead poisoning in Guangzhou.[71] Foshan China Commercial Guotong Electric Co., Ltd also has violations from the illegal disposal of hazardous wastes.[72]

The large number of lead poisoning incidents reported is a result of the failure to install and operate adequate pollution controls in lead battery companies. Some of the companies involved in the incidents are large and have many well-established customers. For example, in one incident in Jiangsu Dafeng, 51 children were tested and shown to have excessive blood lead levels. After an investigation by the government, the cause of the incident was determined to be pollution from the Shengxiang Power Co., Ltd. This company mainly produced battery plates for electric bicycles and its customers have included Jiangsu Hongdou Group, Guangdong Zhongshan Changfa Co., Ltd and others.[73]

Of the hundreds of violations from lead battery companies that we reviewed, few were from foreign firms operating in China but some of the exceptions are outlined below:

The Wuhan Enertech Co, Ltd (located in Hubei Wuhan), part of the Italian Fiamm Group, has an annual capacity of two million batteries. The following environmental violations were uncovered at this plant:

- production without approval;
- Improper marking/labeling of the hazardous waste;

- Excessive lead levels in the wastewater compared to the allowable level.[74]

In September 2011, a representative from FIAMM contacted the NGOs to provide initial explanations regarding an incident reported by media. The NGOs are awaiting further information and follow-up materials regarding this matter and hope the details will be disclosed in the hope for improved environmental information transparency in China.

Yixing Faam Industrial Battery Co., Ltd (located in Jiangsu Yixing) had violations for:

- halting operations at its wastewater treatment facility for an extended period; and
- Discharge of wastewater and sewage with high levels of lead directly to lakes or rivers over an extended period.[75]

10. Lead Pollution Investigation of Suppliers to the Telecommunications Sector

We have focused our initial efforts to influence major purchasers of lead batteries on the telecommunications industry which is experiencing rapid growth in China. There are nearly 800 million mobile phone users and thousands of cell phone towers that are all reliant on large lead battery installations.[76] The industry generated about $140 billion USD in 2010 and is expected to continue to grow at a rate of 8.8% over the next few years, reaching $187 billion USD by 2014.[77] The battery companies supplying this industry tend to be specialized in manufacturing lead batteries for these applications. This gives the battery purchasers more influence over the manufacturers' practices. In addition, batteries purchased by companies in this industry are generally used at locations owned or leased by the telecommunications companies or managed by their subcontractors. Rather than being distributed to downstream users as is the case in other key sectors (e.g. e-bike or motor vehicle manufacturing), telecommunications companies have complete control over the collection and recycling of used batteries. Therefore, we have initiated a dialog with telecommunications companies with operations in China to inform them of the violation records of their suppliers as described below.

After searching more than 85,000 publicly available, government sourced records we identified links between these violating supplier companies and international and domestic purchasers in the telecommunications sector.[78] A coalition of Chinese NGOs came together to respond to these findings.

In August 2011, the organizations sent letters to the management of 21 companies pointing out links with these violating lead battery manufacturers and called on them to assist in improving the environmental performance of these suppliers. Along with the names of the lead battery companies and year of the recorded violation, the organizations sent web links to view more specific information about the environmental performance of each company on the Green Choice Alliance website.[79]The letter included the questions listed below and called on these buyer companies to respond within a 30-day period:

1. *Are the factories listed above currently, or have they previously been, suppliers or sub-tier suppliers to your company?*
2. *If the enterprises listed are your suppliers, were you aware of these environmental violation records?*
3. *If you were aware of the situation described above, what measures have you taken in response? If you were not aware of this situation before receiving this letter, then what kind of measures or actions are you preparing to take?*
4. *Do you have any other suppliers that have problems with environmental compliance? Are there any channels through which your company is informed of such information? **
5. *Do you have environmental performance standards, beyond legal compliance, for your lead battery suppliers? Have you established an oversight or audit program to evaluate the environmental management system and performance of your current lead battery suppliers?*
6. *What measures does your company take to evaluate the environmental performance of facilities where used lead batteries generated internally are taken to be recycled?*

**This question was only asked in Chinese letters sent to Chinese companies.*

Table 6: Telecommunications Company Responses to Letter from NGOs

The responses generated have been reviewed and categorized according to a set of criteria:

√	Achieved	√	Partially Achieved	X	Not Achieved

Company Name	Replied to NGO Letter	Checked the Purpose of the Study	Checks on Supplier Violation Cases		Use of Public Information to Enhance Supply Chain Management		Push for Suppliers to Make Corrective Action & Disclose Information		Further Extension of Environmental Management into the Supply Chain		Product Stewardship		
			Performed Initial Checks	Performed In-depth Checks	Considered Establishing a Search Mechanism	Decided to Establish a Search Mechanism	Corrective Action & Explanation	Regular Disclosure of Discharge Data	Directly Extended to Main Materials Suppliers	Pushing Tier 1 Suppliers to Manage Tier 2	Waste Manifest System to Track Used Lead Battery Shipments	All Lead Batteries go to Licensed Recyclers	Monitor Recycling Facilities Used
Siemens AG	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x
Vodafone	✓	✓	✓	✓	✓	✓	✓	x	x	✓	x	x	x
Nokia	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x
Alcatel-Lucent	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x
France Telecom	✓	✓	✓	✓	✓	✓	x	x	x	✓	x	x	x
BT Group Plc.	✓	✓	✓	✓	✓	✓	x	x	x	✓	x	x	x
Samsung	✓	✓	✓	✓	✓	x	x	x	x	x	x	x	x
Sprint Nextel	✓	✓	✓	✓	x	x	x	x	x	x	x	x	x
Ericsson	✓	✓	✓	x	x	x	✓	x	x	x	x	x	x
SingTel	✓	✓	✓	x	x	x	x	x	x	x	x	x	x
Telecom Italia	✓	✓	x	x	x	x	x	x	x	x	x	x	x
Tyco Electronics	✓	x	x	x	x	x	x	x	x	x	x	x	x
China Mobile	x	x	x	x	x	x	x	x	x	x	x	x	x
China Telecom	x	x	x	x	x	x	x	x	x	x	x	x	x
China Unicom	x	x	x	x	x	x	x	x	x	x	x	x	x
Guangdong Mobile	x	x	x	x	x	x	x	x	x	x	x	x	x
Emerson	x	x	x	x	x	x	x	x	x	x	x	x	x
Telefónica	x	x	x	x	x	x	x	x	x	x	x	x	x
Ameritech	x	x	x	x	x	x	x	x	x	x	x	x	x
BellSouth	x	x	x	x	x	x	x	x	x	x	x	x	x
Verizon	x	x	x	x	x	x	x	x	x	x	x	x	x

From the 21 companies contacted, we had varied degrees of success concerning communications on the issues raised in the initial letters. Some companies responded quite openly and constructively, whilst others have yet to respond. Please see Appendix B for the communications records for 12 of these 21 companies that responded as of October 1, 2011.

11. Recommendations

An effort to reduce the impact of the lead battery industry on health and the environment in China should include a number of steps aimed at reducing lead emissions during production and recycling of lead batteries. Outlined below are several recommendations to achieve this objective:

Government

1. **Improve and enforce existing standards and guidelines**
   Many government regulations specifically address environmental practices in the lead battery industry. In order to deter the types of violations characterized in this report, there must be more resources going to enforcement with higher penalties for violators. In addition, compliance with current standards is not sufficient to prevent impacts on health and the environment. In particular ambient air standards for lead, medical surveillance, and occupational limits for employee protection, should be strengthened to account for our current knowledge of low-level health effects of lead and to be consistent with the most stringent international norms.

2. **Develop guidelines for effective large-scale collection and recycling of lead batteries**
   In spite of existing government mandates requiring lead battery manufacturers to take back used batteries, there is no guidance as to how this should be done. As noted in this report, only a small percentage of lead battery collection in China is being conducted directly by battery producers. If batteries were collected on a larger scale by manufacturers, a system could be put in place to track shipments to authorized recyclers operating with pollution controls and more efficient technology. To facilitate collection by battery producers, uniform incentives must be established through the regulatory process to encourage individuals and businesses to return used lead batteries to authorized locations. Such incentives can take the form of a deposit fee or purchase discount (e.g. a set fee is discounted off the price of a new lead battery if the used battery is exchanged). A uniform fee must be set at a high enough level to make collection by dealers and unauthorized recyclers uneconomical.

3. **Increase industry transparency**
   If bulk consumers become aware that lead battery suppliers are in violation of regulatory requirements or are responsible for lead poisoning and pollution, they can pressure these companies to make improvements. To build on the existing system outlined in this report, lead battery manufacturing and recycling companies should be required to disclose their annual lead emissions to air, water and waste.

Lead Battery Industry

1. **Adopt the BEST Standard**
   The Better Environmental Sustainability Targets (BEST) Standard is a comprehensive set of voluntary environmental certification criteria for lead battery manufacturing facilities that includes provisions for emissions, waste disposal, energy and water consumption, and take back provisions for used batteries. Adoption of these criteria by lead battery industry leaders would bring China closer to the environmental performance indicators in place in much of the developed world. Adoption of this voluntary standard would be a big step toward reducing the health and environmental impact of these businesses. Certification under the BEST program would allow these companies to market their products with an eco-label and provide them an advantage in a competitive environment.

2. **Improve Transparency**
   Manufacturers and recyclers of lead batteries should disclose their environmental policies and any actions they are taking to reduce their emissions, reduce waste, and improve used battery collection practices. Companies must also disclose their annual lead emissions in air, water, and waste.

Bulk Purchasers

1. **Require BEST Certification for Suppliers**
   Companies purchasing large volumes of lead batteries should require that their suppliers adopt the BEST Standard and become certified under this program. If major battery purchasers select suppliers based on meeting these environmental performance standards, this will encourage lead battery manufacturers to initiate improvements. Purchasers should also consider environmental compliance records and community impacts of their suppliers.

2. **Require Suppliers to Take Back Used Lead Batteries**
   Battery purchasers should insist on requiring lead battery suppliers to take back used batteries in their contracts with suppliers. These take back policies should include provisions for recycling batteries only at authorized facilities and a manifest system to track individual shipments to these locations.

12. Conclusions

China is facing increasing challenges from the rapid growth of polluting industries causing environmental contamination, impacts on human health, and social unrest. This situation is particularly acute in communities surrounding lead battery manufacturing and recycling industries. The health impact of lead exposures from this industry is apparent from the large number of mass lead poisoning cases that have been reported in recent years. In addition, evidence from published reports in scientific journals has also demonstrated that there are a large number of workers and children in communities surrounding these facilities with elevated BLLs that are unacceptable. Given the available expertise in China to improve pollution controls, increase industrial efficiency, and minimize employee exposures in this industry, this situation is entirely preventable. This report outlines deficiencies in the current production and recycling infrastructure for lead batteries in China, and underscores the need for improvements to protect public health and the environment. Some of our recommendations require government intervention, while other scan be pursued by private sector initiatives.

APPENDIX A. China Mass Lead Poisoning Incidents (2005-2011)

1. Shanghai, China 2011

Twenty-five children living in Kanghua New Village in were found to have elevated blood lead levels. At least ten of these children were hospitalized for treatment. As a result, the Shanghai Environmental Protection Bureau shut down two factories that are approximately 700 meters away from the village for investigation. One of the two factories was a battery manufacturing plant operated by the U.S. company, Johnson Controls. The other was a Chinese company called Shanghai Xinmingyuan Automobile Accessory Co., which makes lead-containing wheel weights, although the plant was not authorized to manufacture products containing lead.

2. Jiangsu Province, China 2011

One-third of the employees at Taiwanese-owned Changzhou RiCun Battery Technology Company in eastern Jiangsu province were found with elevated BLLs between 28-48ug/dL. All employees of the factory were tested after a pregnant employee discovered through testing her BLL was twice the level of concern. Production at the factory was temporarily suspended.

3. Yangxunqiao, Zhejiang Province, China 2011

More than 600 people (including 103 children) working in and living around a cluster of tin foil fabricating workshops were found with excessive blood lead levels (BLLs). Demonstrations by the workers prompted the government to provide modest compensation to poisoned workers and children

4. Deqing County, Zhejiang Province, China 2011

The Zhejiang Haijiu Battery Company was confirmed as the source of lead emissions responsible for poisoning of 53 people who required hospitalization to undergo treatment. An additional 275 people in the area were found with BLLs in excess of recommended levels. Following this incident, the government suspended operations of this plant and 273 additional battery manufacturers in the province to conduct further investigations.

5. Zijin County, Guangdong Province, China 2011

44 children living near Sunnyway Battery Company in Guangdong Province's Zijin County were found with excessive lead in their blood. Some of those tested had BLLs that reached 60 ug/dL. Initial testing indicated that only 3 of the 199 tested had elevated BLLs. Reports indicate that some local residents were suspicious of the initial test results and traveled to Guangzhou for confirmatory testing, which revealed that far more people had high BLLs than was originally indicated.

6. Taizhou City, Zhejiang Province, China 2011

The Feng Jiang Storage Battery Company in Taizhou City closed after it was confirmed to have poisoned at least 168 residents from the community surrounding the plant. One of those poisoned had a BLL that reached 79 ug/dL. At least 53 of those with elevated BLLs were children. Three officials of the local environmental protection bureau were suspended and the factory manager was arrested.

7. Huaining County, Anhui Province, China 2011

The Borui Battery Co. Ltd. and another unnamed battery manufacturing plant were shut down after testing confirmed that over 200 children living in the surrounding Xinshan community had elevated BLLs. Twenty four of the children were described as having moderate to severe cases of lead poisoning and required hospitalization. Many of these children are less than one year old.

8. Binhai County, Jiangsu Province, China 2010

First Financial Daily reported that ten children living near Chaowei Power Co. Ltd. in Fuzhong Village had symptoms of lead poisoning.

9. Ningyang County, Shandong Province, China 2010

Residents of Wujialin Village in Shandong Province submitted a statement to *First Financial Daily* indicating that contamination from battery manufacturer, Chaowei Power was causing lead poisoning in those living in the area surrounding the plant. It is reported that 121 out of the 145 villagers tested, had BLLs in excess of the 10 ug/dL. Local government officials handling this poisoning reported that only 5 of those tested had BLLs exceeding this limit.

10. Sixian County, Anhui Province, China 2010

Local residents in the Sixian Economic Development Zone, protested the continued operation of Huifeng Power, a lead-acid battery manufacturer, after medical tests from more than one hundred children living in the area revealed that many had elevated blood lead levels (BLLs). According to residents there are numerous homes and three schools, attended by at least 8,000 students, located near the plant. The factory continues to operate.

11. Xinyi, Jiangsu Province, China 2010

The Naier Storage Battery Ltd Company, a manufacturer of lead batteries, was closed after blood tests confirmed that at least four children in the surrounding area had excessive levels of lead in their blood. The factory, a manufacturer of lead batteries, is located less than 150 meters from a residential area. The local government indicated that physical examinations were being offered to all residents of the area and that the families of the four poisoned children received compensation.

12. Chongyang, Hubei Province, China 2010

In an industrial area of Chongyang County, at least 30 people, including 16 children, were found to have excessive BLLs. Two-thirds of those with high BLLs were hospitalized. The incident occurred in the community around the Hubei Jitong Battery Co., which manufactures lead batteries. Reports have indicated that occupational exposures resulting in take-home lead exposures by the workers may be responsible for poisoning these children. The county government has suspended the battery plants operations until further investigation.

13. Chenzhou, Hunan Province, China 2010

Three lead smelters, including the Yuanshan Lead Recycling Company, in Chenzhou City are believed to have poisoned nearly 200 children living in nearby communities. Some of those children tested were confirmed to have four to five times the acceptable threshold exposure to lead and were hospitalized. The smelters believed to have caused the poisonings have been closed by the Chenzhou Municipal Environmental Protection Bureau.

14. Longchang, Neijiang, Sichuan Province, China 2010

Zhongyi Alloy Company was ordered closed following the confirmed poisoning of at least 88 children living in close proximity of the smelter. After a local resident was found to have dangerously high BLLs, authorities ordered testing of all residents living within an 800-meter radius of the factory. Seven children had dangerously high BLLs and were hospitalized in the provincial capital of Chengdu.

15. Dafeng, Yancheng, Jiangsu Province, China 2010

Blood lead testing of 110 children in the industrial district of Dafeng indicated that approximately half who lived in the area of a lead battery plant have blood lead levels in excess of 10 ug/dL. The Shengxiang Battery Company, the suspected source of the poisonings, is located less than 100 meters from the village. The factory was closed and ordered to relocate.

16. Jiyuan City, Henan Province, China 2009

In Jiyuan City, Henan Province, blood samples confirmed that over 1000 children living near lead smelters had BLLs exceeding 25ug /dL. The three large plants believed to be the source of these exposures are Yuguang Gold and Lead Group, Wanyang Smelter Group, and Jinli Smelting. Families living within 1 km of the plants were ordered to move, with a small relocation stipend provided by the government.

17. Qingyuan, Guangdong Province, China 2009

Aokelai Power Co. Ltd, a battery factory in the Qingyuan industrial area, is confirmed to have poisoned over 40 children. The factory is situated less than 50 meters from a residential area that houses workers of a nearby aluminum factory and their families. The factory was ordered closed until it complies with environmental standards.

18. Tangxia, Jiaoyang, and Chongtou, Fujian Province, China 2009

A battery manufacturing facility is confirmed to have poisoned at least 121 children in three villages of Fujian. The Huaqing Battery Factory in Shanghang County, in operation since 2006, was temporarily closed by government officials following protests by affected residents in the surrounding areas. Reports indicate that most children with elevated test results were in the range of 10 to 20 ug/dL with at least one case exceeding 21 ug/dL.

19. Kunming, Yunnan Province, China 2009

In an industrial area outside of Kunming, over 200 children tested positive for lead poisoning. According to Kunming's Center for Lead Poisoning Prevention, an average of 50-60% of children under 14 in Yunnan's mining intensive regions suffer from lead poisoning.

20. Wenping, Hunan Province, China 2009

In southeastern China's Wenping village, elevated BLLs were found in over 1,300 children living near a newly opened and unlicensed manganese smelter. Seventy percent of children tested were found to have BLLs in excess of 10 ug/dL. At least 17 of these children were treated in nearby hospitals for severe lead poisoning. Officials have ordered the smelter closed until it meets environmental standards and have detained two of the plants owners for operating without the appropriate licenses. According to reports by Xinhua news agency, a kindergarten and a primary and middle school are located less than 1,700 feet of the smelter.

21. Changqing, Shaanxi Province, China 2009

At least 851 children living near the Dongling metal smelter, China's fourth largest lead and zinc smelter, tested positive for lead poisoning. Some of these children are confirmed to have BLLs over ten times China's current level of concern of 10 ug/dL. Violent protests by angry parents and village residents caused authorities to temporarily close the smelter until it meets environmental standards. This closure comes several weeks after the plant initially ignored recommendations from local environmental authorities to suspend operations until specific environmental criteria were met.

22. Pizhou City, Jiangsu Province, China 2008

Nearly 100 children living in Xinsanhe Village were confirmed to have BLLs exceeding 10 ug/dL. JiansuChunxinshengke Alloy Co. Ltd., the battery company responsible for the poisonings, was within 100 meters of the village where many people were living. It was closed by authorities following the poisonings.

23. Lushi County, Henan Province, China 2006

Nearly 450 people living in the area surrounding the Lushixinghuo Smelter were tested and determined to have elevated BLLs. While the national government ordered the plant to be closed, it continued operation for nearly a year following the poisonings. A court hearing found the local environmental officials guilty of negligence and the plant finally ceased operations.

24. Xinsi and Moba Villages, Gansu Province, China, 2006

In Gansu Province concerned residents traveled hundreds of kilometers to access medical facilities to determine if a local lead smelting plant was poisoning them and their children. Local hospitals refused to test residents for lead poisoning, so they traveled 300 km to Xijing Hospital where 954 children were found to have blood lead levels greater than 10 ug/dL. Ten children were hospitalized, at least four with severe poisoning. In addition, 43 adults in the area were found to have blood lead levels of over 40 ug/dL. Chinese press reported that the Huixian County Non-Ferrous Metal Smelting Co Ltd chose this rural location because it would be more likely to escape scrutiny of the government. Before the facility was shut down it produced 5,000 lead ingots per year and dumped waste into open slag piles.

25. Mafang Village, Henan Province, China, 2005

In June 2003, the Oriental Golden Lead Co Ltd constructed a new lead smelter near the village of Mafang. The company neglected to do an environmental impact assessment prior to building on the new site. Almost immediately production resulted in excessive emissions of sulphur dioxide and lead dust. In 2005, 259 village children were tested for lead in their blood. Eighty percent of the children were found to have BLLs in excess of the 10 ug/dL acceptable limit including eight children with over 30 ug/dL. Villagers reported to local media that the majority of the village children had left their homes for schools further away because of the danger to their health.

26. Meishan Town, Zhejiang Province, China, 2005

Meishan is the site of the Tianneng Lead Battery Factory. In May of 2005, 700 out of 1,300 local children tested for lead poisoning at a nearby hospital were found to have lead exposures over 10 ug/dL. In August, town residents staged a protest by locking the employees in the factory. They demanded the government close or relocate the plant because it was poisoning their children. The prior factory inspection in October 2004 showed the facility was in compliance with waste discharge standards according to the director of the State Environmental Protection Bureau. The protest ended when the local government agreed to take steps on the community's behalf.

27. Guangzhou Nanfang, China 2005

In 2005 many of the workers at the Guangzhou Nanfang Guangyuan Super Energy Battery Ltd, a major producer of auto batteries in China, began to complain of nausea and stomach pains. After 400 of the company's workers underwent a physical exam, 140 workers were subsequently diagnosed with lead poisoning and treated by nearby hospitals. Immediately following the chelation treatment the workers were forced to return to work in the same factory with no significant changes in working conditions. The company denied all claims of wrongdoing by saying they had warned the workers about lead poisoning when recruiting and had established safety rules to protect them.

Appendix B: Communication Records from Telecommunications Industry Investigation

Siemens AG

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 24th, 2011:** Siemens responded acknowledging receipt of the letter.
- **August 25th, 2011:** By telephone, Siemens asked for information showing their relationship with suppliers, notifying that after screening they had found that these suppliers were not part of the company's supply chain. Siemens spoke of its commitment to continue dialogue with the organizations.
- **August 25th, 2011:** NGOs sent the related information connecting Siemens to the supplier companies.
- **August 25th, 2011:** Siemens contacted the NGOs advising that they had already begun investigations and that they will communicate detailed findings and measures to be taken in accordance with the company's policies.
- **August 30th, 2011:** Siemens stated that they had carried out internal investigations using internal resources along with the IPE database. The company found no record of the suppliers being part of their supply chain.
- **September 21st, 2011:** Siemens visited one organization's office in a hope to establish more fluid communications with the organizations. The company aims to increase momentum and to extend progress in their supply chain management and sustainability efforts. Siemens acknowledged that two of the three suppliers mention in the NGO letter were connected indirectly through a distributor and from outside of China. After learning of the issues raised the company gained a new extended focus in their China supply chain screening process and is making plans to take supplier compliance to a new level.
- **September 23rd, 2011:** No further response has been received.

Vodafone

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 24th, 2011:** Vodafone confirmed receipt of the letter and said the company will coordinate internally. The company said they will continue to engage in an open, transparent and constructive manner.
- **August 25th, 2011:** The NGOs said they are pleased the company is actively following up on the issues raised and they eagerly await the outcome of the investigations.
- **September 23rd, 2011:** No further response has been received.

Nokia Corporation

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 30th, 2011:** Nokia informed they will investigate and will immediately inform the NGOs of the results.
- **September 2nd, 2011:** Nokia wrote referring to its proactive collaboration with the NGOs and how the company had made the decision to "utilize the valuable database on environmental information in its sourcing activities." Nokia, upon receiving notification immediately carried out investigations in a hope to answer the NGO's questions. It was found that the supplier in question was not indeed a first or second tier supplier to Nokia. The company continued to give detailed descriptions of their environmental performance standards.
- **September 5th, 2011:** The NGOs responded to Nokia, acknowledging the great strides they had made in screening the environmental compliance of suppliers. They hoped Nokia could continue to push suppliers into taking corrective actions and to take further steps to promote disclosure of corrective actions taken and regular environmental data. The NGOs hoped all of these good practices could be extended throughout Nokia's supply chain.
- **September 23rd, 2011:** No further response has been received.

Alcatel Lucent

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.

- **September 6th, 2011:** Alcatel acknowledged receipt of the letter and advised that an official response is being prepared. The company has arranged for positive and open face-to-face talks in the coming weeks regarding the issues raised.
- **September 6th, 2011:** The NGOs responded to Alcatel, setting a fixed date for the face-to-face talks and hoping to hear more of the company's investigation findings.
- **September 22nd, 2011:** In a letter to the organizations, Alcatel welcomed working with the organizations as an additional external source of information to detect potential supplier's non-compliance. After internal investigations and requests for suppliers to perform checks, Alcatel could only identify one company mentioned in the NGO letter. Currently Alcatel is working with this supplier, amongst others, to recommend disclosure of explanations on corrective actions. The company informed that, in 2010, Alcatel carried out a campaign to assess its battery supplier's management systems and required those with unsatisfactory results to work on improvement plans or to be audited on-site.
- **September 23rd, 2011:** No further response has been received.

BT Group plc.

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **September 8th, 2011:** BT responded notifying that the company has received the letter and is doing checks on the information contained. However, the company said that from preliminary investigations nothing has been found to show a link with the suppliers in question. The company hopes to respond formally at a later date.
- **September 23rd, 2011:** No further response has been received.

Samsung Group

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 25th, 2011:** Samsung responded saying they would look into the issue raised and would respond as soon as possible.
- **August 25th, 2011:** The NGOs responded eagerly awaiting the outcome of the investigations.
- **August 30th, 2011:** Samsung notified the NGOs that the company has not had a direct relationship with the supplier in question. The supplier was however a secondary subcontractor to Samsung, occasionally delivering storage batteries to Samsung's other subcontractors in 2006, since then there has been no business relationship.
- **September 5th, 2011:** The NGOs responded, understanding that no direct relationship existed with the supplier mentioned and questioned Samsung on whether or not the company has other suppliers that have records of violations.
- **September 23rd, 2011:** No further response has been received.

France Telecom S.A.

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August24th, 2011:** France Telecom said they would respond to the NGOs with all exhaustive answers once they "have gathered all the necessary information."
- **August25th, 2011:** The NGOs responded saying they are pleased to hear that France Telecom is actively following up on the issues raised and that they eagerly await the outcome of the investigations.
- **August 31st, 2011:** France telecom responded saying they have studied the letter and it had been sent to the company President. They advised that the questions had been answered by the Head of the CSR department and a formal written response will be sent within one week.
- **September 6th, 2011:** The NGOs wrote to inquire about the letter from the Head of the CSR department
- **September 6th, 2011:** France Telecom advised that the letter will be sent promptly.
- **September 16th, 2011:** An e-mail was received from France Telecom showing the company's concern that the violating supplier we raised was indeed their supplier. The company, although unaware of the supplier company's violation record, informed that they had identified this company as "a supplier at environmental risk" during a recent selection process. France Telecom spoke of the implications for the supplier company not

to implement a corrective action plan and explained the company's environmental performance standards and plans for global lead acid battery recycling.

- **September 20th, 2011:** In a response to France Telecom the NGOs recognized that the supplier in question was part of the company's supply chain and asked to learn more about the company's screening of suppliers for legal compliance and sustainability risk. The organizations introduced the progress made in improving environmental information transparency and spoke of how hundreds of suppliers have been pushed by buyer companies to disclose explanations on environmental incidents, to provide supporting documentation to prove corrective measures have been taken. The NGOs asked if France Telecom plans to utilize this publicly available government sourced resource to screen suppliers and to persuade suppliers to disclose details of environmental corrective actions to the public.
- **September 21st, 2011:** France Telecom called the NGO representatives office informing of the company's interest in using the publicly available government sourced data to screen suppliers. After a series of technical background questions on the use of the resources available France Telecom made clear some of the difficulties the company would have in disclosing corrective actions and environmental data of suppliers due to existing business agreements and procedures. The organization's representative assured France Telecom that no corporate confidentiality or business secrets will be at risk and that the record will remain on the database until the matter has been handled effectively. The company hopes to work with the organizations to learn what it can do to improve battery supplier performance and recycling efforts.
- **September 23rd, 2011:** No further response has been received.

Sprint Nextel Corporation

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 25th, 2011:** Sprint sent a reply stating they had engaged quite a few departments within their company to determine any direct or indirect links with the supplier mentioned. The e-mail also stated that they would be interested in finding out what sort of batteries this issue involved and where the materials that linked Sprint with the supplier could be found.
- **August 25th, 2011:** A reply was sent to Sprint giving links to their suspected suppliers' violation record as well as providing a screenshot showing the connection with Sprint. Sprint was advised that if they had any problems accessing the information then they should contact the IPE as soon as possible.
- **September 14th, 2011:** Sprint responded with an extensive explanation showing concern for the issues raised. The company noted that they had immediately begun to investigate the matter and had found that although the Chinese supplier mentioned was not a supplier, lead-acid batteries for back-up use in network operations are purchased from another company in the same group, through a distributor. Sprint was given assurances by this distributor that batteries and all raw materials or sub-components were purchased from the American supplier in the same group and not through the Chinese plant. Sprint placed a temporary hold on all lead acid batteries from this group, although this hold was lifted when assurance was confirmed. Sprint went on to inform of the company's code of conduct and the lack of additional environmental requirements for lead–acid battery manufacturers. The company reached out to the NGOs for expertise and guidance in this area while also providing details on the company's lead acid battery recycling practices.
- **September 15th, 2011:** The NGOs responded to Sprint's email, first by acknowledging the timely manner in which Sprint had replied and the attention the company paid to the issues raised. The NGOs went on to state their understanding that the batteries purchased were produced by their supplier in the US rather than in China. The NGO's advised Sprint of the opportunities available, through exercising purchasing power to promote green procurement and responsible manufacturing to all of their distributors and supplier operations. The NGOs went on to question if Sprint has any mechanisms or systems in place to allow a prompt and accurate screening of suppliers to detect supervision records within the company's supply chain. The NGOs informed Sprint of the possibilities of utilizing publicly available, government sourced violation records to screen suppliers for infractions in environmental compliance. The NGOs went on to ask Sprint if the company is willing to push suppliers, which have been discovered to have pollution issues, to publicly disclose details regarding violation records and the corrective actions that have been taken or that are planned to take place.
- **September 23rd, 2011:** No further response has been received.

Telefonaktiebolaget L.M. Ericsson

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 25th, 2011:** Ericsson responded to the NGOs confirming receipt and notifying that a response will be sent as soon as possible.
- **August 25th, 2011:** The NGOs responded thanking Ericsson for the prompt response and hoped the company could respond directly to the questions contained in the original August 24th letter.
- **September 3rd, 2011:** Ericsson responded stating that one of the suppliers had not been a direct supplier to Ericsson for the last four years, nor did the company have any indications that they were a direct supplier before that either. The other supplier mentioned in the letter is a regional supplier in Europe on a small scale, where batteries had been manufactured in the European plants. Ericsson noted that the company had not sourced anything from the Chinese plant. However Ericsson did intend to conduct a full 'Supplier Code of Conduct' audit of the Chinese site. Ericsson also notified the NGOs that the Chinese Municipal Environmental Bureau had approved that this company's production had reached the required standards with regard to effluents discharge and air emissions so as to be categorized as "Clean production."
- **September 7th, 2011:** The NGOs responded pleased to hear that checks had been done on the relationship with the suppliers mentioned and applauded the plans for a full 'Supplier Code of Conduct' audit on the Chinese plant. The NGOs stressed the importance of environmental information transparency and suggested the disclosure of the audit findings, the corrective action plan and any supporting information (the Government follow-up documentation previously mentioned by Ericsson). The NGOs went on to question if Ericsson has any mechanisms or systems in place that will allow the company to promptly and accurately screen suppliers and to detect violation records within the supply chain. The NGOs informed Ericsson of the possibilities of utilizing publicly available, government sourced supervision records to screen suppliers for environmental compliance. The NGOs went on to ask Ericsson if the company is willing to push suppliers, which have been discovered to have pollution issues, to publicly disclose details regarding violation records and the corrective actions that have been taken or that are planned to take place.
- **September 23rd, 2011:** No further response has been received.

Singapore Telecommunications Limited

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **September 22rd, 2011:** SingTel responded saying the networks and procurement departments have checked and confirmed that the suppliers mentioned by the organizations do not have a business relationship with SingTel.
- **September 22rd, 2011:** The organizations responded asking if SingTel had a relationship with other companies belonging to this parent group and if the supplier may have a relationship through a distributor or supplier further down the supply chain. The NGOs went on to inquire about the company's screening processes, introducing the concept of environmental information transparency in China and the opportunities available to the company by utilizing thousands of publicly available government supervision records to verify supplier compliance to environmental laws and regulations. The organization questioned whether SingTel was willing to take this opportunity and to push suppliers to disclose the circumstances of their violations.
- **September 23rd, 2011:** No further response has been received.

Telecom Italia

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 24th, 2011:** Telecom Italia advised that the letter had been sent to the joint committee for audits on suppliers which includes Telecom Italia, France Telecom and Deutsche Telekom.
- **August 25th, 2011:** The NGOs responded saying they hoped to hear from Telecom Italia soon and would like the company to respond directly to the questions contained within the August 24th, letter.
- **September 23rd, 2011:** No further response has been received.

Tyco Electronics Ltd.

- **August 24th, 2011:** Initial letter sent regarding poisoning and polluting issues.
- **August 24th, 2011:** Tyco replied saying that they didn't manufacture batteries.
- **August 29th, 2011:** A letter sent to Tyco stated that although they do not produce batteries themselves, publically available information has shown the company may have purchased batteries from a supplier with government violation records. The NGOs encouraged Tyco to review the information in the original letter sent August 24th, and respond in a timely fashion.
- **September 23rd, 2011:** No further response has been received.

The following Companies were non-responsive as of September 23rd, 2011

- China Mobile Limited
- China Telecom Corp. Ltd.
- China Unicom
- Guangdong Mobile Communication Company
- Emerson Electric Company
- Telefónica, S.A.
- Ameritech Corporation (SBC/AT&T)
- BellSouth Corporation (AT&T Inc.)
- Verizon Communications Inc.

Lead Pollution Investigation of Suppliers to the Telecommunications Sector
Environmental NGO Signatories:
Green Beagle
Global Village Beijing
Envirofriends
Gansu Green Camel Bell Environment & Development Center
Blue Dalian
Global Environmental Institute
Hebei Green Friend Association
Green Panjin
Red Phoenix Project
Institute of Public & Environmental Affairs

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