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Report No: PAD 938

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT FROM THE
GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US\$ 15.0 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

CONTAMINATED SITE MANAGEMENT PROJECT

April 9, 2015

Environmental and Natural Resources Global Practice
East Asia and Pacific Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective January 31, 2015)

Currency Unit = CNY
CNY 6.25 = US\$1

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AHP	Analytical Hierarchy Process
CEPB	Chongqing Environmental Protection Bureau
CG	Coordination Group for Implementation of the POPs Stockholm Convention
CNAO	China National Audit Office
CNY	Chinese Yuan Renminbi (also RMB)
DA	Designated Account
DDT	Dichlorodiphenyltrichloroethane
EA	Environmental Assessment
EMDP	Ethnic Minority Development Plan
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FECO	Foreign Economic Cooperation Office under the MEP
FM	Financial Management
FMM	Financial Management Manual
FYP	The 12th Five-Year (2011-2015) Plan
GEF	Global Environment Facility
HCB	Hexachlorobenzene
HCH	Hexachlorocyclohexane
HRS	Hazard Ranking System
IFR	Interim Unaudited Financial Report
LEPD	Liaoning Environmental Protection Department
MEP	Ministry of Environmental Protection
MHURD	Ministry of Housing, Urban and Rural Development
MIIT	Ministry of Industry and Information Technology
MLR	Ministry of Land and Resources
MOA	Ministry of Agriculture
MOF	Ministry of Finance
MOU	Memorandum of Understanding
NDRC	National Development and Reform Committee
NIP	National Implementation Plan
PAH	Polycyclic Aromatic Hydrocarbons
PBB	Polybrominated Biphenyl
PBDD	Dioxin and Polybrominated Dibenzodioxin
PBDE	Polybrominated Diphenyl Ether
PCB	Polychlorinated Biphenyl

PFOS	Perfluorooctane Sulfonic Acid
PMM	Procurement Management Manual
PMU	Project Management Unit
POPs	Persistent Organic Pollutants
PPP	Public Private Partnership
RAP	Resettlement Action Plan
RBCA	Risk-based Corrective Action
RPF	Resettlement Policy Framework
TA	Technical Assistance
USEPA	US Environmental Protection Agency
VSL	Value of Statistical Life

Regional Vice President:	Axel van Trotsenburg, EAPVP
Country Director:	Bert Hofman, EACCF
Senior Global Practice Director:	Paula Caballero, GENDR
Practice Manager:	Iain Shuker, GENDR
Task Team Leader:	Qing Wang, GENDR

CHINA
China Contaminated Site Management Project (P145533)

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PAD DATA SHEET

China

China Contaminated Site Management Project (P145533)

PROJECT APPRAISAL DOCUMENT

EAST ASIA AND PACIFIC

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Report No.: PAD938

Basic Information			
Project ID P145533	EA Category A - Full Assessment	Team Leader Qing Wang	
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints []		
	Financial Intermediaries []		
	Series of Projects []		
Project Implementation Start Date 01-Jan-2015	Project Implementation End Date 31-Dec-2021		
Expected Effectiveness Date 29-May-2015	Expected Closing Date 31-Dec-2021		
Joint IFC No	GEF Focal Area Persistent Organic Pollutants		
Practice Manager/Manager Iain G. Shuker	Senior Global Practice Director Paula Caballero	Country Director Bert Hofman	Regional Vice President Axel van Trotsenburg
Borrower: PEOPLE'S REPUBLIC OF CHINA			
Responsible Agency: Foreign Economic Cooperation Office of Ministry of Environmental Protection			
Contact: Telephone No.:	Ms. Qiong Ding 86108226-8810	Title: Email:	Division Chief ding.qiong@mepfeco.org.cn
Project Financing Data(in USD Million)			
<input type="checkbox"/> Loan	<input type="checkbox"/> IDA Grant	<input type="checkbox"/> Guarantee	
<input type="checkbox"/> Credit	<input checked="" type="checkbox"/> Grant	<input type="checkbox"/> Other	
Total Project Cost:	75.00	Total Bank Financing:	0.00
Financing Gap:	0.00		

Financing Source	Amount
Borrower	60.00
Global Environment Facility (GEF)	15.00
Total	75.00

Expected Disbursements (in USD Million)

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	0000	0000
Annual	0	1.50	3.00	3.50	3.00	2.00	1.00	1.00	0.00	0.00
Cumulative	0	1.50	4.50	8.00	11.00	13.00	14.00	15.00	0.00	0.00

Institutional Data

Practice Area / Cross Cutting Solution Area

Environment & Natural Resources

Cross Cutting Areas

- Climate Change
- Fragile, Conflict & Violence
- Gender
- Jobs
- Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Industry and trade	Other industry	70		
Public Administration, Law, and Justice	Public administration- Industry and trade	30		
Total		100		

I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Environment and natural resources management	Pollution management and environmental health	80
Environment and natural resources management	Environmental policies and institutions	20

Total	100
Proposed Global Environmental Objective(s)	
The project development objective is to improve the country's capacity for managing site contamination, and demonstrate environmentally sound identification and cleanup of sites contaminated with POPs and other hazardous chemicals.	
Components	
Component Name	Cost (USD Millions)
Component 1: Capacity Development for Prevention and Control of Site Contamination	22.14
Component 2: Cleanup Demonstrations of Sites Contaminated with POPs and Other Hazardous Chemicals	49.70
Component 3: Project Management	3.16
Systematic Operations Risk- Rating Tool (SORT)	
Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Low
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and Social	Substantial
8. Stakeholders	Substantial
9. Other	
OVERALL	Substantial
Compliance	
Policy	
Does the project depart from the CAS in content or in other significant respects?	Yes [] No [X]
Does the project require any waivers of Bank policies?	Yes [] No [X]
Have these been approved by Bank management?	Yes [] No []
Is approval for any policy waiver sought from the Board?	Yes [] No []
Does the project meet the Regional criteria for readiness for implementation?	Yes [X] No []
Safeguard Policies Triggered by the Project	Yes No
Environmental Assessment OP/BP 4.01	X

Natural Habitats OP/BP 4.04			X
Forests OP/BP 4.36			X
Pest Management OP 4.09			X
Physical Cultural Resources OP/BP 4.11	X		
Indigenous Peoples OP/BP 4.10	X		
Involuntary Resettlement OP/BP 4.12	X		
Safety of Dams OP/BP 4.37			X
Projects on International Waterways OP/BP 7.50			X
Projects in Disputed Areas OP/BP 7.60			X
Legal Covenants			
Name	Recurrent	Due Date	Frequency
Institutional Arrangements	X		
Description of Covenant			
Provisions requiring the maintenance of the Steering Committees and the Project Management Units in Chongqing Municipality and Liaoning Province. (Section I. A. of Schedule 2 to the Grant Agreement)			
Name	Recurrent	Due Date	Frequency
Safeguards	X		
Description of Covenant			
Provisions requiring: (i) the Project to be carried out in accordance with the safeguard instruments; and (ii) the terms of reference for any consultancies related to technical assistance activities under the Project shall be satisfactory to the World Bank and, to that end, such terms of reference shall, inter alia, duly incorporate the requirements of the World Bank's safeguard policies. (Section I. E. of Schedule 2 to the Grant Agreement)			
Name	Recurrent	Due Date	Frequency
Annual Work Plans and Budgets	X		Yearly
Description of Covenant			
Provision requiring the submission of a consolidated annual work plans and budgets by no later than March 1 of each year to the World Bank. (Section I. C. 1 of Schedule 2 to the Grant Agreement)			
Name	Recurrent	Due Date	Frequency
Project Implementation Manual (PIM)	X		
Description of Covenant			
Provision requiring the Project to be carried out in accordance with the Project Implementation Manual. (Section I. C. 2 of Schedule 2 to the Grant Agreement)			
Name	Recurrent	Due Date	Frequency
Clean-up Sub-projects	X		
Description of Covenant			

Provisions requiring that: (i) the sites for the Clean-up Sub-projects are selected in accordance with the criteria set forth in the PIM, and subject to the World Bank's prior approval; and (ii) a completion report outlining the activities undertaken under each Clean-up Sub-project is furnished to the World Bank no later than six months after the completion of the respective Clean-up Sub-project. (Section I. F. of Schedule 2 to the Grant Agreement)

Conditions

Source Of Fund	Name	Type
GEFU	Signing of implementation agreements	Effectiveness

Description of Condition

Signing of the implementation agreements between FECO, MEP and Chongqing Municipality and Liaoning Province, respectively. (Article V. 5.01 of the Grant Agreement)

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Xieli Bai	Program Assistant	Program Assistant	EACCF
Laurent Granier	Senior Environmental Specialist	Senior Environmental Specialist	GCCIA
Nina Queen Irving	Senior Program Assistant	Senior Program Assistant	GENDR
Solvita Klapare	Environmental Economist	Co-TTL, Environmental Economist	GENDR
Brenda Morata	Legal Analyst	Legal Analyst	LEGES
Aristeidis I. Panou	Counsel	Counsel	LEGOP
Frank Van Woerden	Senior Environmental Engineer	Senior Environmental Engineer	GENDR
Peishen Wang	Consultant	Consultant	GTIDR
Qing Wang	Senior Environmental Specialist	Team Lead	GENDR
Ning Yang	Senior Environmental Specialist	Senior Environmental Specialist	GENDR
Guoping Yu	Senior Procurement Specialist	Procurement Specialist	GGODR
Fang Zhang	Financial Management Specialist	Financial Management Specialist	GGODR
Meixiang Zhou	Social Development Specialist	Social Development Specialist	GSURR

Non Bank Staff

Name	Title	City
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Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
China	Chongqing Shi	Chongqing	X		
China	Hunan	Changsha	X		
China	Liaoning	Shenyang	X		

I. STRATEGIC CONTEXT

A. COUNTRY CONTEXT

1. **Soil Pollution in China.** China's impressive economic growth and transformation over the past three decades have come at the price of significant environmental pollution and degradation. The rapid industrialization has left its footprint on soil, air and water quality. Soil pollution has become a serious health and environmental threat in China, contaminating the food chain with heavy metals, fertilizers and pesticides, persistent organic pollutants (POPs) and solvents; and polluting groundwater and surface waters. The Chinese Government has become aware of the serious socioeconomic risks resulting from soil pollution and carried out China's first soil pollution survey from April 2005 to December 2013. The survey covered all arable land, partial forest land, grassland, unused land, and construction land with a total area of about 6.3 million square kilometers.

2. On April 17, 2014, the Ministry of Environmental Protection (MEP) and Ministry of Land and Resources (MLR) jointly issued a Communiqué with the results of this survey. It states that soil pollution in some regions is severe, soil quality of arable land is worrying, and soil environment problems in abandoned industrial and mining sites are prominent. The overall percentage of sample points exceeding the screening threshold in the country is estimated at 16.1%. About 33% of sample points in highly polluting industries, industrial parks, abandoned industrial sites, and mining areas; 20% in arable land; 26% in wastewater irrigation areas; and 20% in the land along highways show contamination. The main contaminants found are heavy metals (cadmium, nickel, arsenic, copper, mercury, lead, chromium, zinc), POPs (hexachlorocyclohexane-HCH, dichlorodiphenyl trichloroethane-DDT), and other organic contaminants (polycyclic aromatic hydrocarbons-PAHs). These results demonstrate the extent of the country's land pollution problems. On one hand, this poses environmental and health risks in China's most densely populated areas, on the other hand, this is an obstacle to redevelopment and urban and rural economic growth.

3. **Government Efforts to Address Site Contamination.** In 2004, in response to human poisoning incidents resulting from legacy soil pollution from older industries, the former State Environmental Protection Administration, now MEP, issued a Notice on Effective Prevention and Control of Environmental Pollution for Industrial Enterprise Relocation (SEPA 2004, No. 47). In June 2008, MEP updated the 2004 Notice by issuing a Notice on Strengthening Soil Pollution Prevention and Control (MEP, No. 48). In 2011, the State Council issued Opinions on Strengthening Key Tasks on Environmental Protection, which requires that environmental assessment and environmentally sound management is carried out for contaminated sites before they can be redeveloped. In November 2012, MEP, MLR, the Ministry of Industry and Information Technology (MIIT), and the Ministry of Housing, Urban and Rural Development (MHURD) jointly issued a Notice on Safeguarding Redevelopment of Industry-contaminated Sites. The Notice requires: (i) to identify industrial enterprises to be closed or relocated, (ii) to carry out environmental investigation and risk assessment of these sites in consideration of land use, (iii) to clarify cleanup responsible bodies before land transfer, (iv) to stipulate special arrangements for the cleanup of high-risk sites, and (v) to set up professional qualifications for companies, which will be engaged in contaminated site investigation, risk assessment and remediation.

4. In January 2013, the State Council further issued a Work Arrangement on Soil Protection and Comprehensive Treatment in Near Future. This document sets the working targets for soil protection, namely: by 2015 start control of environmental risks of contaminated sites, promote treatment and cleanup demonstrations of soil pollution in typical areas, and gradually establish the policy, regulation and standard system; with a view that by 2020 a national soil protection system will be established and the soil quality in the country will show improvement. The document also calls for local governments to develop their own soil protection and comprehensive treatment programs with clear objectives, tasks and measures. For example, Beijing, Chongqing and Zhejiang have issued local policies and regulations on contaminated site management and have spent hundreds of millions of RMB on contaminated sites management. Pilot cleanup projects have been implemented in Beijing, Shanghai, Chongqing, Zhejiang, Jiangsu, Liaoning, and other provinces. Most draw on foreign experience, and have been jointly executed with foreign environmental protection companies and research institutes, and their domestic counterparts.

5. The 12th Five-Year (2011-2015) Plan (FYP) for National Economic and Social Development of the People's Republic of China focuses on addressing salient environmental problems, such as unsafe drinking water, and air and soil pollution negatively impacting public health, intensify integrated management and noticeably improve environmental quality. Based on the Plan, MEP has developed and issued (1) the National Environmental Protection 12th FYP; and (2) the National POPs Prevention and Control Plan during the 12th FYP period. Both plans emphasize the need to establish and improve relevant laws, regulations and standards for soil pollution prevention and control.

6. The 12th National People's Congress Standing Committee (China's top legislature) voted to adopt on April 24, 2014 the amended Environmental Protection Law, which came into effect on January 1, 2015. With 70 articles, compared with 47 in the original law passed in 1989, the revised Environmental Protection Law, the first change to the law in 25 years, sets environmental protection as the country's top priority. The new law requires that economic and social development should be coordinated with environmental protection and encourages studies on the impact that environmental quality causes on public health, urging prevention and control of pollution-related diseases. It says that the country should establish and improve a national soil pollution investigation, monitoring, risk assessment and remediation system (Article 32), and set up and strengthen a national public health monitoring and risk assessment system (Article 39). It also says in a new Chapter 5 that the public has the right to access information related to environmental quality, monitoring data, pollution incidents, etc. and the environmental protection agencies should disclose this information and improve public participation procedures (Article 53-58).

7. MEP is also making great efforts to include a Soil Pollution Prevention and Control Law in the legislation plan of the National Congress. The initial draft of the law has been prepared and comments are being widely collected. The Law, when finalized, will be submitted directly to the National People's Congress for approval without a need of going through the Legislative Affairs Office of the State Council, which means that its review and approval process will be more streamlined, although it is not clear yet when the Law will be issued. Recently, MEP has also internally approved in principle an Action Plan for Soil Pollution Prevention and Control (i.e., Tushitiao), which is expected to be approved by the State Council in 2015. The objective of

the Action Plan is that by 2020, soil environment of arable land will be effectively protected, the worsening trend of soil pollution will be controlled, and soil quality in some regions improved. The total investment is expected to reach trillions of RMB. China has also considered international technical assistance, an important means to introduce good practices and experiences from developed countries for expediting its process of addressing site contamination issues.

B. SECTORAL AND INSTITUTIONAL CONTEXT

8. **Stockholm Convention.** The proposed project will contribute to China's efforts of complying with the Stockholm Convention on Elimination of POPs. The Stockholm Convention, listing twenty-two POPs chemicals to date, was adopted in 2001 and came into force on May 17, 2004. China demonstrated its commitment to the Convention by ratifying it early, and it came into effect for the country on November 11, 2004. Parties are requested to develop appropriate strategies for identifying sites contaminated by chemicals listed in Annex A (elimination), B (restriction) or C (unintentional production) of the Convention; if remediation of those sites is undertaken it shall be performed in an environmentally sound manner. China has developed its National Implementation Plan (NIP) for POPs Reduction and Elimination. Cleanup of POPs contaminated sites is one of the priorities.

9. **POPs Contamination Extent.** Some attempts limited at identifying and initially assessing POPs contaminated sites were made through development of the NIP for POPs in 2007, and a Study on Regulatory and Institutional Framework and Remediation Technologies for POPs Pesticide Contaminated Sites in China funded by the Canadian POPs Trust Fund, managed by the World Bank in 2009/2010. During the project preparation stage, additional information on POPs contaminated sites was gathered from the provincial annals on chemical industries, the China Pesticide Information Network (www.chinapesticide.org.cn) on endosulfan and its formulation producers, the Organic Fluorine and Silicone Material Industry Association on perfluorooctane sulfonic acid (PFOS) producers, as well as from local governments responding to the data reporting requirements under the National POPs Prevention and Control Plan during the 12th FYP period. It is estimated that, for the initial 12 POPs, China had about 60¹ production factories for DDT, chlordane and mirex, hexachlorobenzene (HCB), heptachlor, and toxaphene, and four polychlorinated biphenyls (PCBs) production factories. For the 10 new POPs, China had about, 38 endosulfan producers, 72 HCH (and DDT) producers, and 12 PFOS producers (still in production today). Most of these factories were equipped with outdated technologies and lacked proper waste and wastewater handling and rainfall collection systems, which could lead to soil and groundwater pollution. Evidence of site contamination was found through initial site investigations, such as presence of waste residues and strong odors of pesticides in and around the production areas. In addition, China also has some legacy e-waste contaminated sites containing heavy metals, PCBs, pentabromodiphenyl ether (PBDE), polybrominated biphenyls (PBBs), dioxin and furans (PCDD/Fs) and polybrominated dibenzodioxins (PBDDs), mainly in Guangdong, Zhejiang and Fujian provinces resulting from extensive operations in the past, including illegal incineration, crushing, dumping, and use of concentrated acid to extract precious metals and direct discharge of the effluent. Due to lack of nation-wide or sectoral hazard material tracking systems and reporting requirements for producers and users, as well as

¹ Initial site investigation was carried out in 47 out of the 60 sites with POPs contamination identified.

lack of risk assessment requirements before land use change and land owner change, some POPs contaminated areas have already been dismantled and redeveloped without thorough investigation and, where needed, remediation.

Issues Related to Prevention and Control of Site Contamination in China

10. **Policy and Legal Constraints.** There is no national law encompassing soil pollution, cleanup and redevelopment, as well as prevention of soil pollution. Legal requirements related to soil pollution and liability are scattered in the provisions of several existing national laws or regulations. These relevant legal provisions, however, are not systematic or consistent, and none of them focuses on prevention and control of soil pollution or site contamination. They are also not specific, lacking operational details, accountability and enforcement provisions. Control and prevention requirements with measures pertaining specifically to soil pollution are largely missing.

11. **Institutional and Capacity Constraints.** Responsibility for management of industrial and agriculture contaminated sites or land is divided among several ministries: MEP, MLR, MHURD, Ministry of Agriculture (MOA) and the National Development and Reform Committee (NDRC). Although there is a definition of each ministry's responsibilities, overlaps persist and there is a lack of agreed and streamlined management and coordination procedures for contaminated sites due to the lack of applicable law for soil pollution. Most remediation projects that have been completed were the result of health incidents and/or developer's demand for a clean land after discovering contamination. Most government officials lack technical background and knowledge to review cleanup proposals. There are no professional qualifications for cleanup practitioners, nor unified procedures for review and approval of cleanup plans. The country also lacks cleanup professionals with hands-on engineering experience on remedial plan development and remedial action.

12. **Technology Constraints.** In recent years, government funding has helped develop cleanup technologies and equipment for selected types of contaminated sites. Although various soil and groundwater remediation technologies exist, for most sites only few are both practical and economical. In China, the most commonly used but relatively expensive remediation practice is excavation followed by ex-situ treatment, such as depositing contaminated soil in an off-site landfill, and/or neutralizing with cement kiln treatment. In-situ remediation technologies, which are often less costly whilst taking more time to implement, are still in the early stage of research and piloting. Furthermore, the concept of a risk-based approach that includes risk assessment and risk management for contaminated sites is yet to be accepted and used widely in China.

13. **Financing Constraints.** Cleanup of contaminated sites for redevelopment is expensive, and financing is often a major obstacle. Even in cases where land values after cleanup easily outweigh the cleanup costs, the upfront costs of remediation and the lack of funding options cause serious cash-flow problems. In China, no specific funds exist for contaminated site cleanup (like the Superfund or the Brownfield Remediation Fund in USA) at either national or local levels. No clearly defined rules and funding channels exist between the key stakeholders (namely the governments, previous or current land owners, and developers). This is an area that requires improvement urgently.

14. **Information Constraints.** Although the national soil survey has provided an overview of soil pollution, particularly in agricultural land, the degree of pollution and other risks in specific locations remain unclear. China has no hazardous materials tracking and information reporting system for events and activities related to facilities that generate, transport, treat, store, and dispose of hazardous waste. The invisibility of soil pollution and insufficient information disclosure has led to poor public awareness of potential harms.

GEF-added Value

15. Given the growing pressure to manage health and environmental risks of contaminated industrial sites and agricultural land, China is now making more efforts to establish its management system and improve its technical and institutional capacity. It will be challenging to deal with potential issues such as inadequate characterization of contamination, which could lead to underestimation of risks or remediation measures that would go beyond what is required for managing risks. Developed countries, such as USA, Canada, and European Union member states, have accumulated experience through over 30 years of tackling site contamination and have developed comprehensive and proven frameworks for risk management of contaminated sites. China does not need to re-invent the wheel and there is a great deal to learn from international experience. With GEF support, it is expected that China will improve its technical guidelines and standards for supporting risk based contaminated site management framework based on international good practices in the Chinese context. The project, building on the Chinese government's efforts especially on high-level policy development, will incrementally improve China's capacity for managing contaminated sites by developing additional technical guidelines for prevention and control of soil pollution and policy recommendations on information disclosure and public participation; studying financing options for cleanup; providing training programs for cleanup professionals, government officials and polluting enterprises; raising public awareness; identifying POPs contaminated sites; carrying out technical assistance activities on prevention of site contamination; and demonstrating contaminated site cleanup.

16. The project will be the first operation in the country to (i) demonstrate the entire cleanup process, including site identification, investigation, risk assessment, selection of remediation options, remedial design and action, remediation validation, and post cleanup monitoring by introduction of international good practices, (ii) demonstrate contaminated site remediation technologies that have been used internationally, and have a great potential for scale-up in China, and (iii) introduce a risk-based approach for site contamination identification and cleanup. By supporting such identification and cleanup demonstrations of POPs contaminated sites, the technical and managerial experience gained will be disseminated nationwide.

17. **Global Environmental Benefits.** The project will reduce POPs waste and also strengthen the country's management capacity for prevention and control of soil pollution in the long run. The project will contribute to achieving the goal of the GEF's chemicals program "to promote the sound management of chemicals throughout their life-cycle in ways that lead to the minimization of significant adverse effects on human health and the global environment", and specifically the outcome 'POPs waste prevented, managed, and disposed of, and POPs contaminated sites managed in an environmentally sound manner' and 'country capacity built to effectively phase out and reduce release of POPs'.

C. HIGHER LEVEL OBJECTIVES TO WHICH THE PROJECT CONTRIBUTES

18. The higher level objectives are to help the Chinese government manage contaminated sites in a sustainable way and reduce associated environmental and health risks. This is aligned with the country's POPs NIP priorities and ongoing national efforts on developing the National Law on Prevention and Control of Soil Pollution.

19. The proposed project is consistent with Strategic Theme One: "Supporting Greener Growth of the China" – World Bank Country Partnership Strategy for FY 2013-2016. Under this theme, the project would support Outcome 1.6: Demonstrating Pollution Management Measures, which would be achieved among others by "supporting efforts to reduce hazardous waste, by continuing to support the reduction of POPs - the byproducts of industrial production and the world's most toxic chemicals - from the regulatory level to emissions control and urban site cleanup." The project will also contribute to the World Bank Group's goals of ending extreme poverty by 2030 and boosting shared prosperity through improving health conditions by reduced exposure to pollution and increased access to reliable and accurate environmental information. Access to information is currently limited for the bottom 40 percent, who are known to be relatively more exposed to degraded or highly-polluted areas than other population groups.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

20. The project development objective is to improve the country's capacity for managing site contamination, and demonstrate environmentally sound identification and cleanup of sites contaminated with POPs and other hazardous chemicals.

B. PROJECT BENEFICIARIES

21. The main project beneficiaries are expected to include the owners of the selected contaminated sites participating in the project for cleanup demonstrations under Component 2, as well as nearby residents who are exposed to soil contamination. Other project beneficiaries are MEP, Chongqing and Liaoning government agencies, the owners of POPs contaminated sites to be identified and investigated, MOA, and the Hunan Provincial Agriculture Commission through capacity building activities under Component 1. In addition, government officials involved in regulating and managing contaminated sites, contaminated site cleanup practitioners, and soil polluting industries will benefit from training offered through the project.

C. PDO LEVEL RESULTS INDICATORS

22. The PDO level results indicators are: (1) Selected priority technical guidelines and policy recommendations for prevention and control of site contamination at the national and local levels developed or issued; (2) Training materials published and on-line training courses integrated into the staff training system of MEP; (3) Contaminated land managed and dump sites closed under

the project (ha) (core sector indicator)²; (4) National database for POPs contaminated sites established. See Annex 1 for more details.

III. PROJECT DESCRIPTION

A. PROJECT COMPONENTS

23. The project will include activities at both the national and provincial level. Chongqing municipality and Liaoning province as pioneers with strong commitment and ownership for managing contaminated sites have been selected as the two demonstration areas.

24. The project will support investment, technical assistance (TA) and policy recommendations and technical guidelines development for the cleanup of contaminated sites (control of contaminated sites). The pilot cleanup sites will be sites contaminated with POPs together with associated hazardous chemicals. The project will also include TA and technical guidelines development for prevention of industrial contaminated sites and agricultural contaminated land.

25. From contamination identification to actual cleanup works, risk assessment helps form management decisions made at each stage of a site or land's life cycle. The goal of the human health and environmental impacts evaluation process is the development of risk information to determine whether a removal action and/or remedial action is necessary, or conversely, whether the site may be closed with no further action. The project will introduce and transfer knowledge on environmental and human health risk-based remediation approach. The project activities will also promote a risk-based approach in soil pollution management to effectively prioritize the countries' inventory of POPs polluted sites according to impacts on the environment and human health.

26. The project consists of three components described below (see more details in Annex 2).

Component 1: Capacity Development for Prevention and Control of Site Contamination
(total cost US\$ 22,136,000, of which GEF-US\$ 8,220,000; counterpart funding-US\$13,916,000)

27. **Sub-component 1.1: Development of Technical Guidelines, Policy Recommendations and Financing Options for Contaminated Site Cleanup.** As MEP is working on the Soil Pollution Prevention and Control Law and its Implementation Rules, and has issued four Technical Guidelines³ on cleanup of contaminated sites, this sub-component will focus on development of other necessary priority technical guidelines for both prevention and control of site contamination. These will include: (i) technical guidelines for sampling of POPs contaminated sites; (ii) general guidelines for establishment of environmental and social management plan at the producing industries; (iii) general guidelines for prevention and control of environmental pollution during industrial enterprise relocation; (iv) technical guidelines for remediation engineering design; (v) technical guidelines for environmental and social

² In Annex 1, the contaminated land (ha) was estimated based on four sites in Chongqing and Liaoning only.

³ China has issued four technical guidelines on contaminated sites (in Feb. 2014, effective since July 1, 2014) for environmental site investigation, environmental site monitoring, risk assessment, and soil remediation.

management plan; (vi) technical guidelines for remediation treatability studies; (vii) design guidelines for remediation technologies to be selected and demonstrated under the project; and (viii) technical guidelines for long-term risk management after site cleanup. This sub-component will also include development of policy recommendations on information disclosure, public participation and risk-based approach for contaminated site management at the national level. In Chongqing and Liaoning, this sub-component will include development and issuance of administrative measures for management of contaminated sites and environmental supervision for site remediation, and environmental risk screening levels for contaminated sites. This sub-component will also support studies on possible financing options (including public and private partnership - PPP) and market incentives for contaminated site cleanup.

28. **Sub-component 1.2: Knowledge Management and Awareness Raising in Support of Prevention and Control of Site Contamination.** This sub-component will develop and provide systematic training courses for nation-wide government officials and cleanup practitioners on laws, regulations, technical guidelines/standards, and environmental and social safeguard requirements for contaminated site cleanup (including occupational and community health and safety), and for polluting industries in Chongqing and Liaoning on establishment of environmental and social management systems (ESMS) to prevent soil and groundwater pollution. The emphasis of the training will be on risk based concept for soil pollution management. Knowledge exchange and experience sharing events or workshops will be organized. It is expected that a national training system for prevention and control of site contamination established under the Project will continue beyond the project life and the developed online training courses will be integrated in the staff training system of MEP.

29. This sub-component will also conduct public awareness activities for prevention and control of site contamination, and community involvement (public consultation) activities for cleanup demonstrations under Component 2.

30. **Sub-component 1.3: Management Tools for Prevention and Control of Site Contamination.** This sub-component will develop a national database for POPs contaminated sites by carrying out initial site investigation and risk assessment of POPs sites in China: mainly POPs pesticides, e-waste and PFOS contaminated sites, as well as mercury contaminated sites (as relevant) and developing a national database. This database is expected to be expanded and used by MEP and other ministries after the project life for monitoring and managing contaminated sites in China. As a result of this activity, a national priority list of POPs sites will be produced based on environmental and health risks, including site's location, surroundings, geology and hydrogeology, present / future land use, pollution pathways, number / sensitivity of receptors, abundance, mobility and toxicity of the pollutants and other factors.

31. This sub-component will also support a feasibility study for constructing a knowledge and remediation center in Chongqing by collecting information on all potential contaminated sites in Chongqing, assessing currently available in-situ and ex-situ remediation approaches and technologies, and determining the business potential for such a center. Based on these results, a business plan will be prepared considering potential public private partnership (PPP) arrangements to ensure that the center will be able to operate efficiently and competitively. It is expected that the center in Chongqing will provide advisory services and contamination treatment services resulting from future cleanup of the municipality's contaminated sites.

32. This sub-component will also, for the purpose of demonstration, support establishing a regional soil and groundwater contamination prevention and warning system at the Changshou Industrial Park in Chongqing. This will include identification and investigation of the soil and groundwater contamination risks (including POPs) at the Park and assessment of these risks to determine “risk-acceptable”, “risk-warning”, and “risk-mitigation” areas, which can provide a risk source layout for the Park. Based on the risk source identification and assessment, an integrated environmental management system, including hazardous material tracking and information reporting system, environmental safety planning, early-warning, emergency management, and impacts and remediation option assessment after pollution incidents, will be developed. Experience learned will be shared with other industrial parks in China for potential replication.

33. Anxiety is growing in China about contaminated soil in the country’s agricultural centers (such as Hunan province) and the potential effects on the food safety. Some farmland soil in suburbs of most cities is polluted with heavy metals and organic pollutants (mainly POPs) as indicated by the national soil survey results. This sub-component plans to support policy gap analysis for pollution source control (prevention) and control of contaminated agricultural land in Hunan, development of methodology for assessment of environmental and human health risks of agriculture land pollution and one or two case analysis in selected counties, and preparation of a proposal for establishing an environmental monitoring system for agriculture land in Hunan. These outputs will be shared with other provinces. This activity will be managed by FECO with technical support from the Hunan Provincial Agriculture Commission.

34. **Sub-component 1.4: Technical Expert Team and Project Monitoring and Evaluation.** This sub-component will support hiring of international and national technical experts with both site cleanup knowledge and remediation engineering experience, to assist FECO and the two Project Management Units’ (PMU) daily management of the project. These technical experts will be hired at the beginning of project implementation. This sub-component will also support monitoring and evaluation of the project outcome indicators and results by collecting evidence-based information and data, as well as organizing the project launch and completion workshops.

Component 2: Cleanup Demonstrations of Sites Contaminated with POPs and Other Hazardous Chemicals (total cost US\$ 49,705,000, of which GEF-US\$ 6,030,000; counterpart funding-US\$ 43,675,000)

35. This component will demonstrate the cleanup of several sites (estimated 5-6 in total) contaminated with POPs and other hazardous chemicals. Before a site is ready for remediation action, site investigations, risk assessment to determine remediation goals, a remediation program, an environmental and social management plan (ESMP), and public consultation and information disclosure will be carried out, prepared, approved and documented. The first demonstration site, which used to be a pesticides warehouse in Chongqing (Ganshui site), has been identified and confirmed during project preparation. According to the construction plan of 2003-2020 for Guanshui Town in Qijiang County, the site is planned to be used as residential land in the future. A site-specific cleanup Environmental Assessment (EA) report has been prepared for this site with detailed contamination scope and proposed remediation plan (see

Annex 2). The remediation process will include site clearing, protection of building structure, wall surface peeling, excavation, packaging of contaminated materials, transportation to and storage at the treatment site, treatment/disposal and remediation completion. No aftercare of the site is needed because it will be fully cleaned up with the removal of contaminated materials. Remediation of this site will be initiated as soon as the project is approved.

36. The other sites will be confirmed during project implementation. Availability of counterpart funding and clarity on land ownership arrangements before and after site cleanup will be two key prerequisites for sites to participate in the project. A preliminary site selection has been carried out, and identified another seven potential candidate sites from a total of 160 potential POPs contaminated sites (mainly chemical and industrial production sites and some warehouse sites and e-waste sites)⁴. The sites were screened using such criteria as local governments' willingness and commitment to participate in the demonstration project, type of POPs contaminated site, clear land redevelopment plan and notable land value after cleanup, clear information on site ownership and environmental liabilities, and impact on human health and environment. The site cleanup EA reports will be prepared for each site selected under this component and approved by the Bank before initiating the bidding process for remediation. The EA report for the Ganshui site will be used as a model EA for the other sites.

Component 3: Project Management (total cost US\$ 3,159,000, of which GEF-US\$ 750,000; counterpart funding-US\$ 2,409,000)

37. This component will support incremental operating costs associated with project management, including day-to-day project implementation, procurement and financial management, and environmental and social safeguards functions carried out by FECO, the Chongqing PMU and the Liaoning PMU, including coordination and collaboration among national and local government agencies, non-government agencies and the private sector (site owner, polluter or site redeveloper). See Annex 3 for details on implementation arrangements.

B. PROJECT FINANCING

38. The project will be supported through GEF grant (20%) and counterpart funding (80%) in both cash and in-kind formats from the national and local governments and the private sector.

C. PROJECT COST AND FINANCING

39. The table below indicates the project cost by components.

Project Components	Total Project Cost (USD)	GEF (USD)	Counterpart Funding (USD)	GEF % Financing
Component 1	22,136,000	8,220,000	13,616,000	37%
Component 2	49,705,000	6,030,000	43,975,000	12%
Component 3	3,159,000	750,000	2,409,000	24%

⁴ Information on storage, dump or disposal sites possibly contaminated by the 10 new POPs is very limited by now. China has investigated obsolete waste of the first 12 POPs in 47 sites, 22 of which are considered as contaminated sites. Details are provided in the Site Selection Report prepared during project preparation.

Total	75,000,000	15,000,000	60,000,000	20%
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D. LESSONS LEARNED AND REFLECTED IN THE PROJECT DESIGN

40. The World Bank has extensive experience in working with other countries on site cleanup: Azerbaijan, India, Kazakhstan, Kosovo, Montenegro etc. International experience and lessons learned from these projects include: (i) legal issues related to the selected sites for remediation such as (former) ownership or any other claim, concession or exploitation right that may rest on the site need to be thoroughly reviewed and addressed, (ii) any ongoing use of the site needs to be assessed, including continued practices of waste disposal, and if so how to address it, (iii) importance of learning from international experience in tailoring remediation or confinement approaches to future use of the site, and (iv) the roles and responsibilities in site cleanup and redevelopment between the public and the private sector (both site owners and developers) need to be defined.

41. In China, two POPs demonstration projects supported by the World Bank and funded through the GEF have been completed, which involved cleanup of two chlordane and mirex production sites in Jiangsu and all identified and accessible PCB contaminated sites in Zhejiang. While the two projects were not designed to programmatically address contaminated site issues as is this proposed project, they provide valuable lessons that will be incorporated in the proposed project. The lessons learned from the two projects include: (i) capacity building with a perception-and-behavior-change approach at the both national and provincial levels facilitates project sustainability, (ii) undertaking in-depth needs assessment early on is required to ensure the project is accurately designed to respond to local needs, (iii) knowledge and expertise sharing can be fostered with a network of international consultants, implementing agencies, and the private sector, (iv) addressing POPs issues should be integrated into the country’s existing regulatory framework, (v) capacity should be built before physical interventions, and (vi) project risk assessment should be adequate and should foresee unexpected events, financially and technically, as they nearly always occur during cleanup operations.

IV. IMPLEMENTATION

A. INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

42. Foreign Economic Cooperation Office (FECO) under the MEP will serve as the overall national implementing agency for the Project. Chongqing and Liaoning have set up Project Management Units (PMUs) in Chongqing Environmental Protection Bureau (CEPB) and Liaoning Environmental Protection Department (LEPD) to manage and coordinate project activities in Chongqing and Liaoning, respectively. FECO will manage and coordinate project activities at the national level, and also supervise project implementation by the two PMUs and consolidate project progress and financial reports.

43. To ensure strong stakeholder involvement, the existing national Coordination Group (CG) for implementation of the POPs Stockholm Convention will continue to provide an overall guidance and coordination for implementation of the Project and to facilitate adoption of national level regulations as early as possible. The CG was established in 2005 with 14 ministries and with MEP as the Lead Agency. FECO will organize CG meetings at least once a year to report

and collect feedback/comments on project implementation. In Chongqing and Liaoning, the inter-agency steering committees have also been set up to provide guidance to the PMUs for project implementation.

44. In the two demonstration areas, the specific site cleanup subprojects will be managed by the local PMUs. Site cleanup subprojects in other provinces will be managed by FECO. Implementation of site cleanup activities will be conducted by contractors, and supervised by independent supervision companies. Both will be selected through a bidding process. Environmental, health and safety mitigation measures in the EA/ESMP will be incorporated into the bidding documents and later into the contractors' contracts to ensure effective implementation. Cleanup process will be closely supervised and final results be verified by the local EPBs. Site owners will provide information during investigation of the site and be consulted regarding implementation arrangements and the financing plan for their site clean-up. As part of the site eligibility criteria set forth in the Project Implementation Manual, site owners will enter into an agreement with the relevant PMU and FECO, setting forth the terms and conditions of the clean-up as well as the maintenance of the site for preventing future pollution thereafter.

45. USEPA, based on request of FECO and two PMUs, will provide additional technical support to project implementation in line with the existing Memorandum of Understanding (MOU) between USEPA with MEP on collaboration in environmental protection.

B. RESULTS MONITORING AND EVALUATION

46. The progress towards the PDO will be monitored by the outcome indicators in Annex 1. Evidence or data of these indicators will be collected by FECO and the two PMUs from project beneficiaries, stakeholders and contractors. Additional studies will be made if necessary in order to obtain effective data for justifying achievements of the PDO. The Monitoring and Evaluation (M&E) system of the Project includes: (a) Annual Work Plans and Budgets; (b) periodic on-site inspection and verification by FECO and PMU staff; (c) consolidated semi-annual project progress reports compiled by FECO to the World Bank; (d) consolidated semi-annual unaudited Interim Financial Reports (IFRs) on use of funds provided by the FECO to the World Bank; (e) completion reports for each cleanup subprojects under Component 2; (f) project completion reports in Chongqing and Liaoning and a consolidated project completion report by FECO; and (g) annual financial audits of the sole project account set in MOF. See Annexes 1 and 3 for details.

C. SUSTAINABILITY

47. The Government of China is committed, as a Party to the Stockholm Convention, to identify POPs contaminated sites and to ensure that when their remediation is undertaken, it is in an environmentally sound manner. Sustainability and replicability of the project will be ensured through the following features of the project design:

- (a) The project design is aligned with ongoing efforts of the Chinese government on adopting the Soil Pollution Prevention and Control Law. If the Law is issued during the

project implementation period, this will facilitate possible issuance of policy recommendations and technical guidelines prepared under the project before its closing to secure long-term project outcome sustainability.

- (b) The demonstration area approach will allow combination of policy actions, capacity building and cleanup demonstrations to systematically and sustainably address site contamination at the provincial level; experiences learned from the demonstration areas will be disseminated to other provinces for potential replication.
- (c) In support of cleanup demonstrations of POPs contaminated sites under Component 2, the project Component 1 includes TA and policy activities on both prevention and control of site contamination: technical training on site cleanup process, ESMS training on prevention of industrial site contamination, pilot on regional soil and groundwater contamination prevention and warning system for an Industrial Park in Chongqing, and policy gap analysis for prevention and control of agricultural land contamination in Hunan. Training courses will be developed and integrated as part of the MEP on-line training system to sustain knowledge sharing and outreach.
- (d) Public awareness and community involvement activities will also be designed for both prevention and control of soil pollution.
- (e) Site-specific EAs and ESMPs will be prepared, approved and disclosed for each site cleanup to make sure that any potential environment, social, health and safety risks be minimized and the site is cleaned to standards that meet the needs of future land use. These EA and ESMP reports will contribute to standardizing documentation requirements for site cleanup in China.

V. KEY RISKS AND MITIGATION MEASURES

A. RISK RATINGS SUMMARY TABLE

Risk Categories	Ratings (H, S, M or L)
1. Political and Governance	Moderate
2. Macroeconomic	Low
3. Sector strategies and policies	Moderate
4. Technical design of project or program	Moderate
5. Institutional capacity for implementation and sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and social	Substantial
8. Stakeholders	Substantial
9. Other	
Overall	Substantial

B. OVERALL RISK RATING EXPLANATION

48. The risk assessment is based on current residual risk. Stakeholder risk is rated ‘Substantial’, as project activities will involve close coordination between a number of ministries with sometimes overlapping and/or unclear responsibilities for site pollution prevention and control. The institutional capacity risk is also rated ‘Substantial’ owing to complexity of site cleanup and lack of Bank project implementation experience of the two PMUs. The social and

environmental risks are rated ‘Substantial’ as well. Firstly, it is because the project will involve handling of hazardous waste during site remediation. There might be risks of leakage and cross-contamination. Secondly, site remediation is also likely to involve land acquisition (not applicable for the first Chongqing Ganshui site) and temporary resettlement of households living in the vicinity of the demonstration cleanup sites. The overall implementation risk is therefore rated as ‘Substantial’.

49. To mitigate these risks, coordination and collaboration among national and provincial agencies will be encouraged through the CG meetings and training and outreach activities on prevention and control of contaminated sites during project implementation. The procurement and financial management (FM) capacity of FECO and the provincial PMUs will be strengthened through regular trainings offered by the Bank. An Environmental and Social Management Framework (ESMF) will be followed to carry out site-specific environmental and social assessment including preparation of ESMPs which will be required for each site and approved by the Bank before initiating the bidding process for site remediation. In addition, an international and national technical expert team will be financed by the project to provide management and technical support for FECO and the two PMUs.

VI. APPRAISAL SUMMARY

A. ECONOMIC AND FINANCIAL ANALYSIS

50. The Project benefits align with the three commonly accepted metrics of sustainability: economy, society and environment. Cleanup of selected contaminated sites will benefit environmental, natural resource and human health in and around the areas of contaminated sites and provide immediate job creation and economic investment stimulated by site investigation and site remediation, as well as long-term investment induced by the redevelopment of the areas. Further, the policy recommendations, administrative measures and relevant technical guidelines to be developed for prevention and control of contaminated sites under the project will also promote development of the environmental cleanup industry. Some other possible benefits include: (i) increase in tax revenue, (ii) promoting city reputation and competitiveness, (iii) land appreciation, (iv) improved efficiency of city infrastructure and land resources, (v) increased housing supply, and (vi) better quality of life for residents.

51. While negative impacts of air and water pollution on human health are generally accepted and understood, impacts of soil pollution had much lower recognition, and have not been well understood, as it is difficult to provide estimates on the number of incidents or total cost associated. Knowledge of the level of contaminant in soil and human susceptibility in its presence does not give an accurate picture of the toxicological risk to humans, and only indicates risks originating from the soil. To get an idea of the true public health risk, other health risks that people are exposed to alongside soils must also be taken into account. This ‘background intake’ may come from food, drinking water, or air pollution levels. Individual behavior, such as smoking, unusual diet or occupational exposure may also contribute to the overall impact on health from soil contaminants (Environment Agency, 2009). However, health risks related to direct exposure of individual contaminants are known, and more health incidents have recently been linked to polluted soil, including in China (e.g., excessive levels of cadmium in rice

products coming from central Hunan province), although it remains highly challenging to quantify exposure mechanisms and intake of toxics.

52. Quantifying soil contamination impacts on human health is proven to be a complex task with a very limited experience in this field internationally. On the other hand, quantifying impacts on human health is necessary in circumstances that require site prioritization. As such, the cost benefit analysis was used for the project economic analysis that considered, as economic benefits of the investment in cleanup of the contaminated sites, the health benefits and increase of land value. The health benefits are proposed to be measured by the value of statistic life (VSL) based on the methodology used in a report for “Cost-Benefit Analysis of the Proposed NES (National Environmental Standard) for Assessing and Managing Contaminants in Soil to Protect Human Health” by Reuben Irvine and Tim Denne of Covec Ltd. of August 2010 for the Ministry of Environment of New Zealand. The health benefits measured by VSL depend on the number of people affected by the contaminated site, the death probability caused by disease (e.g. cancer) relating to the exposure to the contaminants identified in the contaminated sites, and the estimated VSL. The estimated number of people affected is based on the data available for the four sites in Chongqing and Shenyang as listed in Annex 2, which are likely to participate in the project Component 2. People who live within 200 meters from the contaminated sites were considered as affected. The death probabilities of the four sites were calculated by the local consultants of FECO. The estimated VSL came from a Bank policy working paper issued in 2010. The product of these three elements is the health benefit of the investment in site cleanup. Due to lack of information and data of the diseases, which could be avoided by the site cleanup, the avoided medical costs were not calculated. The increase of land value is the difference in value before and after the site cleanup. The four sites are currently considered “industrial land”. After completion of site cleanup, these sites are expected to become “residential land”. The value of “residential land” is higher than that of the “industrial land”. This difference forms the increase in land value.

53. The results show that the increase of land value makes great contribution to the economic sustainability of the proposed project. The following table summarizes the results of the economic analysis. Site cleanup is complex not only in its evaluation and selection of technical remediation options, but also regarding who will finance cleanup and who will benefit from the cleanup. The site cleanup financing plan and implementation arrangements will clarify the responsibilities of the site owners, the PMUs and FECO, local governments, and other stakeholders before remediation actions begin.

Name of Site	Chongqing		Shenyang	
	Ganshui Site	Jingkou Site	Northeast Pharmaceutical Group Co. Ltd. Site	Shenyang Chemical Plant Site
EIRR Benchmark	8.0%	8.0%	8.0%	8.0%
EIRR with Health Benefit only	8.3%	n.a.	n.a.	7.6%
EIRR with Incremental Land Value only	1.5%	35.6%	8.5%	22.8%
EIRR with both above	19.1%	35.7%	8.7%	29.2%

54. The proposed project would not generate financial revenues from direct and immediate land sales, but would potentially generate revenues stemming from site redevelopment. For example, it is most likely that the sites will be redeveloped as commercial and residential areas, which will generate income from sale/rent of housing. At current stage however, the exact nature of redevelopment is not known (site redevelopment is not part of the project), therefore assumptions on revenues would not be accurate and the financial analysis of the proposed project was not carried out. However, due diligence will be carried out by Chongqing and Liaoning PMUs to assess the financial capacities of the site owners as most counterpart funding for site cleanup will come from the site owners, especially the two sites in Shenyang.

B. TECHNICAL

55. The 22 POPs currently within the scope of the Stockholm Convention include 12 pesticides and 10 industrial chemicals or by-products. The 12 pesticides have been produced intentionally and used on agricultural crops or for public health vector control. The 10 industrial chemicals and by-product POPs include PCBs, dioxins, furans, brominated flame retardants, PFOS, and penta-chlorobenzene. The project's Component 2 will finance cleanup of selected POPs contaminated sites.

56. During typical site remediation, POPs and other contaminants, if any, must be identified and their potential threat assessed, sites must be characterized and investigated, and contaminated materials must be isolated, treated or removed. A range of technologies can be used with the goal of ensuring contaminants are either removed from the site and disposed of in sanitary manner or are treated in such way that they no longer pose a threat to human health and the environment, taking into account site characteristics and future land use. Remediation technologies can be broadly categorized as ex-situ and in-situ methods. The more traditional remediation approach (internationally used almost exclusively on contaminated sites from the 1970s to the 1990s) and also the main solution for soil remediation in China consists primarily of soil excavation and disposal to landfill or incinerators ("dig and dump/incineration") and pump-and-treat systems for reducing groundwater pollution. In-situ technologies include solidification, stabilization, oxidation/reduction, soil vapor extraction and natural attenuation. In addition, in-situ or ex-situ thermal desorption is an environmental remediation technology that utilizes heat to increase the volatility of contaminants such that they can be removed (separated) from the solid matrix (typically soil, sludge or filter cake). Other options also include biological means, e.g., bioremediation and the specific use of plants, for example, by using phytoremediation.

57. Selection of remediation technologies is determined by the nature of contaminants, site-specific soil conditions, cleanup goals, available technologies, effectiveness, appropriate order if multiple steps are needed, timing and cost. Detailed analysis on remediation technologies will be made for each selected demonstration site as part of the site-specific EA process and considering approaches that are internationally well-proven and have been widely applied. The proposed project will also build upon international good practice and experience of contaminated site cleanup.

58. The required cleanup area of the first site selected for demonstration, Ganshui site in Chongqing, is about 250 m² and contains about 150 m³ of soil contaminated with α - and β -HCH

and arsenic. Based on the EA outcomes, it was determined that the best suited technique would involve excavation of all contaminated soil and its use for testing two non-combustion remediation technologies that are considered to be innovative and emerging: anaerobic bioremediation and phytoremediation. The testing will be carried out at an area at the Chongqing Lafarge Cement Plant. The testing will be carried out in two stages: (1) small pilots of the two new technologies, (2) treatment of the remaining contaminated soil if the small pilots are successful. If after ample efforts biological treatment remains unsuccessful, the contaminated soil will be treated by the cement kiln co-incineration technology commonly used in China (at the same plant). The total needed time for remediation of the contaminated soil from the site is estimated at 1.5 to 2 years.

C. FINANCIAL MANAGEMENT

59. MEP FECO will be responsible for overall project management and coordination, implementation of project activities at the national level and in Hunan under Components 1 and 3, as well as implementation of cleanup subprojects under Component 2 for the demonstration sites outside Chongqing and Liaoning. FECO will be responsible for financial management (FM) for its project activities: project accounting and financial reporting, as well as consolidating FM reports. The two PMUs will be responsible for their project activities, including respective FM work. One designated account (DA) will be opened and maintained by MOF⁵ subject to the activities incurred at the national level, in Chongqing and Liaoning. A FM capacity assessment of all concerned implementing agencies and local finance bureaus (Chongqing Municipal Finance Bureau and Liaoning Provincial Finance Bureau) identified that these local agencies lack knowledge and experience in managing Bank financed projects, which is a principal FM risk. To address this principal risk, the following risk management measures have been agreed: (a) preparation and issuance of a Financial Management Manual as part of the Project Implementation Manual acceptable to the Bank, to standardize project FM procedures; (b) in addition to extensive FM training from the Bank, FECO who has extensive experience with the Bank operations will arrange more workshops and experience sharing events for local agencies.

D. PROCUREMENT

60. MEP FECO will be responsible for overall project management and focus on procurement and implementation of project activities at the national level and in Hunan under Components 1 and 3, and site cleanups in non-demonstration provinces under Component 2. The two PMUs will be responsible for procurement and implementation of their project activities under all Components.

61. The procurement capacity assessment concluded that FECO, which has implemented Ozone Depleting Substances Phaseout Projects (I, II, III, and IV), the PCB Management and Disposal Demonstration project, Alternatives to Chlordane and Mirex for Termite Control project and several other POPs projects, has adequate experience and capacity to carry out

⁵ MOF is considering revising its internal regulations to allow for the Designated Account to be managed by FECO, MEP. Upon formal notification of such change by MOF, the Disbursement Letter and the Project Implementation Manual will be revised, accordingly.

procurement activities under the Project. However, the Liaoning PMU and Chongqing PMU have no Bank project management experience, and are weak in procurement, including managing the procurement process and contract implementation, as well as retaining all procurement records. Measures to enhance the two PMUs' procurement capacity, further strengthen FECO's procurement management for the overall project and to mitigate potential procurement risks have been agreed upon and will be implemented during project implementation (see details in Annex 3). A Procurement Plan for the project activities of FECO and the two demonstration provinces for the initial 18 months of the project have been prepared, which is acceptable to the Bank.

E. SOCIAL (INCLUDING SAFEGUARDS)

62. The project is expected to have social impacts on local community and residents using or living near the contaminated sites. The presence of minority people living on or near the sites (except for the first site) can only be determined through detailed remedial investigation during project implementation. Therefore, the Bank's safeguard policies: OP/BP 4.10 Indigenous People and 4.12 Involuntary Resettlement are considered triggered for the entire project.

63. The first site in Chongqing was investigated during project preparation, and a site-specific environmental assessment has been carried out that also investigated social impacts. One household (Han people) living on the site will need to be temporarily relocated for a few months during remediation of the site and they will move back after the remediation activities. An abbreviated resettlement action plan has been incorporated in the site cleanup ESMP (also including grievance redress procedure and contacts) for the affected household. The OP/BP 4.10 policy is not triggered for the Ganshui site.

64. A few additional sites are expected to be confirmed during implementation stage for remediation, mainly from a short list of candidate sites identified during project preparation stage. An ESMF has been prepared and sets out the principles, rules, guidelines and procedures to assess the environmental and social impacts and to prepare safeguards documentation according to the World Bank safeguards policies and national laws/regulations. Specifically, the ESMF includes a resettlement policy framework to address any land acquisition and resettlement in the project and an ethnic minority development framework to address ethnic minority people presence if any on the project sites. A resettlement action plan (RAP including grievance redress procedures) and an ethnic minority development plan (EMDP) will be prepared if needed based on the results of site investigation and proposed remediation plan. FECO and the PMUs will report and monitor potential involuntary resettlement activities and indigenous people present during project implementation and as necessary, actions will be taken.

65. **Gender Aspects.** Component 2 will clean up several demonstration sites, thus potentially reducing health risks to nearby residents. While quantifying health impacts arising from soil pollution is nearly impossible, scientific studies show that exposure to certain contaminants found in the soil leave serious health impacts on both men and women. However, exposure to certain contaminants is known to result in more serious impacts on women's and children's health. As part of the M&E system, the project will measure the number of people positively

affected by site cleanups, including the number of female from project interventions under Component 2.

66. Social and gender equality has also been considered through equal participation of men and women (34 men and 44 woman) during consultations of the Ganshui site cleanup subproject and the draft EA report for the Qijiang Ganshui site. Consultation and agreement with the only household (one man and one woman) living on the Qijiang Ganshui site for their resettlement during remediation of the site have been made. They have jointly signed the temporary resettlement agreement. The same approach will be applied to other sites for men's and women's equal participation in consultation and benefit from the project. Such approach to gender equality will also be applied to compensation of affected male and female people related to the project temporary and permanent land acquisition and resettlement during project implementation. Specific gender responsive measures will be documented in the environment and social assessment report for each site.

F. ENVIRONMENT (INCLUDING SAFEGUARDS)

67. Given the potential environmental and health risks of POPs and other hazardous chemical contamination and the possibility that hazardous materials will be excavated, packaged, and transported for ex-situ treatment as part of remediation works, the project is classified as a Category A project as per the Bank's Safeguard Policy OP4.01. In addition, based on the information provided in the candidate site selection report, the project is not expected adversely impact physical cultural resources, as none of the candidate sites is located in the area of physical cultural resources. However, during site remediation, contaminated soils will be excavated for either in-situ or ex-situ treatment. Physical Cultural Resources might be found during excavation. Therefore, the ESMF has included provisions for managing chance finds which will be included in the ESMP for each site. Chance finds procedure has been included in the ESMP for the Ganshui site. Therefore, the Bank's safeguard policies: OP/BP 4.01 Environmental Assessment and 4.11 Physical Cultural Resources are considered triggered for the entire project.

68. A first pilot site has been identified in Ganshui Town of Chongqing City, for which a site-specific EA report has been prepared. Based on site investigation, the site is found to be contaminated with α -HCH, β -HCH and arsenic which, according to risk assessment, will cause unacceptable health risks. Through comprehensive analysis of alternative remediation technologies, a final remediation plan has been developed, i.e., anaerobic biodegradation and phytoremediation as the Plan I, and cement-kiln incineration as the Plan II. The potential environmental and health risks involved in site remediation process will include contaminated site excavation, building demolition, contaminated waste packaging/ transportation/storage; social disturbance of site enclosure, excavation and traffic; nuisance of noise and dust; potential environmental impacts of ex-situ contamination remediation at the new location under Plan I and final disposal of remediated soils under Plan II. These impacts are covered by the EA report, which developed adequate mitigation measures to address the envisaged impacts. The EA report was prepared by an independent environmental institute under the guidance of the Bank's task team.

69. A few more sites will be confirmed during the project implementation stage for Component 2. The site-specific EA reports for the other sites will be prepared during project implementation stage following the ESMF. The EA report for the Ganhui site in Chongqing can serve as a model.

70. Public consultation process has been incorporated into the ESMF for the site remediation. It will also address the social safeguards concerns, with due consideration of gender equality. For the first demonstration site (Chongqing Ganshui site), three rounds of public consultations have been conducted among the stakeholders during the EA process, i.e., during site investigation and after the draft EA was available. Information on site remediation, risks and mitigation measures etc. has been presented to the public, and public concerns have been solicited and addressed in the site remediation program and ESMP.

71. The Chinese versions of Ganshui EA report and the ESMF were locally disclosed in the websites of Chongqing EPB on July 11, 2014 and FECO website on October 13, 2014 respectively. The English version of the project Environmental and Social Assessment Executive Summary was disclosed in the World Bank InfoShop on October 15, 2014; the English version of the ESMF was originally disclosed in the World Bank InfoShop on October 15, 2014 and updated on December 23, 2014 (after project appraisal); and the English version of the Ganshui Site EA was disclosed in the World Bank InfoShop on October 28, 2014.

G. OTHER SAFEGUARDS POLICIES TRIGGERED

None.

ANNEX 1: RESULTS FRAMEWORK AND MONITORING

Country: China

Project Name: China Contaminated Site Management Project (P145533)

Results Framework

Global Environmental Objectives

PDO Statement

The project development objective is to improve the country's capacity for managing site contamination, and demonstrate environmentally sound identification and cleanup of sites contaminated with POPs and other hazardous chemicals.

These results are at | Project Level

Global Environmental Objective Indicators

Indicator Name	Baseline	Cumulative Target Values							End Target
		YR1 2015	YR2 2016	YR3 2017	YR4 2018	YR5 2019	YR6 2020	YR7 2021	
1. Selected priority technical guidelines (TG) and policy recommendations (PRs) for prevention and control of site contamination at the national and local levels developed or issued (Text)	Existing TG for site cleanup (control of site contamination) at the national and local levels (see Annex 2)	TORs prepared, approved by the Bank			TGs and PRs at the national level and in Chongqing and Liaoning developed			TGs in Chongqing and Liaoning issued	TG and PRs for prevention and control of site contamination at the national level and in Chongqing and Liaoning developed or issued
2. Training materials published and on-line training courses integrated	No training system for prevention and control	Training materials developed and trainers	Annual training plan implemented	Annual training plan implemented	Annual training plan implemented	Annual training plan implemented	Training materials improved and	Training materials published and on-line	Training materials published and on-line training courses integrated into the staff training system of MEP

into MEP staff training system (Text)	of site contamination	selected	d	d	d	d	updated	training courses integrated into the staff training system of MEP	
3. Contaminated land managed or dump sites closed under the project (Hectare(Ha)) - (Core)	0.00	0.01	0.01	4	5.2				5.2
4. National database of POPs contaminated sites established (Text)	No database for contaminated sites	TOR for development of the database prepared, approved by the Bank			Development of database completed	Trial run of the database	Trial run of the database	Priority list of POPs sites is produced	The national database is operational

Intermediate Results Indicators

Indicator Name	Baseline	Cumulative Target Values							End Target
		YR1	YR2	YR3	YR4	YR5	YR6	YR7	
5. Number of people trained on prevention and control of site contamination (Text)	0		As per annual training plan	As per annual training plan	As per annual training plan	As per annual training plan	As per annual training plan	As per annual training plan	As per annual training plans
6. Public Awareness activities implemented (Text)	0	TORs for public awareness campaign	Public awareness activities initiated					Public awareness campaign results	Public awareness campaign successfully implemented

		prepared						evaluated	
7. Feasibility Study for Knowledge and Remediation Center in Chongqing prepared (Text)	No feasibility study	TOR prepared, consultant selected, study initiated			Study completed				Feasibility study completed
8. Regional Soil and Groundwater Contamination Prevention and Warning System at the Changshou Industrial Park established (Text)	No warning system	TORs for system establishment prepared	Works on system establishment initiated		System established	System trial run		Results and experience dissemination activities completed	Warning system established and functional
9. POPs & POPs waste destroyed, disposed or contained in environmentally sound manner (Metric ton) - (Core)	0.00	0.00	875	15,700	46,600	68,000	79,000		79,000
10. Number of people positively affected by site cleanups (Text)	0	750	750	3,900	5,900	7,700	8,100		8,100
- Of which female (Text - Sub-Type: Breakdown)	0								To be based on site investigation results

Indicator Description

Global Environmental Objective Indicators				
Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
1. Selected priority technical guidelines (TG) and policy recommendations (PRs) for prevention and control of site contamination at the national and local levels	This indicator measures improvement of management capacity. The baseline for this indicator is existing TG for site cleanup (control of site contamination) at the national and local level (see Annex 2).	Semi-annually	Implementation progress reports	FECO, the PMUs
2. Training materials published and on-line training courses integrated into MEP staff training system	Successful achievement of this indicator will result in improvement of country's capacity for managing site contamination. The baseline for this indicator assumes that there are no systematic training materials and on-line training courses on risk based approach for prevention and control of site contamination.	Semi-annually	Implementation progress reports	FECO, the PMUs
3. Contaminated land managed or dump sites closed under the project	This indicator measures the cumulative size of industrial or municipal dump sites that are closed or contaminated land that is managed as a result of the project. The baseline for this indicator is zero.	Semi-annually	Implementation progress reports, site investigation and risk assessment	FECO, the PMUs
4. National database of POPs contaminated sites established	This indicator measures results of identification of POPs contaminated sites in China. The baseline indicates that there is no database for contaminated sites.	Semi-annually	Implementation progress reports	FECO, the PMUs
Intermediate Results Indicators				
Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
5. Number of people trained on prevention and control of site contamination	This indicator measures training results under the project. The baseline of this indicator is zero.	Semi-annually	Implementation progress reports	FECO, the PMUs
6. Public Awareness activities implemented	This indicator measures progress of the public awareness activities under component 1.	Semi-annually	Implementation progress reports	FECO, the PMUs
7. Feasibility Study for Knowledge and Remediation	This indicator will measure progress of successful preparation of feasibility study.	Semi-annually	Implementation progress reports	FECO, and PMUs

Center in Chongqing prepared				
8. Regional Soil and Groundwater Contamination Prevention and Warning System at the Changshou Industrial Park established	This indicator will measure progress towards establishment of warning system at the Changshou Industrial Park.	Semi-annually	Implementation progress reports	FECO, the PMUs
9. POPs & POPs waste destroyed, disposed or contained in environmentally sound manner	This indicator measures the amount of persistent organic pollutants (pops) and pops waste destroyed, disposed of or contained in environmentally sound manner (tons) under the project. The baseline for this indicator is zero.	Semi-annually	Site investigation and risk assessment	FECO, the PMUs
10. Number of people positively affected by site cleanups	This indicator measures site cleanup results in terms of how many people will be positively affected by site cleanups (reduced exposure to pollution). The baseline of this indicator is zero. The targets are conservative estimates. Each site investigation will include risk receptor investigation, which will provide more accurate numbers.	Semi-annually	Site investigation	FECO, the PMUs
- Of which female	No description provided.	Semi-annually	Site investigation	FECO, the PMUs

ANNEX 2: DETAILED PROJECT DESCRIPTION

Component 1: Capacity Development for Prevention and Control of Site Contamination

Sub-component 1.1: Development of Technical Guidelines, Policy Recommendations and Financing Options for Contaminated-site Cleanup

1. At the national level, this activity will develop⁶ selected priority technical guidelines on prevention and cleanup of contaminated sites, policy recommendations on information disclosure and public participation, and study financial options and market incentives for cleanup of contaminated sites.

- (a) A set of technical guidelines for contaminated site cleanup that cover the entire cleanup process is needed, including site investigation, risk assessment, remediation program design, remedial action, and remediation completion with verification. These guidelines should also include requirements related to community involvement, approval procedures, enforcement, emergency response, requirements for qualified site-cleanup practitioners, and a wide variety of characterization, monitoring, and remediation technologies throughout the cleanup process. China MEP has issued four technical guidelines in February 2014 for implementation starting from July 1, 2014. The project will develop other technical guidelines to complement what have been issued and what are being developed in the country in order to form a set of core standards for supporting risk-based contaminated site management framework in China. The table below summarizes the issued ones, ones set for development, and the proposed guidelines to be developed under the Project covering selected priority areas.

Technical process for contaminated site management	Technical Guidelines that have been issued in China	Technical Guidelines that have been set for development in China	Technical Guidelines/Administrative Measures to be developed under the Project
Pollution identification and site sampling	Technical Guidelines for environmental site investigation (HJ 25.1-2014); Technical Guidelines for environmental site monitoring (HJ 25.2-2014) (including monitoring during site investigation and remediation, remediation acceptance monitoring, and post monitoring after remediation)		Technical guidelines for sampling of POPs contaminated sites
Risk assessment	Technical Guidelines for risk		Screening levels in Chongqing and

⁶ At the national level, FECCO will lead development of the national-level regulations and technical guidelines for contaminated site cleanup, but FECCO has no authority to issue policies or technical guidelines. Therefore, issuance/adoption of the national-level regulations and technical guidelines to be developed under the project will not be a key project indicator, but efforts will be made during project implementation to facilitate their issuance as early as possible.

Technical process for contaminated site management	Technical Guidelines that have been issued in China	Technical Guidelines that have been set for development in China	Technical Guidelines/Administrative Measures to be developed under the Project
	assessment of contaminated sites (HJ 25.3-2014)		Liaoning
Remediation program	Technical Guidelines for contaminated sites soil remediation (including basic principles, procedures, contents and technical requirements for preparation of remediation program) (HJ 25.4-2014)		Technical Guidelines for remediation treatability studies
Remediation action/implementation		Technical Guidelines for environmental supervision during contaminated site remediation ⁷	Technical Guidelines for remediation engineering design; Technical Guidelines for environmental and social management plan;
Remediation completion/ Verification/acceptance and post-cleanup risk management		Technical Guidelines for remediation acceptance ⁵	Design Guidelines for remediation technologies to be selected and demonstrated under the Project; and Technical Guidelines for long-term risk management after site cleanup.
Others			
General		Management and Technical Guidelines for investigation and remediation of industry contaminated sites ⁸	
Industries in production			General Guidelines for establishment of ESMS at producing industries
Relocation of industries			General Guidelines for prevention and control of environmental pollution during industrial enterprise relocation

(b) Most developed countries realize their source control of contaminated sites by strengthening their environmental education and awareness. The project will support development of policy recommendations for *information disclosure and public participation* on prevention and control of contaminated sites. These policy recommendations are expected to be integrated into the MEP's existing information disclosure system. The project will also develop policy recommendations on risk-based approach for contaminated site management.

⁷ Being developed by the China Environmental Science and Research Institute during 2014 and 2016 and financed by the Ministry of Environmental Protection (National Environmental Protection Public Sector Research). The development work was initiated in 2014.

⁸ Consultation has been completed in early 2014.

(c) The "polluter pays" principle is one of the main policies of modern environmental management. However, when polluting enterprises go bankrupt, close down or remediation of contaminated sites is too expensive for them. Complementary to the "polluter pays" principle, the site developers, based on a "beneficiary sharing" principle, should also bear part of the economic responsibility. Raising funds in many different ways is a decisive factor for promoting contaminated site remediation and redevelopment. The project will finance studies on options of fiscal tools, economic policies and market incentives in the public sector, including cleanup subsidies, special appropriation, loans, and guarantees under existing tax or fee categories (such as land transfer fee, pollution discharge fee, etc.).

2. In Chongqing, Technical Guidelines for Environmental Risk Assessment of Site Contamination in Chongqing (Chongqing EBP 2010) and Technical Guidelines for Supervision and Acceptance of Remediation of Contaminated Soils from Industrial Move-out (Chongqing EBP 2013) were issued. The project will support development and issuance of the following:

- a) Administrative Measures for Contaminated Sites in Chongqing;
- b) Environmental Risk Screening Levels for Contaminated Sites in Chongqing;
- c) Technical Guidelines for Environmental Supervision during Contaminated Site Remediation in Chongqing;
- d) Study on Financing Mechanisms for Cleanup of Contaminated Sites in Chongqing; and
- e) Study on Public Participation Mechanisms for Cleanup of Contaminated Sites in Chongqing.

3. In Liaoning, the project will support development and issuance of the following:

- a) Amendment of Administrative Measures for Environmental Treatment and Remediation of Contaminated Sites in Shenyang;
- b) Administrative Measures for Environmental Remediation of Contaminated Sites in Liaoning;
- c) Environmental Risk Screening Levels for Contaminated Sites in Liaoning;
- d) Technical Guidelines for Acceptance of Contaminated Site Remediation Engineering in Liaoning;
- e) Technical Guidelines for Pollution Control during Move-out of Polluting Industries in Liaoning.

Sub-component 1.2: Knowledge Management and Awareness Raising in Support of Prevention and Control of Site Contamination

4. **Training for Prevention and Control of Site Contamination.** This sub-component will finance preparation and delivery of training courses and workshops for different target audiences on laws, regulations, technical guidelines and standards, site cleanup process, cost-effective containment and remediation technologies, reporting requirements, and environmental and social management system for prevention of contaminated sites using risk-based approach. The sub-component will support development of training materials and on-line training courses in the above mentioned topics, and will integrate these on-line courses into the staff training system of MEP. On-site training will also be organized for stakeholders as part of training courses to experience the cleanup process and results under Component 2.

5. The China Environmental Remediation Network, the National Solid Waste and Chemical Management Center under MEP, and the China Environmental Remediation Industry Alliance have been jointly organizing training on contaminated site cleanup since 2011 (six training workshops have been conducted so far). Training activities under the project will build on the existing experiences and provide broader and deeper training courses in and outside China on both prevention and control of contaminated sites by inviting national and international trainers. The contents of the systematic training program for control/cleanup of contaminated site include, but is not limited to, the following:

- (a) Organic contaminant and metal fate and transport in soil and groundwater
- (b) Groundwater hydrology
- (c) Soil and groundwater sampling methods
- (d) Sampling laboratory analysis and quality assurance and quality control program (QA/QC)
- (e) Site risk assessment and pollution delineation in soil and groundwater
- (f) Soil and groundwater cleanup technologies and methods
- (g) Risk-based contaminated site cleanup
- (h) Site remediation closure/acceptance standard
- (i) US or other countries site cleanup experience: site cleanup laws and regulations, site remediation funds, site assessment and remediation database management, site cleanup enforcement procedures, mathematical modeling in site assessment
- (j) Site cleanup showcases collected during project preparation
- (k) Site contamination prevention

6. This sub-component will include the following training activities:

- for government officials and cleanup practitioners on control of contaminated sites:
 - (a) Preparation or development of training presentation and/or training materials on policies/regulations and technical guidelines for cleanup for two target audience groups: *government officials* at all levels who are involved in contaminated site management and hazardous waste management; and *cleanup practitioners* who are engaged in different types of work during the cleanup process: site investigation, risk assessment, remediation program preparation (feasibility study), remediation, supervision of remediation projects, remediation acceptance, and environmental monitoring through the site cleanup process;
 - (b) Delivery of classroom-based training courses on policies/regulations and cleanup process;
 - (c) Development of internet-based training courses (internet seminars) on cleanup process;
 - (d) Workshops or forums on cost-effective containment and cleanup technologies;
 - (e) Dissemination of all training courses information, registration and archiving of all internet seminars through websites, including MEP staff training system;
 - (f) Preparation and delivery of international training and knowledge exchange activities
- for government officials and polluting industries involved in POPs production, consumption and emission and/or other polluting industries on prevention of site contamination:

- (g) Development of training materials for prevention of soil and groundwater pollution, especially how to establish environmental and social management systems (ESMS) in industries. The ESMS is an approach to managing environmental and social risks and impacts in a structured way on an ongoing basis. The ESMS, which is similar to ISO14001 Environmental Management System, incorporates:
- policy;
 - identification of risks and impacts;
 - management programs;
 - organizational capacity and competency;
 - emergency preparedness and response;
 - stakeholder engagement; and
 - monitoring and review
- (h) Training will be delivered to potential soil and groundwater polluting enterprises through workshops and/or webinars by working together with relevant industrial associations or relevant government departments;
- (i) Preparation and delivery of international training and knowledge exchange activities, as needed;
- (j) Technical assistance will be provided for development of ESMS in selected few industrial enterprises in Liaoning or Chongqing.

In addition, knowledge exchange and experience sharing events or workshops on prevention and control of site contamination will be organized among developed countries and developing countries.

7. The training activities, TA for ESMS, and knowledge events will be at the national and local levels in Chongqing and Liaoning. An annual training program will be prepared by FECO and the two PMUs for each year of the project life as part of the Annual Work Plans. It is expected that a systematic training program will be formed by end of the project and be maintained beyond the project life through developing a full set of comprehensive training materials in the above subjects, and integrating the training courses into the MEP training system.

8. **Public Awareness and Community Involvement.** Public awareness and community involvement activities at the national level and in Chongqing and Liaoning, respectively, will be organized by FECO and PMUs according to the agreed annual work plans. Public awareness activities aim to increase the public's knowledge on land pollution problems, generic information on site cleanups, and tips and skills for prevention of land/site pollution. Videos or posters will be made or other formats of public awareness activities will be carried out. Community involvement activities aim to advocate and strengthen early and meaningful community participation and consultation during site-specific cleanups. Specific requirements on public consultation and information disclosure during the site cleanup process have been recorded in the ESMF prepared for the Project, especially in relation to activities under Component 2.

Sub-component 1.3: Management Tools for Prevention and Control of Site Contamination

9. **Development of National Database of POPs Contaminated Sites.** According to the issued Technical Guidelines on environmental site investigation, this sub-component will finance phase I site investigation (preliminary investigation) and/or phase II site investigation (contamination confirmation) of identified POPs contaminated sites in China (roughly estimated 160 sites): mainly POPs pesticides, e-waste and PFOS contaminated sites, as well as mercury contaminated sites (as relevant). This activity will also finance development of a national database for contaminated sites. Information collected for POPs sites will be entered into the database for trial run. The database will also be able to produce an initial national priority list of these POPs sites, which will guide the country in determining which POPs sites warrant further detailed investigation (pollution quantification-detailed investigation) and remediation.

10. The phase I site investigation (preliminary investigation) will collect readily available information about a site and its surrounding area (potential risk receptors) and determine whether a site poses little or no threat to human health and the environment or if it does pose a threat, whether the threat requires further investigation. If the phase I site investigation results in a recommendation for further investigation, a phase II investigation will be performed. Phase II site investigation (contamination confirmation) will collect environmental and waste samples to determine what hazardous substances are present at a site and determine if these substances are being released to the environment and assess if they have reached nearby sensitive targets.

11. Information collected during the phase I and phase II will be used to calculate a hazard ranking system (HRS) score based on environmental and health risks. During the project preparation stage, the methodology for the POPs sites inventory including the HRS has been developed and it will be used during project implementation. However, HRS scores do not determine the priority in funding remedial response actions, because the information collected to develop HRS scores is not sufficient to determine either the extent of contamination or the appropriate response for a particular site. Remedial actions will need to rely on more detailed site investigation.

12. A national database will be developed to store and analyze all information collected under this activity. The national database will be designed in a way that it will continue to operate after the project life with upgrades and expansion as needed by MEP and other ministries for managing contaminated sites in China. The POPs site information will be first entered in the database for trial run and a priority list of POPs sites will be produced by the database.

13. Chongqing and Liaoning PMUs will be responsible for site investigation of POPs contaminated sites in Chongqing and Liaoning. FECO will be responsible for site investigation of POPs contaminated sites in other provinces. Liaoning and Chongqing may expand the list to include all potential contaminated sites in the province or municipality during the project life through its counterpart funding support. Chongqing also proposed to procure some equipment (such as soil heavy metal rapid detecting instrument, soil organic components rapid detecting instrument, water and underground water heavy metal rapid detecting instrument, etc.) to support the Chongqing EPB and the selected EPBs at the district level where more POPs contaminated sites are located, on investigation, on-site remediation inspection, remediation acceptance and emergence response rapid monitoring of contaminated sites.

14. Feasibility Study for a Knowledge and Remediation Center in Chongqing. Remediation of contaminated sites is costly and time-consuming, and hazardous waste needs to be identified, collected, transported, treated and/or disposed in a way of minimizing environment, health and safety risks. Financing and business models and selection of cost-effective remediation technologies taking into account future land use and risk-based remediation are crucial for sustainability of contaminated site management. A risk-based site remediation is based on site-specific human health and environmental risks of exposure to contamination. Safe levels of contaminants of concern are determined based on land use (residential or non-residential); the analysis of exposure pathways, such as direct exposure to surface soil, groundwater use, vapor intrusion into buildings, and others; and the mobility of contaminants in soil layers and groundwater. In some cases contamination may be left in place with appropriate controls (engineering or institutional controls, or both) to ensure long-term protection (e.g., USEPA, Risk-based Corrective Action). Therefore, a range of technologies could be used to ensure that contaminants are either removed from the site and disposal of in a sanitary manner, are contained in-situ, or are treated in such a way that they no longer pose a threat to human health and the environment.

15. The project will support feasibility studies for establishing a Knowledge and Remediation Center for contaminated soil and waste. The feasibility study will be carried out in two stages:

- a) The first stage study will collect information on all potential contaminated sites in Chongqing; how urgently remediation is needed for these sites due to risks or redevelopment needs; and will further investigate the scope for a limited range of adequate (cost-effective, risk based) remediation approaches for these sites. The investigation of remediation potential in Chongqing should have a long-term perspective because investments in soil treatment and remediation facilities can have a 10-20 year time horizon. The remediation approaches to investigate will therefore also include in-situ treatment and containment in addition to removal solutions, simply because in the long-term and for many sites ex-situ treatment, although might take shorter time, is unaffordable and quite often not feasible. The first stage will also include an assessment of currently available remediation approaches/technologies and suppliers/contractors for site cleanup. The first phase will thus present the 'business' potential for building remediation capacity based on potential needs and gaps that may exist in available services, and a judgment of the long-term 'market' for both in-situ and ex-situ treatment solutions.
- b) The second stage of the feasibility study, based on the results of the first phase, will then prepare a business plan for a remediation center for excavated materials, which then can also be a knowledge center plus operational center with treatment facilities. This stage of the feasibility study would also investigate public and private partnerships (PPP) and how to make sure that the Center can operate efficiently and competitively, within competing with existing service providers or services that can readily developed fully by the private sectors.

16. Demonstration of Establishing Regional Soil and Groundwater Contamination Prevention and Early-Warning System at the Changshou Industrial Park in Chongqing. Changshou Economic Development Zone (a Chemical Industrial Park) was established in 2010 and it is located in the northeast part of Chongqing with a total land area of 73.6 square

kilometers. The Park is divided into five main industrial zones: natural gas chemical industry, petrochemical industry, new materials and new energy industry, ferrous metallurgy, and equipment manufacturing. Up to date, 148⁹ enterprises are operating in the Park, which have taken 35 square kilometers of the Park area. Among the 148 industries, there are about 20 World Top 500 enterprises and 30 Multinational Corporations. Potential contaminants present in the Park include POPs such as polychlorinated biphenyl (PCB), perfluorooctane sulphonate (PFOS) and dioxins, polycyclic aromatic hydrocarbons (PAHs), and other toxic pollutants.

17. The Park has established environmental monitoring, waste management and emergency response facilities, such as regular environmental monitoring (points and wells), sewage network, two wastewater treatment plants, a hazardous waste disposal plant/site and an industrial waste disposal plant/site, emergency response control center, hazard source video surveillance system, linkage alarm system, a fire service station, a hospital, 19 sets of emergency evacuation indicators and five emergency assembly points and evacuation/exit passageways. Although a series of environmental protection and management system and emergency response mechanisms have been developed, there are still problems that prevent effective monitoring and ensuring a safe environment in the Park. Currently, the main problems for the Park soil and groundwater environmental monitoring and management face include: (1) the lack of standardized environmental monitoring and management system and the lack of monitoring indicators for POPs; (2) the lack of complete monitoring system to monitor soil and groundwater conditions with few existing monitoring points and low monitoring frequency; (3) insufficient monitoring of dynamic transport of pollutants and information dissemination platform; and (4) the lack of prevention and warning system based on soil and groundwater POPs and other toxic chemical indicators. The proposed activities under the project aim to improve existing environment management of the Park with the focus on soil and groundwater pollution management by establishing a Regional Soil and Groundwater Contamination Prevention and Warning System.

18. This sub-component will specifically include the following activities:

- a) Soil and groundwater risk source (pollution source) investigation and potential risk receptor investigation through mandatory and regular reporting by industries and on-site inspection. Some environmental monitoring at strategic locations might be needed in addition to existing monitoring points and wells. A hazardous material tracking and information reporting system will be developed for events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste;
- b) Soil and groundwater contamination risk assessment and trend analysis within the Industrial Park:
 - Environmental risk source temporal and spatial diffusion modeling;
 - Hazard assessment of environmental risk sources;
 - Exposure and vulnerability assessment of the receptors;
 - Establishment of environmental risk zoning and grading maps;
 - Establishment of zoning map of receptor's vulnerability;
 - Establishment of environmental risk overall zoning map;

⁹ With 36 additional enterprises in construction phase, and 56 in planning phase.

- Development of technical and methodological guidelines for risk assessment for Industry Parks
- c) Risk management - Development of soil and groundwater contamination incident early-warning system, emergency response system, and treatment system
- Early-warning:*
- Compulsory reporting requirements and procedures by industries in the Park for hazard registry, unexpected or high levels of emissions, spills, etc.;
 - Regional environmental safety planning (environmental risk source layout, protection of receptors, and allocation of emergency resources)
- Emergency Response:*
- Environmental risk emergency management system (emergency planning and emergency decision)
- Post-incident Treatment:*
- Procedures for assessment and environmental restoration after occurrence of environmental pollution incidents;
 - Gap analysis of existing environmental monitoring and waste management facilities
- d) Environmental and Social Management System training:
- Selection of good ESMS cases/enterprises in the Park;
 - Knowledge sharing on ESMS;
 - Requirements on establishment of ESMS by the industries in the Park
- e) Trial run of the environmental risk assessment and management system

19. Chongqing will counterpart fund all goods needed for establishing the Regional Soil and Groundwater Contamination Prevention and Warning System at the Changshou Industrial Park. The GEF funds will be used for consulting services under this sub-component. Experience of this demonstration will be disseminated to other industrial parks nationwide.

20. **Prevention and Control of Agricultural Land Contamination.** Anxiety is growing in China about contaminated soil in the country's agricultural centers (such as Hunan province) and the potential effects on the food chain. Some farmland soil in suburbs of most cities and sewage irrigation district in China are polluted to some extent with heavy metals and organic pollutants (mainly are POPs), as indicated by the national soil survey results. The sources of pollutants in farmland in most Asian countries include natural source, mining, smelting, pesticides and sewage sludge applications, and livestock manure uses. Systematic remediation technologies for agriculture contaminated land will be needed, which include green and environmentally-friendly bioremediation, combined and hybrid remediation, in-situ remediation, environmentally functional material based remediation, equipment based site remediation, remediation decision supporting system and post-remediation assessment¹⁰. Phytoremediation is another emerging low-cost in-situ technology.

21. The Chinese government has requested a loan from the World Bank (project is expected to be delivered in FY 2017) to support Hunan province's efforts on improving agriculture production base safety and quality by cleaning up heavy metals (such as cadmium, lead and

¹⁰Luo L., Ma Y., Zhang S., Wei D., Zhu Y.G. Inventory of trace element inputs to agricultural soils in China. Journal of Environmental Management, 2009, 90: 2524-2530

arsenic) and organic pesticide contaminated farmland, cutting off polluted water irrigation, reforming cropping system, applying integrated pest management for reducing chemical use. As the project is still in early preparation stage, it is expected that this sub-component will carry out policy gap analysis for pollution source control (prevention) and control of contaminated agricultural land in Hunan, development of methodology for assessment of environmental and human health risks of agriculture land pollution and one or two case analysis in selected counties, and preparation of a proposal for establishing an environmental monitoring system for agriculture land in Hunan. These outputs, to be adjusted as needed, will support the technical design of the lending project in Hunan and will be shared with other provinces. This sub-component will be managed by FECO with technical support to be provided by the Hunan Provincial Agriculture Commission.

22. It is expected that these activities and piloting results will be completed by June 2016 in order to support the technical design of the lending project.

Sub-component 1.4: Technical Expert Team and Project Monitoring and Evaluation

23. This sub-component will hire international and national technical experts with both site cleanup knowledge and remediation engineering experience, to support FECO and the two PMUs daily management of the project. These technical experts will be hired at the beginning of project implementation. The technical expert group is also expected to facilitate effectively knowledge transfer on soil pollution prevention and control. This sub-component will also support monitoring and evaluation of the project outcome indicators and results by collecting evidence-based information and data, as well as organizing the project launch and completion workshops.

Component 2: Cleanup Demonstrations of Sites Contaminated with POPs and Other Hazardous Chemicals

24. The 22 POPs currently within the scope of the Stockholm Convention include 12 pesticides and 10 industrial chemicals or by-products. The 12 pesticides have been produced intentionally and used on agricultural crops or for public health vector control. The 10 industrial chemicals and by-product POPs include PCBs, dioxins, furans, brominated flame retardants, PFOS, and penta-chlorobenzene. This component will finance cleanup of selected POPs contaminated sites.

25. This component will demonstrate cleanup of several contaminated sites, estimated a total of 5-6 sites, including site investigation, risk assessment, remediation program, remediation action and completion. It aims to make standard cleanup engineering cases with different remediation technologies (combustion, non-combustion and containment technologies) and financing models as much as possible. The remediation process will be videotaped by the supervision entity and professional cameraman and will be analyzed during the training courses on what are good practices and what are not.

26. The first demonstration site, which used to be a pesticides warehouse in Chongqing (Ganshui site), has been identified and confirmed during project preparation as pilot participant in the project. Site investigation that analyzed 61 soil samples at 24 soil sampling points, 2 ground-water samples and 11 building wall and ground surface samples, indicated that the site is

contaminated with α -HCH, β -HCH and arsenic. More details can be found in the EA report for this site.

27. The site will become residential area after site cleanup according to the Ganshui Town Qijiang County Construction Planning 2003-2020. The Risk-based Corrective Action (RBCA)¹¹ model was used to evaluate the risk posed by the site contamination, which use the 95% confidence upper limit of soil samples detection results as exposure concentrations. The results of risk assessment showed that the carcinogenic risk of arsenic, α -HCH and β -HCH was higher than the acceptable carcinogenic risk level, and the hazard quotient of arsenic was also greater than the acceptable non-carcinogenic risk level.

28. Based on risk assessment results, and comparing the environmental risk screening levels in different countries, the recommended remediation goals of arsenic, α -HCH and β -HCH at Ganshui site are 20 mg/kg, 0.2 mg/kg and 0.22 mg/kg, respectively, following the Screening Levels for Soil Environmental Risk Assessment of Sites in Beijing (DB11/T811-2011), which is the only soil pollution screening standard in China. These goals are all lower than the Netherlands soil intervention values (76, 17 and 1.6 mg/kg), while comparing with USEPA generic soil screening level, the recommended remediation goal of β -HCH is also lower (0.3mg/kg), but arsenic and α -HCH are higher (0.67 and 0.085 mg/kg).

29. The site owner is the Ganshui Supply and Marketing Cooperative. There are no legacy issues on the site. The Chongqing PMU will manage remediation of the site by contracting with a remediation company to be selected through a competitive bidding process. An entity for both engineering and environmental supervision of the site remediation will also be hired by the Chongqing PMU. Remediation of this site will be initiated once the project is approved and will be financed by both GEF (mainly for remediation of the contaminated soil) and counterpart funding. The environmental and social safeguard requirements will be fully applied during the site remediation process. Table 1 below summarizes the estimated soil amount remediation from the site.

Table 1: Estimated Soil Amount for Remediation

Plots on the site	Excavation area (m ²)	Excavation Depth (m)	Soil Volume (m ³)	Contaminants	Contamination level
Plot 1	4.2	0.5	2.1	α -HCH、 β -HCH	Low-contaminated
Plot 2	5.8	0.5	2.9	α -HCH、 β -HCH	Low-contaminated
Plot 3	71.0	1.5	106.6	α -HCH、 β -HCH	Low-contaminated
Plot 4	20.9	1.5	31.4	Arsenic, α -HCH, β -HCH	Medium-contaminated arsenic and Low-contaminated α -HCH、 β -HCH
Building wall and ground surface	153.7	Wall 0.05, Ground surface 0.10	7.7	α -HCH、 β -HCH	Low-contaminated

¹¹ RBCA model is an action rule published by American Society for Testing and Materials (ASTM), which focuses on the remediation of contaminated soil and groundwater. In 2009, according to the action rule, American GSI environmental company developed RBCA model to be used in site risk assessment.

Total	249.8	/	150.7	/	/
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30. The selection of remediation technology for Ganshui POP-contaminated site follows several principles of technical feasibility, operability, suitability of existing conditions in Chongqing, as well as competitive remediation cost. Over 20 in-situ and ex-situ remediation technologies have been considered and compared, based on which three candidate technologies were chosen: co-incineration (cement kiln), anaerobic biodegradation and phytoremediation (Table 2):

Table 2: Remediation technologies for the Ganshui sites

Medium	Target pollutant	Not requiring test	Requiring test
Soil	α -HCH and β -HCH	Incineration	Anaerobic biodegradation
			Phytoremediation
	Arsenic	Incineration	Phytoremediation

31. The remediation process will include site clearing, protection of building structure, wall surface peeling, excavation, and packaging of contaminated materials, transportation to and storage at the treatment site, treatment/disposal and acceptance. Chongqing Lafarge Cement Plant has been selected as the treatment site for testing anaerobic biodegradation and phytoremediation technologies, which has enough space for testing phytoremediation and anaerobic biodegradation. Further, Chongqing Lafarge cement plant has passed acceptance of project environmental impact assessment and is qualified for disposal and storage of hazardous waste.

32. Considering the advantages and disadvantages of remediation technologies, time requirement of the Ganshui sub-project, alternative I (anaerobic biodegradation and phytoremediation) and alternative II (cement kiln co-processing) were designed for treatment of the contaminated soils of Ganshui site, and if alternative 1 fails to remedy the contaminated soil to the target level, then the alternative II will be the final resolution. No aftercare of the site is needed because it will be fully cleaned up with the removal of contaminated materials.

- a) **Plan I** is composed of two pilot scale tests (i.e., anaerobic biodegradation and phytoremediation) as follows: Anaerobic biodegradation is to be conducted for the α -HCH and β -HCH contaminated soils, adding 8g/L of Blood Meal and 20g/L of iron powder as the enhanced measures. For one batch, test of 150 days treatment, four anaerobic tanks will be used for 18 m³ contaminated soils, and kept by water seal for the anaerobic condition. Meanwhile, phytoremediation with ryegrass, purple medic, ciliate desert-grass and Cretan Brake will be used for the arsenic contaminated soil, and intercropping mode will be accepted. If the pilot field test is successful, the remaining soil from the Ganshui site will be treated by the two technologies; it is expected that about 500 days in total are needed to complete the treatment. The total budget of alternative I is about 1.28 million yuan, including both capital and operating cost.
- b) **Plan II** is cement kiln co-processing, the added contaminated soil accounted for 1.6%-3.0% of cement raw materials, and the mixed materials are kept for 2-6 seconds in the preheating furnace (the average temperature >800°C and flame temperature >1000°C),

and for 5-6 seconds in the cement kiln (the average temperature >1450 °C and flame temperature >1800 °C), respectively. The budget of alternative II was about 0.71 million yuan for operating cost only. More than 150 days will be needed to complete treatment of the soil from Ganshui site.

33. A protocol for switching from Plan I to Plan II (incineration) has been developed and included in the Project Implementation Manual. Due to the very small amount of waste of 150m³ in this site, the alternative treatment is more expensive than co-incineration in the cement kiln, creating incentives that could quickly put pressure on switching to Plan II for various reasons. Therefore, the protocol is in place to make sure that everything that can be reasonably done to make Plan I successful has been done, and that in case of set-backs or disappointing intermediate results, first every effort is made to turn matters around before consideration is given to diverting to Plan II. And the final decision to switch to Plan II will be subject to a Bank no-objection.

34. Selection of other sites. The other sites to participate in the project will be confirmed during the project implementation stage. Availability of counterpart funding and clarity on land ownership arrangements before and after site cleanup will be two key prerequisites for sites to participate in the project. A Site Selection Report, including preliminary information of another 7 sites, has been prepared during project preparation. Sites included in this report will be considered first and selected for cleanup demonstrations, if appropriate. A site cleanup EA report will be prepared for each site selected and approved by the Bank before initiating the bidding process for remediation. The EA report for the Ganshui site will be used as a model for EA preparation for the other sites.

35. Based on (1) POPs contaminated site information collected at the time of NIP preparation in 2007; (2) POPs pesticides contaminated site information collected under the Studies on POPs Contaminated Sites financed by the Canadian POPs Trust Fund of the World Bank in 2009/2010, (3) information on chemical companies from provincial chronicles, (4) information on endosulfan manufactures from China Pesticide Information Network, (5) information on PFOS manufactures from the China Association of Fluorine and Silicone Material Industry, and (6) site information reported by the governments at the provincial and municipal levels according to the National POPs Prevention and Control Plan during the 12th FYP period, a list of 160 potential POPs contaminated sites was established. About 50% of 160 sites are located in Jiangsu, Hebei, Guangdong, Hunan, Shanghai and Chongqing. As most information about the 160 sites on pollution situation, pollution liability, and owners is not available, 56 sites were initially pre-screened, by excluding sites that have been cleaned up (13) and ones that have no site contamination information (91). Then 15 sites (including Ganshui site in Chongqing) out of the 56 sites were screened to meet all of the three conditions, including: (1) site owner is clear; (2) site pollution liability is clear; and (3) sites are confirmed polluted after initial site investigation.

36. For the 15 sites, site information was collected by questionnaire survey on site representativeness (production, category of POPs contaminants, geographical zone, topographical condition, and site size), environmental and health risks (i.e., potential risk receptors surrounding the sites), future land use, and possible fatal flaws of sites (legacy issues such as site ownership, legal status, disputes with present industries and unclear division of liabilities for cleanup costs and rights to cleaned land after the remediation or possible claims to land use by present industries or residents), and others (site investigation done, being done or not

yet, and in/out of demonstration areas). Based on this information, the following selection criteria and an Analytic Hierarchy Process (AHP)¹² were established for final selection of a shortlist of candidate sites for the Project.

Selection Principles	Selection Standards
Principle of priority	Criterion 1: in demonstration area
Principle of representativeness	Criterion 2: Main type of POPs contaminated sites: pesticide production sites, industry of fine chemicals, waste incineration, and dismantling and incineration of e-waste
	Criterion 3: Main POPs contaminants: pesticides and dioxins
	Criterion 4: Appropriate size of contaminated sites
Principle of risk	Criterion 5: Medium or high risk on human health
	Criterion 6: Medium or high risk on environment
Principle of benefit	Criterion 7: Notable environmental and economic benefits after cleanup
	Standard 8: Clear land redevelopment plan after cleanup

37. Based on these selection criteria (down to 12 sites) and the AHP analysis method (down to 8 sites including the first site), a shortlist of 8 candidate sites was established. It is expected that four to five sites in addition to the Chongqing Ganshui site will be first selected from the shortlist to participate in the project's Component 2. General information of the other 7 sites is summarized in the table below.

¹² AHP is a multiple-index and multiple-program comprehensive analytic method raised by T.L. Saaty at the beginning of 1980s. AHP combines qualitative and quantitative analysis, and expresses and treats the subjective judgment of people in form of numbers.

Site name	City/Province	Main POPs	Env. health Risk	Land value	Future land use*	Estimated cleanup cost (million US\$)**	Estimated Site Area (ha.) for cleanup	Counterpart funding source	Site owner	Supervision entities for cleanup if the site selected
1. Northeast Pharmaceutical Group Co.,Ltd.	Shenyang/Liaoning	Organochlorine pesticide;	M	H	R	3~4.5	18	Tiexi District Land Reserve Trading Center of Shenyang city	Land Reserve Trading Center of Tiexi District	Liaoning PMU, Tiexi District Land Reserve Trading Center of Shenyang
2. Shenyang Chemical Plant	Shenyang/Liaoning	Organochlorine pesticide;	M	H	R	57~85	35	Shenyang Chemical Co. Ltd, local government	Shenyang Chemical Co. Ltd	Liaoning PMU, Shenyang Chemical Co. Ltd
3.Chongqing Jingkou Warehouse of Agricultural Material Co.	Chongqing	DDT and HCH	M	H	R	11.4	0.8	Chongqing EPB and Chongqing Agricultural Production Material (Group) Co., Ltd.	Chongqing Agricultural Production Material (Group) Co., Ltd.	Chongqing PMU
4. Hunan Pesticide Factory	Xiangtan/Hunan	Organochlorine pesticide; industrial chemicals	M	H	R&C	45.7~68.6	28	TBD	The Pesticide Plant	FECO, Local government
5. E-waste Dismantling Site of Tianjin Ziya Circular Economy Industrial Park	Tianjin	Dioxin and PBDE	H	H	I	40~60	4	TBD	China energy company	FECO, Local government
6. Tianjin Dagu Chemical Factory	Tianjin	Organochlorine pesticide; industrial chemicals	M	H	I	Estimated cost is not applicable as enterprises are still in operation on sites. If selected, site env. management will be demonstrated.	222	TBD	Dagu Chemical Co. Ltd	FECO, local government
7. E-waste incineration site in Guiyu	Shantou/Guangdong	Dioxin, PBDEs	M	L	I	6~9	3.73	TBD	Guiyu Town of Guangdong province	FECO, Guiyu Town of Guangdong province

Notes: *R-residential; C-commercial; and I-Industrial.

**Before detailed environmental investigation, cleanup cost is roughly estimated at 10-15 million RMB/ha.

38. The Chongqing and Liaoning PMUs will manage site cleanups in their area if the sites 3, 4, and 7 are confirmed. FECO will be responsible for management of implementation of cleanup of the sites if confirmed outside Chongqing and Liaoning by working with local management bodies assigned by the local government. The lessons learned from all the demonstration sites will feed the process of policy development and capacity building under Component 1.

Component 3: Project Management

39. This component will support incremental operating costs associated with project management, including day-to-day project implementation, procurement and financial management, and environmental and social safeguards functions carried out by FECO, the Chongqing and Liaoning PMUs, including coordination and collaboration with national and local government agencies, non-government agencies and the private sector.

Project Cost

40. The total project cost and counterpart funding are summarized below:

Project Cost By Comp.	GEF (1,000 US \$)				Estimated Counterpart Funding (1,000 US \$)				Total (1,000 US \$)
	Sub-Total	MEP	Chongqing	Liaoning	Sub-Total	MEP and others	Chongqing	Liaoning	
Component 1	8,220	4,370	2,330	1,520	13,916	1,900	11,506	510	22,136
1.1 Development of technical guidelines, policy recommendations and financing options	1,160	770	100	290	760	400	300	60	1,920
1.2 Knowledge management and awareness raising									
Training for prevention and control of contaminated sites	2,002	910	612	480	510	510			2,512
Public awareness and community involvement	330	180	30	120	60	10	50		390
1.3 Management Tools									
Development of national database of POPs contaminated sites	1,940	1,260	360	320	8,218	640	7,178	400	10,158
Feasibility study for a remediation knowledge and treatment center	350		350		2,000		2,000		2,350
Demonstration of establishing regional soil and groundwater contamination prevention and warning system	700		700		1,700		1,700		2,400
Prevention and control of agricultural land contamination	300	300			300	300			600
1.4 Technical expert team and project monitoring and evaluation	1,438	950	178	310	368	40	278	50	1,806
Component 2	6,030	2,710	290	3,030	43,675	15,500	1,435	26,740	49,705
Site investigation, risk assessment, remediation plan, ESA and preparation	2,400	1,000		1,400	100		100		2,500

Project Cost By Comp.	GEF (1,000 US \$)				Estimated Counterpart Funding (1,000 US \$)				Total (1,000 US \$)
	Sub-Total	MEP	Chongqing	Liaoning	Sub-Total	MEP and others	Chongqing	Liaoning	
Site remediation	3,630	1,710	290	1630	43,575	15,800	1,335	26,740	47,205
Component 3	750	370	180	200	2,409	950	1,059	400	3,159
FECO and the two PMU's IOC	750	370	180	200	2,409	950	1,059	400	3,159
Total Project Costs	15,000	7,450	2,800	4,750	60,000	18,350	14,000	27,650	75,000

Sources of counterpart funding	Name of co-financer	Type of counterpart funding	Amount (1,000 US\$)
National Gov.	MEP	Cash	360
		In-kind	2,090
Chongqing	CEPB	Cash	2,594
		In-kind	7,628
	Local Gov.	Cash	1,000
		In-kind	1,078
	Private sector (industrial park)	Cash	
		In-kind	1,700
Liaoning	LEPD	Cash	
		In-kind	850
	Local Gov.	Cash	30
		In-kind	30
	Private sector (site owners)	Cash	20,940
		In-kind	5,800
Others: Private sector & Local Gov.	Depending on sites confirmed for participating in the project	Cash	13,700
		In-kind	2,100
USEPA		In-kind	100
Total Counterpart Funding			60,000

ANNEX 3: IMPLEMENTATION ARRANGEMENTS

Project Institutional and Implementation Arrangements

1. The Ministry of Environmental Protection (MEP) is the designated focal point for implementation of the POPs Stockholm Convention for China. The Foreign Economic Cooperation Office (FECO) affiliated to MEP is responsible for daily managing and coordinating the overall POPs program in China, including all POPs reduction and elimination activities and measures.

2. To ensure strong stakeholder involvement, the existing national Coordination Group (CG) for implementation of the POPs Stockholm Convention, established in 2005 with MEP as the Lead Agency and other 13 ministries as members by now, will continue to provide overall guidance and coordination for implementation of the Project. FECO will organize CG meetings as needed to report and collect feedback/comments on project implementation. In Chongqing, an inter-agency steering committee was set up in 2008 consisting of Chongqing Environmental Protection Bureau, Chongqing Administration of Land, Resources and Housing, Chongqing Urban Planning Bureau, Chongqing Economic and Information Technology Commission and Chongqing Urban and Rural Construction Committee. The inter-agency steering committee will supervise project implementation in Chongqing. In Liaoning, an inter-agency Steering Committee was set up for project implementation in March 2014 consisting of the provincial Department of Environmental Protection, the Provincial Development and Reform Commission, the Provincial Finance Department and the Provincial Department of Land and Resources.

Project administration mechanisms

3. FECO will be responsible for the overall implementation of the Project and focus on project activities at the national level under Component 1 and site cleanups in non-demonstration provinces under Component 2. FECO will collaborate and coordinate with other departments under MEP, such as the Department of Pollution Prevention and Control, the Department of International Cooperation, the Department of Science, Technology and Standards, the Department of Natural Ecological Protection, and the Department of Law and Regulation, as well as other ministries including MOF, NDRC, MOHURD, MLR, and MIIT for project activities as needed, and issuance, if possible, of policies and technical guidelines developed under the project.

4. A PMU housed in Chongqing Environmental Protection Bureau (Chongqing PMU) was established in March 2014. Liaoning set up its PMU in February 2014 under the Liaoning Environmental Protection Department (Liaoning PMU). The Chongqing and Liaoning PMUs will manage project activities at the local level. The PMUs will have a Project Director and a Coordinator assigned and paid by the Provincial Environmental Protection Departments and one or two consultants dedicated to day-to-day operations who will be financed by the Project.

5. In the two demonstration areas, the specific site cleanup subprojects will be managed by the local PMUs. Site cleanup subprojects in other provinces will be managed by FECO. Implementation of site cleanup activities will be conducted by contractors, and supervised by independent supervision companies. Both will be selected through a bidding process. Environmental, health and safety mitigation measures in the EA/ESMP will be incorporated into the bidding documents and later into the contractors' contracts to ensure effective implementation. Cleanup process will be closely supervised and final results be verified by the local EPBs.

6. Site owners will provide information during investigation of the site and be consulted regarding implementation arrangements and the financing plan for their site clean-up. As part of the site eligibility criteria set forth in the Project Implementation Manual, site owners will enter into an agreement with the relevant PMU and FECO, setting forth the terms and conditions of the clean-up as well as the maintenance of the site for preventing future pollution thereafter.

Financial Management, Disbursements and Procurement

Financial Management

7. The FM capacity assessment concluded that the Project FM arrangements satisfy Bank requirements and identified the following principal risk: PMUs financial staff's lack of experience in managing Bank financed projects.

8. Mitigation measures to address the above risk that have been agreed to are: (i) preparation and issuance of a Financial Management Manual (FMM; as part of the PIM) acceptable to the Bank to standardize project FM procedures; and (ii) in addition to extensive FM training from the Bank, FECO, who has extensive experience with the Bank financed operations, will arrange more workshops and experience sharing. Overall, the residual project FM risk after mitigation is assessed as Moderate.

9. FECO will be responsible for the overall project management and implementation of project activities at the national level, including project FM related day-to-day works: project accounting and financial reporting. Chongqing Municipality and Liaoning Province through Chongqing Environmental Protection Bureau and Liaoning Environmental Protection Department will be responsible for project activities at the local level, including respective project FM works. FECO has a strong financial management team with adequate educational background and work experience. Each of the two PMUs will designate two financial staffs, one financial manager, one accountant to be responsible for day-to-day project FM and disbursement works.

10. **Budgeting.** The Annual Work Plans and Budgets, including the funding budget and the resources, will be prepared by each implementing agency. Budget variance analysis will be conducted on a semi-annual basis to inform management of significant variances from plan that may need corrective actions. Based on the approved budget and implementation progress, the related finance bureaus will provide government appropriations to the project.

11. **Funds flow.** One centralized Designated Account (DA) will be opened and managed by Ministry of Finance (MOF). Withdrawal applications required for GEF grant (World Bank) disbursements will be prepared and submitted by each PMU and submitted to FECO for review before going to MOF. MOF will reimburse funds to the PMUs and FECO for the GEF financed portion paid first by them or directly disburse funds to the contractors.

12. **Accounting and financial reporting.** The administration, accounting and reporting of the project will be set up in accordance with Circular #13: “Accounting Regulations for World Bank Financed Projects” issued in January 2000 by MOF. The standard set of project financial statements has been agreed between the World Bank and MOF.

13. Computerized accounting and reporting system will be adopted by each implementing agency for this project. The detailed chart of accounts and project profile will be established before project start.

14. FECO will be responsible for the overall project management and implementation for the activities it executes, including project FM related day-to-day works, including project accounting and financial reporting. The site cleanup pilots under Component 2 will be implemented by the two PMUs for sites in the demonstration areas and FECO for sites located outside of Chongqing and Liaoning. Original supporting documents will be retained by the three implementing agencies. The project financial statements will be prepared by each PMU and consolidated by FECO. The consolidated unaudited semi-annual project financial statements will be furnished to the World Bank by the FECO no later than 60 days following each semester (the due dates will be August 31st and February 28th).

15. **Internal control.** FECO has adequate financial management regulations in place. The internal control mechanism will be assessed during appraisal. The project related accounting policy, procedures and regulations were issued by MOF, and the FMM has been prepared and issued to standardize the project FM procedures.

16. **Audit.** The Audit Service Center of the China National Audit Office (CNAO) for Foreign Loan and Assistance Projects has been identified as auditors for the grant. Annual audit reports will be issued by CNAO. According to the World Bank Policy on access to Information, the audit reports for all investment lending operations, for which the invitation to negotiate was issued on or after July 1, 2010, need to be made publicly available in a timely fashion and in a manner acceptable to the Bank. Audit reports will be made publicly available on the website of CNAO. Following the World Bank's formal receipt of the audited financial statements from the recipient, the World Bank will also make them available to the public in accordance with the World Bank Policy on Access to Information. FECO will need to submit the Project Financial Statements audited by the Audit Service Center of CNAO by June 30 of each calendar year.

Disbursements

17. Four disbursement methods are all available for the project: advance, reimbursement, direct payment and special commitment. Supporting documents required for Bank disbursement

under different disbursement methods are documented in the Disbursement Letter issued by the Bank.

18. One segregated DA in US dollar will be opened at a commercial bank acceptable to the Bank and will be managed by MOF. The ceiling of each DA are determined and documented in the Disbursement Letter. Upon receipt of each PMU’s withdrawal applications through FECO, MOF will reimburse funds to the PMUs and FECO for the GEF financed portion paid first by them or directly disburse funds to the contractors.

19. The World Bank loan would be disbursed against eligible expenditures (taxes inclusive) as in the following table:

Category	Amount of the Grant Allocated (Expressed in USD)	Percentage of Expenditures to be Financed (inclusive of Taxes)
Goods, works and non-consultants’ services, consultants’ services, Training and Workshops, and Incremental Operating Costs of the Project	15,000,000	100%
TOTAL AMOUNT	15,000,000	

20. It has been agreed that retroactive financing of up to US\$ 3,000,000 (20 percent of the total grant amount) would be available for eligible expenditures incurred on and after January 1, 2015.

Procurement

21. The procurement capacity assessment concluded that the overall procurement risk is moderate. FECO has adequate experience and capacity to carry out procurement; however, Liaoning and Chongqing PMUs for the two demonstration province and municipality lack experience in implementing Bank-financed projects. The key risks include: (i) possible misunderstanding between the PMUs and the Bank and delays in processing procurement and non-compliance due to unfamiliarity with the Bank’s procurement policies and procedures, (ii) weak contract management, and (iii) poor records management. Measures to enhance the two PMUs’ procurement capacity, further strengthen FECO’s procurement and contract management under the project and to mitigate potential procurement risks have been agreed as follows:

- a) FECO and the two PMUs have designated a full-time procurement staff respectively to oversee procurement activities of enterprises, review contracts and provide support for all the components;
- b) A procurement agent with experience of World Bank projects will be hired by FECO and the two PMUs, if needed, to assist them in procurement of cleanup works, goods and non-consulting services;
- c) FECO and the two PMUs have sent and will continue to send their procurement staff to attend workshops on procurement for Bank-financed projects, including procurement of goods, works and non-consulting services, as well as consulting services;

- d) The Bank provided training to FECO and the two PMUs in November 2013 and April 2014, and will continue to provide training to FECO and the two PMUs throughout the project implementation;
- e) The project will also hire international and national technical experts to provide technical support to FECO and the two PMUs for project implementation;
- f) FECO has prepared a Procurement Management Manual (PMM, as part of the PIM), which has been reviewed by the Bank and finalized at appraisal, including Bank’s requirements for selection of consultants and procurement of goods, non-consulting services and works. The PMM also includes sections on ethics, eligibility, conflict of interest and unfair competitive advantage.

22. Procurement for the Project will be carried out in accordance with World Bank’s “Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants” dated January 2011 (revised July 2014); “Guidelines: Selection and Employment of Consultants Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers” dated January 2011 (revised July 2014), and the provisions stipulated in the Grant Agreement.

23. **Procurement Plan.** FECO has developed an acceptable Procurement Plan for the initial 18 months of project implementation. It is available from FECO, and will also be available in the Project’s database and on the Bank’s external website during project implementation. The Procurement Plan will be updated, reviewed and agreed with the Bank annually, or as required, to reflect project implementation needs.

24. **Procurement and Selection Methods and Prior Review Thresholds.** The table below indicates the procurement and selection methods and prior review thresholds for goods, non-consulting services, works, and consulting services to be procured by FECO and the PMUs under the project.

Expenditure Category	Contract Value (US\$)	Procurement Method	Bank Prior Review
Goods/IT Systems and Non-Consulting Services	≥ 10 million	ICB	All ICB contracts
	>=500,000 - << 10 million	NCB Remarks: Where goods are not normally available from within China, the method of procurement will be ICB even if the contract value is less than US\$10 million.	First NCB goods contract by each PMO irrespective of value and all contracts >= USD 3 million
	< 500,000	Shopping	None
	N/A	DC	All DC contracts
Works/ Supply & Installation	≥ 40 million	ICB	All ICB contracts
	>=500,000 - < 40 million	NCB	First NCB works contracts by each PMO irrespective of value and all contracts ≥ US\$15 million.

Expenditure Category	Contract Value (US\$)	Procurement Method	Bank Prior Review
	< 500,000	Shopping	None
	N/A	DC	All DC contracts
Consultants	≥ 300,000	QCBS, QBS, LCS, FBS	Firms: First contract for each selection method and all contracts ≥ US\$1 million; Firms: All SSS contracts ≥ USD 100,000; Individual Consultant: Only in Exceptional Cases; SSS for individual consultant: ≥ US\$50,000
	< 300,000	QCBS, QBS, LCS, FBS, CQS	
	N/A	SSS	
	N/A	IC	

Notes: ICB: International Competitive Bidding
NCB: National Competitive Bidding
DC: Direct Contracting
QCBS: Quality- and Cost-Based Selection
QBS: Quality-Based Selection
LCS: Least Cost Selection
FBS: Fixed Budget Selection
CQS: Selection Based on the Consultants' Qualifications
SSS: Single Source Selection
IC: Individual Consultant selection procedure
NA: Not Applicable

25. **Post Review.** In addition to the prior review of supervision to be carried out by the Bank's Beijing office, Bank procurement supervision missions/external auditors will conduct field visits for post review of procurement actions every 12 months. The post review sampling ratio will be at least one out of fifteen contracts. This ratio will be adjusted periodically during project implementation based on performance of the PMUs and FECO.

26. **Advance Contracting and Retroactive Financing.** Retroactive financing will be permitted for the project within the limits specified in the Grant Agreement. It has been agreed that retroactive financing of up to US\$ 3,000,000 (20 percent of the total grant amount) would be available for eligible expenditures incurred on and after January 1, 2015. The procurement plan sets forth those contracts which are expected to be signed in advance of grant signing together with the relevant Bank review procedures. Only payments made under such contracts procured in accordance with the applicable Bank procurement/consultant selection procedures will be eligible for reimbursement by the Bank.

Environmental and Social (including safeguards)

27. Based on the available information collected during project preparation, it is expected that cleanup of either one of the selected eight candidate sites (including the first site) will not: cause change or degradation of any natural habitat and forests; or require the construction of a new flood control dam; or rely on any existing flood control dam or any dam under construction; or involve procurement or use of pesticides. However, the cleanup is expected to have environmental impacts and social impacts on workers and local community/residents using or living near the contaminated sites. It is unlikely to have presence of ethnic minority people who conform to the Bank Indigenous People term definition in the project cleanup sites, but the presence of minority people in or surrounding the sites (except for the first site) can only be determined through detailed remedial investigation during project implementation after the project sites are confirmed. And during site remediation, contaminated soils will be excavated for either in-situ or ex-situ treatment. Physical Cultural Resources might be found during

excavation. Therefore, the Bank's safeguard policies: OP/BP 4.01 Environmental Assessment, 4.11 Physical Cultural Resources, 4.10 Indigenous People and 4.12 Involuntary Resettlement, are considered triggered. The site-specific environmental and social assessment will identify, assess, and mitigate these issues by the site investigation, risk assessment, remediation plans, and ESMPs following the ESMF.

28. **Environment Safeguards.** The project itself is an environmental remediation and risk reduction effort, which aims at supporting the Chinese government's efforts to improve its capacity for managing contaminated sites, and pilot identification and cleanup of sites contaminated with POPs and/or other hazardous chemicals, and thus has significant positive environmental and social benefits through eliminating POPs pollution sources at demonstration sites and enhancing environmental quality of the project area.

29. The environmental and social safeguards issues are mainly related to the site cleanup demonstration activities under the Component 2, including: potential environmental and health risks involved in contaminated site excavation, building demolition, contaminated waste packaging/ transportation/storage; possible land acquisition and resettlement of local residents; social disturbance of site enclosure, excavation and traffic; nuisance of noise and dust; potential environmental impacts of ex-situ contamination remediation at new locations and final disposal of remediated soils. These impacts, though likely to be site-specific, could be significant to the environment and community health if not well-managed. Therefore, the project is classified as Category A as per *OP4.01 Environmental Assessment*.

30. As a contaminated site cleanup project, managing and addressing these issues is an integral part of the site remediation process. To address the potential environmental and social impacts associated with site remediation, an ESMF has been prepared, which specifies procedures for environmental and social safeguards documents preparation as per requirement of World Bank safeguards policies and national laws/regulations.

31. For effective implementation, the first demonstration site has been identified and prepared for implementation once the project is approved. It is a used pesticide storage house in Ganshui Town of Qijiang District of Chongqing City. The warehouse was built in 1961, and used to store various pesticides, including HCHs, DDTs, Methamidophos, Dimethoate, and Asomate. The sensitive receptors near the site include residential houses, one school and three office buildings (with distance of 30-360m). There is a couple living on the site as doorkeeper of the empty warehouse. Preliminary and detailed site samplings have been conducted and contamination of arsenic and α and β -HCHs are confirmed and scoped. The recommended remediation targets of arsenic, α -HCH and β -HCH at Ganshui site are 20 mg/kg, 0.2 mg/kg and 0.22 mg/kg, respectively. The total contaminated soil to be remediated within the boundary of the warehouse covers an area of ca. 250m² and maximum depth of 1.5m (total volume of ca. 150 m³). There is no indication of groundwater contamination according to site sampling. It is concluded that the soil contamination is limited within a certain area of the warehouse, with not very significant contamination. Remediation of such a small site with small amount of contaminated soil is likely to have site specific but readily manageable impacts.

32. To address the safeguards issues of the first demonstration site, a site-specific Environmental Assessment has been prepared, covering the preliminary investigation, detailed

site investigation, site characterization and risk assessment, soil excavation/transportation/storage plan, alternative technologies demonstration plan, public consultation and Environmental and Social Management Plan. Through comprehensive analysis of alternative remediation technologies, a final remediation plan has been developed, i.e. anaerobic biodegradation and phytoremediation as the Plan I, and cement-kiln incineration as the Plan II. The potential environmental and health risks involved in site remediation process will include contaminated site excavation, building demolition, contaminated waste packaging/ transportation/storage; temporary relocation of one family on the site; social disturbance of site enclosure, excavation and traffic; nuisance of noise and dust; potential environmental impacts of ex-situ contamination remediation at the new location under Plan I and final disposal of remediated soils under Plan II. These impacts are covered by the EA report which developed adequate measures to address the envisaged impacts. The EA report was prepared by independent environmental institutes under the guidance of Bank's task team, and found in compliance with Bank's safeguards policies and the World Bank Group's EHS guidelines. It is concluded that the Bank safeguard policy OP 4.10 Indigenous People is not triggered for this site.

33. For the Ganshui site, public consultations were conducted during the EA preparation in November 2012 and March/ July 2014. Over 80 people in the nearby communities were consulted during the process. All consulted public expressed broad support to timely implementation of the site remediation. Main concerns from the public are traffic disturbance and noise/dust impacts, for which due attention has been given in the ESMP. The full draft Ganshui EA report was disclosed in the website of Chongqing Environmental Protection Bureau on July 11, 2014 with announcement published in the Chongqing Evening Newspaper dated July 12, 2014. The final English version of the Ganshui Site EA was disclosed in the World Bank InfoShop on October 28, 2014.

34. Besides the first demonstration site, additional 7 candidate sites have been identified through a site selection study conducted during project preparation stage. Initial safeguards screening has been conducted for these sites following the ESMF procedures to confirm the World Bank safeguards policy applications. The detailed site investigation and remediation will be conducted during project implementation stage.

35. Activities under the project Component 1 are TA and capacity building activities. Environmental and social safeguard issues will be integrated into the TA activities as needed following the Bank's Interim Guidelines on the Application of Safeguard Policies to Technical Assistance (TA) Activities in Bank-Financed Projects and Trust Funds Administered by the Bank.

36. **Social Safeguard.** There will be positive social impacts of the project as it supports cleanup of several contaminated sites in various provinces in China and technical assistance in policies, technical guidelines, and capacity building on prevention and control of site contamination as a result of better environment for living and production as well as land use. The project is expected to have limited negative social impacts on local community and residents in terms of affecting people using or living near the contaminated sites based on available information of those candidate sites in the Site Selection Report. The first site is located in Ganshui of Chongqing. At the Ganshui site, one household with two Han people (not ethnic

minority), who used to be the door keeper of the site, living in a small house adjacent to the site will be temporarily affected during the site remediation period. An abbreviated resettlement action plan as part of the environmental and social assessment has been prepared for these two affected persons.

37. Besides the first demonstration site, a few additional sites are expected to be confirmed during implementation stage for remediation from a shortlist of candidate sites identified during project preparation stage. A resettlement policy framework has been incorporated in the ESMF for other sites. The ESMF specifies procedures for both environmental and social safeguards documents preparation as per requirement of World Bank safeguards policies and national laws/regulations.

38. FECO and the PMUs will report and monitor involuntary resettlement activities and ethnic minority people presence if any during project implementation and as necessary, actions will be taken. An external consultant will be contracted by FECO for independent monitoring and evaluation of implementation of the project RAP and/or Ethnic Minority Development Plan if needed in related project sites.

39. The EA draft, including the abbreviated resettlement action plan for the first demonstration site in Chongqing, was locally disclosed on July 11, 2014. The final ESMF including the resettlement policy framework was also disclosed through the InfoShop on October 15, 2014 and updated on December 23, 2014 (after project appraisal).

40. **Gender Aspects.** The project aims to support Chinese government's efforts to manage and remediate contaminated sites. Its Component 2 will clean up several demonstration sites that have been selected using a number of criteria, including their potential health risk on nearby residents. While quantifying health impacts arising from soil pollution is nearly impossible, scientific studies show that exposure to certain contaminants found in the soil leave serious health impacts on both men and women. However, exposure to certain contaminants is known to result in worse impacts in women's and children health. For example, arsenic (contaminant found in the pilot cleanup site in Ganshui site) can cause serious gastrointestinal tract, skin, heart, liver and neurological damage, diabetes, bone marrow and blood and cardiovascular disease. But it causes additional danger for pregnant women with increased risk of miscarriage, still-birth and premature birth. Likewise, children are particularly at risk from adverse effects of lead exposure, and studies carried out in Iraq (Greenwood, 1985) showed that children whose mothers ate bread made from grain treated with a fungicide containing mercury when they were pregnant were the worst affected. As part of the M&E system, the project will measure reduced number of people potentially exposed to pollution, including the number of female from project interventions under Component 2.

41. Social and gender equality has also been promoted through equal participation of men and women (34 men and 44 woman) on consultations of the Ganshui site cleanup sub-project and the EA report for the Qijiang Ganshui site. Consultation and agreement has been reached with the only household (both man and woman) living on the Qijiang Ganshui site for their temporary

resettlement to take place during remediation of the site. They have jointly signed the temporary resettlement agreement. The same approach will be applied to other sites for men's and women's equal participation in consultation and benefit from the project. Such approach to gender equality will also be applied to compensation of affected male and female people related to the project temporary or permanent land acquisition and resettlement during project implementation. Specific gender responsive measures will be documented in the environment and social assessment report for each site.

Monitoring & Evaluation

42. The progress toward to the PDO will be monitored by the project indicators in Annex 1. Evidence or data of these indicators will be collected by FECO and the two PMUs from project beneficiaries, stakeholders and contractors. Additional studies will be made if necessary in order to obtain effective data for justifying achievements of the PDO. FECO and the two PMUs will carry out regular supervision and inspection of project outcomes. Capacity building on project management will be provided to FECO and the two PMUs as needed. M&E cost are included in Component 1. A mid-term review is expected to be carried out in 2018.

43. **Reporting requirements.** Project reporting requirements are at two levels: (1) overall project level; and (2) site level. At the overall project level, FECO and the two PMUs will be responsible to provide the following reports to the Bank:

- (a) Annual Work Plans and Budgets. Annual Work Plans and Budgets will provide a complete overview of all activities of project components to be carried out within the next calendar year. It should include an estimated budget for each activity and expected disbursement for the related calendar year. The Annual Work Plans and Budgets will also provide an update on achievements and lessons learned from the previous year, including progress on project indicators and disbursements in the previous years. These Annual Work Plans and Budgets will be prepared in accordance with the format agreed among FECO, the two PMUs and the Bank and provided to the Bank by March 1 annually;
- (b) Semi-annual Interim Financial Reports. Semi-annual unaudited interim financial reports are to be submitted to the Bank half-yearly, not later than 60 days after the end of each semester. The semi-annual financial management reports will be prepared in accordance with the format agreed with the Bank;
- (c) Semi-annual Project Progress Reports. Semi-annual project progress reports, including progress on safeguard instruments implementation, will be prepared by FECO and submitted to the Bank by 28 February and 31 August of every calendar year. The semi-annual progress reports will be prepared in accordance with the format agreed with the Bank. As part of the progress reports, implementation progress on ESMPs will be prepared as well for Component 2 cleanup demonstrations.
- (d) Annual Financial Audit Report of the project account. Annual financial audit reports of the project account should be prepared by independent qualified financial auditors on a calendar year basis. The annual audit reports should be made available to the Bank by 1 July of every calendar year;
- (e) Project completion reports. FECO will prepare a completion report for the overall project. The Chongqing and Liaoning PMUs will prepare a completion report for their activities

respectively. All these completion reports are due to the Bank not later than three (3) months after the project closing date stipulated in the project Grant Agreement.

44. For reporting at the site level, FECO and the two PMUs will be responsible for providing a site cleanup completion report for each site to the World Bank. The report should include information on site, cleanup company, cleanup supervising company, cleanup technologies, contaminated land managed or dump sites closed (ha) (core sector indicator), POPs and POPs waste destroyed, disposed of or contained in an environmentally sound manner (tons) (core sector indicator), cleanup duration, cleanup verification, affected people, future land use, potential economic and social benefits after cleanup, and others as needed. Such a site completion report should be submitted to the Bank within three months after cleanup completion. PPT, Photos or Videos are recommended for recording the cleanup process and completion.

Role of Partners

45. USEPA and MEP has been collaborating since 2003 through a Memorandum of Understanding (MOU) between USEPA and MEP. This MOU includes six annexes, covering cooperation on air pollution, water pollution, chemical management, hazardous and solid waste, enforcement, and environmental law. Collaboration on design and implementation of systematic training activities and technical support for prevention and demonstration of cleanup of pilot sites under the GEF project have been included in the work plan for the area of hazardous and solid waste for 2014 and 2015 as Annex 4 to the MOU, and on development of the legal framework for addressing soil contamination under Annex 6 to the MOU. USEPA is committed to provide technical support to the project as needed where project activities overlap with activities listed in the work plans of the relevant Annexes, as availability of appropriate staff permits.

ANNEX 4: IMPLEMENTATION SUPPORT PLAN

Strategy and Approach for Implementation Support

1. The objective of the implementation support plan is to ensure: (a) the objectives of the project are satisfactorily achieved by project end; and (b) implementation of all project activities follows agreed procedures and complies with all fiduciary and safeguard requirements. The plan takes into consideration the nature of the project, and the identified project risks. As the overall implementation risk is rated substantial and individual risk categories are rated either low or moderate except for stakeholder, implementation agency capacity and environmental and social safeguards (which are rated substantial), the focus of Bank implementation support will be on stakeholder engagement, implementation agency capacity building, and social and environmental management.

Implementation Support Plan

2. **Stakeholder Engagement.** During preparation consultations were made to address the risk that the project will involve several national and local level government agencies, coordination among these agencies could be difficult and poor and responsibilities and roles could be hard to define in the cleanup process. Monitoring of this issue will continue during project implementation. The Bank team will help facilitate knowledge exchange and experience sharing events to bridge international good practices and national needs. Bank supervision will ensure that institutional arrangements agreed at appraisal are maintained and continue to function effectively. The project activities in Chongqing and Liaoning: *Development of Administrative Measures for Contaminated Sites* will further clarify and define agencies' roles and responsibilities for managing contaminate sites. Experience and lessons will be shared at the training workshops on site cleanup or the project completion workshop.

3. **PMU Capacity.** Chongqing and Liaoning PMUs have no Bank project experience. During project implementation, the Bank will continue to provide capacity building support to the two PMUs, focusing on project management, fiduciary control, and monitoring and inspection of project activities. The Bank will also review and supervise preparation and implementation of site cleanups and capacity building activities included in the project Component 1.

4. **Capacity of Cleanup Companies.** The project has included technical training for cleanup practitioners on the cleanup process and workshops on cost-effective remediation technologies. The Project will also finance environmental supervision consultants to supervise site remediation by contractors. The Bank will assist FECO and PMUs in making annual training plans, and preparing and delivering each training or capacity building activity at high quality.

5. **Environmental and Social Management.** The Bank team will help review the EA report for each site and provide training on environmental and social safeguard requirements.

The Bank will also regularly review the proper implementation of the Environmental and Social Management Framework and site-specific Environmental and Social Management Plans.

6. **Monitoring and Evaluation.** In addition to reviewing and verifying project progress reports provided by FECO and the PMUs, the Bank will carry out field visits to pilot sites during implementation support missions, conduct annual evaluation of project progress and intermediate results, and maintain an internal reporting system.

7. Tables below summarize the implementation support needed during the different stages of the project, and the resources needed.

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First 24 months	<ul style="list-style-type: none"> Preparation of other sites for remediation or containment control demonstrations Activities under Component 1 Project progress reporting Environmental and social safeguard FM and procurement 	Technical skills Bank policies	US\$ 250,000	USEPA is committed to collaborate on design and implementation of systematic training activities and technical support for prevention and demonstration of cleanup of pilot sites.
25-80 months	<ul style="list-style-type: none"> Site cleanups Activities under Component 1 FM and procurement Environmental and social safeguard Project progress reporting Project completion 	Technical skills Bank policies	US\$ 500,000	

Skills Mix Required (2015- 2021)

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Site cleanup technical experts	4	2	Annually
Bank Safeguard Policy	3	2	Annually
Bank FM Policy	2	1	Annually
Bank Procurement Policy	2	1	Annually
Logistics Management at HQ and China office	2		As needed

Partners

Name	Institution/Country	Role
USEPA	Region 9, Superfund; Office of General Counsel – International Law Group	Technical support and knowledge transfer

ANNEX 5: PROJECT MAP

COUNTRY: CHINA

Project Name: Contaminated Site Management Project (P145533)

